On the Rogers-Ramanujan identities and continued fractions: new possible mathematical developments and mathematical connections with the mass value of candidate "glueball" $f_0(1710)$ meson, other particles and the Black Hole entropies.

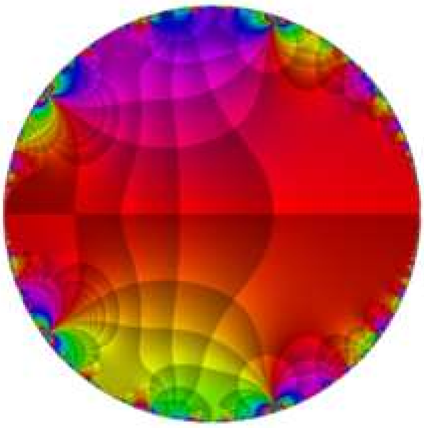
Michele Nardelli[1], Antonio Nardelli

Abstract

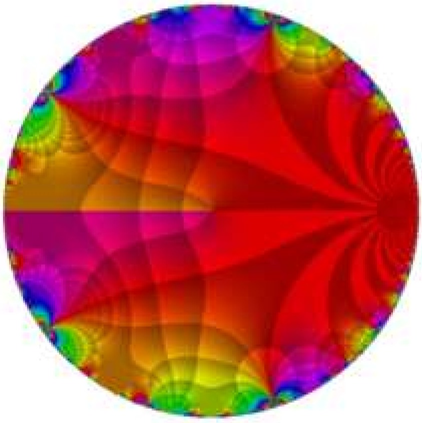
In the present research thesis, we have obtained various and interesting new possible mathematical results concerning the Rogers-Ramanujan identities and some continued fractions. Furthermore, we have described new possible mathematical connections with the mass value of candidate "glueball" $f_0(1710)$ meson, other particles and with the Black Hole entropies.

[1] M.Nardelli have studied by Dipartimento di Scienze della Terra Università degli Studi di Napoli Federico II, Largo S. Marcellino, 10 - 80138 Napoli, Dipartimento di Matematica ed Applicazioni "R. Caccioppoli" - Università degli Studi di Napoli "Federico II" – Polo delle Scienze e delle Tecnologie Monte S. Angelo, Via Cintia (Fuorigrotta), 80126 Napoli, Italy

From Wikipedia



Domain coloring representation of the convergent $A_{400}(q)/B_{400}(q)$ of the function $q^{-1/5}R(q)$, where $R(q)$ is the Rogers–Ramanujan continued fraction.



Representation of the approximation $q^{1/5}A_{400}(q)/B_{400}(q)$ of the Rogers–Ramanujan continued fraction.

Rogers-Ramanujan type modular units

http://www.maths.dur.ac.uk/lms/103/talks/0710ono0.pdf

Now, we have:

These sums can be written as infinite products. These are the famous Rogers-Ramanujan identities

Rogers-Ramanujan Identities

$$\sum_{k=0}^{\infty} \frac{q^{k^2}}{(q;q)_k} = \prod_{m=0}^{\infty} \frac{1}{(1-q^{5m+1})(1-q^{5m+4})};$$

$$\sum_{k=0}^{\infty} \frac{q^{k^2+k}}{(q;q)_k} = \prod_{m=0}^{\infty} \frac{1}{(1-q^{5m+2})(1-q^{5m+3})}$$

or (from Wikipedia):

$$G(q) = \sum_{n=0}^{\infty} \frac{q^{n^2}}{(q;q)_n} = \frac{1}{(q;q^5)_\infty (q^4;q^5)_\infty} = 1 + q + q^2 + q^3 + 2q^4 + 2q^5 + 3q^6 + \cdots$$

$$H(q) = \sum_{n=0}^{\infty} \frac{q^{n^2+n}}{(q;q)_n} = \frac{1}{(q^2;q^5)_\infty (q^3;q^5)_\infty} = 1 + q^2 + q^3 + q^4 + q^5 + 2q^6 + \cdots$$

From:

A FRAMEWORK OF ROGERS–RAMANUJAN IDENTITIES AND THEIR ARITHMETIC PROPERTIES
MICHAEL J. GRIFFIN, KEN ONO, AND S. OLE WARNAAR
https://arxiv.org/abs/1401.7718v4

The Rogers–Ramanujan (RR) identities [69]

$$(1.1) \qquad G(q) := \sum_{n=0}^{\infty} \frac{q^{n^2}}{(1-q)\cdots(1-q^n)} = \prod_{n=0}^{\infty} \frac{1}{(1-q^{5n+1})(1-q^{5n+4})}$$

and

$$(1.2) \qquad H(q) := \sum_{n=0}^{\infty} \frac{q^{n^2+n}}{(1-q)\cdots(1-q^n)} = \prod_{n=0}^{\infty} \frac{1}{(1-q^{5n+2})(1-q^{5n+3})}$$

play many roles in mathematics and physics. They are essentially modular functions, and their ratio $H(q)/G(q)$ is the famous Rogers–Ramanujan q-continued fraction

$$(1.3) \qquad \frac{H(q)}{G(q)} = \cfrac{1}{1+\cfrac{q}{1+\cfrac{q^2}{1+\cfrac{q^3}{\ddots}}}}.$$

The *golden ratio* ϕ satisfies $H(1)/G(1) = 1/\phi = (-1+\sqrt{5})/2$. Ramanujan computed further values such as[1]

$$(1.4) \qquad e^{-\frac{2\pi}{5}} \cdot \frac{H(e^{-2\pi})}{G(e^{-2\pi})} = \sqrt{\frac{5+\sqrt{5}}{2}} - \frac{\sqrt{5}+1}{2}.$$

The minimal polynomial of this value is

$$x^4 + 2x^3 - 6x^2 - 2x + 1,$$

which shows that it is an algebraic integral unit. All of Ramanujan's evaluations are such units.

Remark. The individual values of $q^{-1/60}G(q)$ and $q^{11/60}H(q)$ generically are not algebraic integers. For example, in (1.4) we have $\tau = i$, and the numerator and denominator

$$q^{-\frac{1}{60}}G(q) = \sqrt[4]{\frac{1+3\sqrt{5}+2\sqrt{10+2\sqrt{5}}}{10}} \quad \text{and} \quad q^{\frac{11}{60}}H(q) = \sqrt[4]{\frac{1+3\sqrt{5}-2\sqrt{10+2\sqrt{5}}}{10}}$$

share the minimal polynomial $625x^{16} - 250x^{12} - 1025x^8 - 90x^4 + 1$.

And from:

Rogers -Ramanujan Identities with Golden Ratio

Dr. Vandana N. Purav

P. D. Karkhanis College of Arts and Commerce, Ambarnath

$\sum q^{n2+n} / (q)_n = 1 / [(q^2 ; q^5)_\infty \cdot (q^3 ; q^5)\infty]$ for $n \geq 0$, **Rogers- Ramanujan Identity of Second Kind which can be written as,**

$$1 + \frac{q^2}{(1-q)} + \frac{q^6}{(1-q)(1-q^2)} + \frac{q^{11}}{(1-q)(1-q^2)!1-q^3)} + \frac{q^{18}}{(1-q)(1-q^2)(1-q^3)(1-q^4)} + \ldots\ldots\ldots$$

$$= \frac{1}{(1-q^2)} \frac{1}{(1-q^7)(1-q^{12})(1-q^{17})} \ldots \ldots \times \frac{1}{(1-q^2)(1-q^{13})(1-q^{18})\ldots\ldots} \qquad \ldots\ldots\ldots\text{(ii)}$$

These identities are equivalent forms of

i) The number of partitions of n into parts, any two of which are differ by at least 2, equals the number of partitions of n into parts congruent to $\pm$ mod 5.

ii) The number of partitions of n into parts > 1, any two of which differ by at least 2, equals the number of partitions of n into parts congruent to $\pm$ mod 5.

Partition identities are related to representation theory, modular forms, statistical mechanics, etc.

Theses identities can be written as follows.

$$\mathbf{G(q)} = \sum_{n=0}^{\infty} \frac{q^{n^2}}{(1-q)(1-q^2)(1-q^3)\ldots\ldots(1-q^n)} = \prod_{n=0}^{\infty} \frac{1}{(1-q^{5n+1})(1-q^{5n+4})}$$

$$\mathbf{H(q)} = \sum_{n=0}^{\infty} \frac{q^{n^2+n}}{(1-q)(1-q^2)(1-q^3)\ldots\ldots(1-q^n)} = \prod_{n=0}^{\infty} \frac{1}{(1-q^{5n+3})(1-q^{5n+3})}$$

Remark 1: Roger's -Ramanujan identities are Mock Theta Functions of order 5.

Consider $\frac{H(q)}{G(q)} = \cfrac{1}{1+\cfrac{q}{1+\cfrac{q^2}{1+\cfrac{q^3}{1+\cfrac{q^4}{1+\cdots}}}}}$

If we put q=1, we get $\frac{H(1)}{G(1)} = \cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cdots}}}}}$

For q=1, we get R (1) = $\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cdots}}}}}$ which is the Golden ratio $\beta = \frac{1+\sqrt{5}}{2}$ and $\alpha = \frac{1-\sqrt{5}}{2}$

Indeed, we have that R(1) is equal to:

1/((1+1/((1+1/((1+1/((1+1/((1+1/((1+1/((1+1/((1+1/((1+1/((1+1/((1+1/((1+1/((1+1/((
1+1/((1+1/((1+1/((1+1

Input:

$$\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+1}}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Exact result:

- Step-by-step solution

$$\frac{2584}{4181}$$

Decimal approximation:

- More digits

0.6180339631667065295383879454675914852906003348481224587 41...

0.618033963166706529538387945467591485290600334848122458741

Continued fraction:

- Linear form

$$\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{\cdots}}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

- More

$$\frac{25\,840\,\mathcal{W}_{\text{Wad}}}{12\,543} \approx$$

0.61803396316670652953838794546759148529060033484812245874192776

$\frac{2584}{4181} \approx$
0.61803396316670652953838794546759148529060033484812245874192776

$\frac{2(-46 - 419 e + 390 e^2)}{3(86 + 465 e + 65 e^2)} \approx 0.6180339631667065295556128$

- $\mathcal{W}_{\text{Wad}}$ is the Wadsworth constant

We note that the result 0.618033963166706529.... is practically equal to the golden ratio conjugate, that is equal to:

(sqrt(5)-1))/2

Input:
$\frac{1}{2}\left(\sqrt{5} - 1\right)$
Open code

Enlarge Data Customize A Plaintext Interactive
Decimal approximation:
- More digits
0.6180339887498948482045868343656381177203091798057628621354...
Open code

Alternate form:
- Step-by-step solution
$\frac{\sqrt{5}}{2} - \frac{1}{2}$
Open code

Minimal polynomial:
$x^2 + x - 1$

0.6180339887498948482045868343656381177203091798057628621354

Continued fraction:
- Linear form

$$\cfrac{1}{1+\cfrac{1}{\cdots}}}}}}}}}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

- More

$\frac{1}{2}\left(\sqrt{5}-1\right) \approx$

0.61803398874989484820458683436563811772030917980576286213544862

$\Phi \approx$ 0.61803398874989484820458683436563811772030917980576286213544862

π root of $179x^3 + 16600x^2 + 19551x - 4490$ near $x = 0.196726$ $\approx$

0.61803398874989484810700

Note that:

1 / (((((((1/((1+1/((1+1/((1+1/((1+1/((1+1/((1+1/((1+1/((1+1/((1+1/((1+1/((1+1/((1+1/((1+1/((1+1/((1+1)))))))

Input:

$$\cfrac{1}{\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+1}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Exact result:

- Step-by-step solution

$$\frac{1597}{987}$$

Decimal approximation:

- More digits

1.618034447821681864235055724417426545086119554204660587639...

1.618034447821681864235055724417426545086119554204660587639

Continued fraction:

- Linear form

$$1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{\cdots}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

- More

$$\frac{15\,970\,W_{\text{Wad}}}{2961} \approx$$

1.61803444782168186423505572441742654508611955420466058763931104

$$\frac{1597}{987} \approx$$

1.61803444782168186423505572441742654508611955420466058763931104

$$\frac{(8+7e)(11+28e)}{5(-45-102e+83e^2)} \approx 1.6180344478216818649950$$

- $\mathcal{W}_{\text{Wad}}$ is the Wadsworth constant

This result 1.61803444782168l8.... is practically a very good approximation to the golden ratio, that is equal to:

(sqrt(5)+1))/2

Input:

$$\frac{1}{2}\left(\sqrt{5}+1\right)$$

Open code

Decimal approximation:

- More digits

1.6180339887498948482045868343656381177203091798057628621354...

Open code

Enlarge Data Customize A Plaintext Interactive

Alternate form:

- Step-by-step solution

$$\frac{1}{2}+\frac{\sqrt{5}}{2}$$

Open code

Minimal polynomial:

$$x^2-x-1$$

1.6180339887498948482045868343656381177203091798057628621354

Continued fraction:

- Linear form

$$1+\cfrac{1}{\ldots}}}}}}}}}}}}}}}}}}}}}}}$$

Open code

Possible closed forms:

- More

$\phi \approx 1.6180339887498948482045868343656381177203091798057628621354486 2$

$\Phi + 1 \approx$
1.61803398874989484820458683436563811772030917980576286213544862

$\frac{1}{\Phi} \approx 1.61803398874989484820458683436563811772030917980576286213544862$

- ϕ is the golden ratio
- Φ is the golden ratio conjugate

Thence, from the Roger-Ramanujan's identity, for q = 1 and H(1)/G(1), we obtain R(1):

0.6180339631667065295383879454675914852906003348481224587 41

and the inverse:

1.6180344478216818642350557244174265450861195542046605876 39

that are a very good approximation to the golden ratio conjugate

0.6180339887498948482045868343656381177203091798057628621 35

and to the golden ratio

1.6180339887498948482045868343656381177203091798057628621 35.

Indeed:

0.6180339631667 ≈ 0.6180339887498

1.6180344478216 ≈ 1.6180339887498

Now, we have:

$$q^{-\frac{1}{60}} G(q) - \sqrt[4]{\frac{1+3\sqrt{5}+2\sqrt{10+2\sqrt{5}}}{10}} \quad \text{and} \quad q^{\frac{11}{60}} H(q) - \sqrt[4]{\frac{1+3\sqrt{5}-2\sqrt{10+2\sqrt{5}}}{10}}$$

Thence:

(((((((1+3sqrt(5)+2sqrt((10+2sqrt(5))))/10))))^1/4

Input:

$$\sqrt[4]{\frac{1}{10}\left(1+3\sqrt{5}+2\sqrt{10+2\sqrt{5}}\right)}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Decimal approximation:

- More digits

1.112476869863910982375310319586813840037509772965552688549...

Open code

Alternate forms:

- Step-by-step solution

$$\frac{1}{10}\sqrt[4]{2\sqrt{2\left(5+\sqrt{5}\right)}+3\sqrt{5}+1}\ 10^{3/4}$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$\sqrt[4]{\frac{1}{10}+\frac{3}{2\sqrt{5}}+\sqrt{\frac{2}{5}\left(1+\frac{1}{\sqrt{5}}\right)}}$$

Open code

$$\sqrt[4]{\frac{1}{10}\left(1+3\sqrt{5}+2\sqrt{2\left(5+\sqrt{5}\right)}\right)}$$

Minimal polynomial:

$$625x^{16}-250x^{12}-1025x^8-90x^4+1$$

(((((((1+3sqrt(5)-2sqrt((10+2sqrt(5))))/10))))^1/4

Input:

$$\sqrt[4]{\frac{1}{10}\left(1+3\sqrt{5}-2\sqrt{10+2\sqrt{5}}\right)}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Decimal approximation:

- More digits

0.316031365485514612591064667797315712921820358921551729287...

Alternate forms:

- Step-by-step solution

$$\frac{1}{10}\sqrt[4]{-2\sqrt{2\left(5+\sqrt{5}\right)}+3\sqrt{5}+1}\;10^{3/4}$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$\sqrt[4]{\frac{1}{10}\left(1+3\sqrt{5}-2\sqrt{2\left(5+\sqrt{5}\right)}\right)}$$

Open code

Minimal polynomial:

$$625x^{16}-250x^{12}-1025x^{8}-90x^{4}+1$$

((((((((((((1+3sqrt(5)+2sqrt((10+2sqrt(5))))/10))))^1/4 - (((((((1+3sqrt(5)-2sqrt((10+2sqrt(5))))/10))))^1/4))))^2

Input:

$$\left(\sqrt[4]{\frac{1}{10}\left(1+3\sqrt{5}+2\sqrt{10+2\sqrt{5}}\right)}-\sqrt[4]{\frac{1}{10}\left(1+3\sqrt{5}-2\sqrt{10+2\sqrt{5}}\right)}\right)^2$$

Open code

Enlarge Data Customize A Plaintext Interactive

Decimal approximation:

- More digits

0.634325441444558191032351611464486251212832772967967425712...

1/10 / (((((0.5 * ((((((((((((1+3sqrt(5)+2sqrt((10+2sqrt(5))))/10))))^1/4 * (((((((1+3sqrt(5)-2sqrt((10+2sqrt(5))))/10))))^1/4))))^2))))

Input:

$$\frac{\frac{1}{10}}{0.5\left(\sqrt[4]{\frac{1}{10}\left(1+3\sqrt{5}+2\sqrt{10+2\sqrt{5}}\right)}\sqrt[4]{\frac{1}{10}\left(1+3\sqrt{5}-2\sqrt{10+2\sqrt{5}}\right)}\right)^2}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- Fewer digits
- More digits

1.618033988749894848204586834365638117720309179805762862135...

1.6180339887498948482045868343656381177203091798057628

Continued fraction:

- Linear form

$$1+\cfrac{1}{\cdots}}}}}}}}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

- More

$\phi \approx 1.618033988749894848204586834365638117720309179805762862135$

$\Phi + 1 \approx 1.618033988749894848204586834365638117720309179805762862135$

$\frac{1}{\Phi} \approx 1.618033988749894848204586834365638117720309179805762862135$

This result 1.6180339887498948482... is equal to the value of golden ratio! Note that the Roger's-Ramanujan identities are Mock Theta Functions of order 5, therefore also this type of functions (the mock theta functions) are certainly connected to the golden ratio.

With regard the following mock theta function of 5^{th} order, we have:

$$\Psi_0(q) = -1 + \sum_{n\geq 0} \frac{q^{5n^2}}{(1-q)(1-q^4)(1-q^6)(1-q^9)\ldots(1-q^{5n+1})}$$

From OEIS:

-1 + Sum_{k>=0} q^(5k^2)/((1-q)(1-q^4)(1-q^6)(1-q^9)...(1-q^(5k+1))).

Thence:

-1 + q^(5k^2)/((1-q)(1-q^4)(1-q^6)(1-q^9)(1-q^(5k+1)))

Input:

$$-1+\frac{q^{5k^2}}{(1-q)(1-q^4)(1-q^6)(1-q^9)(1-q^{5k+1})}$$

Alternate forms:

$$-\frac{q^{5k^2}}{(q-1)(q^4-1)(q^6-1)(q^9-1)(q^{5k+1}-1)}-1$$

Enlarge Data Customize A Plaintext Interactive

$$-\Big(\big(q^{5k^2}+q^{5k+1}-q^{5k+2}-q^{5k+5}+q^{5k+6}-q^{5k+7}+q^{5k+8}-q^{5k+10}+2q^{5k+11}-q^{5k+12}+ q^{5k+14}-q^{5k+15}+q^{5k+16}-q^{5k+17}-q^{5k+20}+q^{5k+21}-q^{20}+q^{19}+ q^{16}-q^{15}+q^{14}-q^{13}+q^{11}-2q^{10}+q^9-q^7+q^6-q^5+q^4+q-1\big)\Big/ \big((q-1)^4(q+1)^2(q^2+1)(q^2-q+1)(q^2+q+1)^2(q^6+q^3+1)(q^{5k+1}-1)\big)\Big)$$

Open code

Series expansion at q = 0:

$$\frac{q^{5k^2}\left(1+q+q^2+q^3+2q^4+2q^5+O(q^6)\right)}{1-q^{5k+1}}-1$$

Open code

- Big-O notation

Enlarge Data Customize A Plaintext Interactive

Series expansion at q = ∞:

$$\frac{q^{5k^2}\left(\left(\frac{1}{q}\right)^{20}+\left(\frac{1}{q}\right)^{21}+\left(\frac{1}{q}\right)^{22}+\left(\frac{1}{q}\right)^{23}+\frac{2}{q^{24}}+\frac{2}{q^{25}}+O\left(\left(\frac{1}{q}\right)^{26}\right)\right)}{1-q^{5k+1}}-1$$

Open code

- Big-O notation

Derivative:

- Step-by-step solution

$$\frac{\partial}{\partial q}\left(-1+\frac{q^{5k^2}}{(1-q)(1-q^4)(1-q^6)(1-q^9)(1-q^{5k+1})}\right)=$$

$$\Big(q^{5k^2-1}\big(-5k^2(q^{14}+q^{12}+q^{11}+q^9-q^5-q^3-q^2-1)(q^{5k+1}-1)+ 5k(q^{14}+q^{12}+q^{11}+q^9-q^5-q^3-q^2-1)q^{5k+1}+ q\,(q^{5k+1}+q^{5k+3}+7q^{5k+4}+2q^{5k+5}+14q^{5k+6}+8q^{5k+7}+14q^{5k+8}+ 24q^{5k+9}+23q^{5k+11}+22q^{5k+12}+q^{5k+13}+21q^{5k+14}- q^{5k}+7q^{5(k+2)}-20q^{13}-q^{12}-21q^{11}-22q^{10}-7q^9- 23q^8-14q^7-8q^6-14q^5-3q^4-7q^3-2q^2-q-1)\big)\Big)\Big/ \Big((q-1)^5(q+1)^3(q^2+1)^2(q^2+q+1)^3(q^6+q^3+1)^2(q^2+(1-q))^2 (1-q^{5k+1})^2\Big)$$

Open code

We have that for q = 0.98, k = 2

-1 + 0.98^(10^2)/((1-0.98)(1-0.98^4)(1-0.98^6)(1-0.98^9)(1-0.98^(10+1)))

Input:

$$-1+\frac{0.98^{10^2}}{(1-0.98)(1-0.98^4)(1-0.98^6)(1-0.98^9)(1-0.98^{10+1})}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

22584.3234399465737935308192449852045709954226654429412203...

Open code

We obtain:

(((((-1 + 0.98^(10^2)/((1-0.98)(1-0.98^4)(1-0.98^6)(1-0.98^9)(1-0.98^(10+1)))))))^1/21

Input:

$$\sqrt[21]{-1+\frac{0.98^{10^2}}{(1-0.98)(1-0.98^4)(1-0.98^6)(1-0.98^9)(1-0.98^{10+1})}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- Fewer digits
- More digits

1.611848230873833803918983511010551817684839706758820468777...

Now, from 23.6954 (that is a black hole entropy) 1.55425 (that is the mean between two Hausdorff dimensions (1.5236 and 1.5849) and 1.3057 that is also a Hausdorff dimension, we obtain:

23.6954 – 1.3057 – 1.55425 = 20.83545 ≈ 20.83

Thence:

(((((-1 + 0.98^(10^2)/((1-0.98)(1-0.98^4)(1-0.98^6)(1-0.98^9)(1-0.98^(10+1)))))))^1/20.83

Input:

$$\sqrt[20.83]{-1+\frac{0.98^{10^2}}{(1-0.98)(1-0.98^4)(1-0.98^6)(1-0.98^9)(1-0.98^{10+1})}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- Fewer digits
- More digits

1.618140331603798300468652941105301984078270493668650839783...

1.6181403316037983004686529411053019840782704936686508

Continued fraction:

- Linear form

$$1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{7+\cfrac{1}{2+\cfrac{1}{1+\cfrac{1}{5+\cfrac{1}{1+\cfrac{1}{16+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{6+\cfrac{1}{1+\cfrac{1}{3+\cfrac{1}{16+\cfrac{1}{\ldots}}}}}}}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

- More

$\frac{1}{12}\sqrt{-6118+1746e+376\pi+819\log(2)} \approx 1.61814033160379830095207$

π root of $879x^4+440x^3-61x^2+7312x-3872$ near $x=0.51507$ $\approx$ 1.6181403316037983004674747

π root of $85461x^3-21407x^2-945x-5512$ near $x=0.51507$ $\approx$ 1.618140331603798300459449

This result 1.6181403316037983.... is a very good approximation to the value of golden ratio, that is: 1.6180339887498948482..... Indeed:

1.61814033... ≈ 1.61803398

Now, we return to the Roger's-Ramanujan identities:

(from Wikipedia)

$$G(q) = \sum_{n=0}^{\infty} \frac{q^{n^2}}{(q;q)_n} = \frac{1}{(q;q^5)_\infty (q^4;q^5)_\infty} = 1 + q + q^2 + q^3 + 2q^4 + 2q^5 + 3q^6 + \cdots$$

$$H(q) = \sum_{n=0}^{\infty} \frac{q^{n^2+n}}{(q;q)_n} = \frac{1}{(q^2;q^5)_\infty (q^3;q^5)_\infty} = 1 + q^2 + q^3 + q^4 + q^5 + 2q^6 + \cdots$$

From OEIS, we have for G(q):

1 + Sum_{n >= 1} t^(n^2)/((1-t)*(1-t^2)*...*(1-t^n)) = Product_{n >= 1} 1/((1-t^(5*n-1))*(1-t^(5*n-4))).

G(q) = 1 + t^(n^2)/((1-t)*(1-t^2)*(1-t^n))

Input:

$$1 + \frac{t^{n^2}}{(1-t)(1-t^2)(1-t^n)}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Values:

n	
1	$\frac{t}{(1-t)^2(1-t^2)} + 1$
2	$\frac{t^4}{(1-t)(1-t^2)^2} + 1$
3	$\frac{t^9}{(1-t)(1-t^2)(1-t^3)} + 1$

Alternate forms:

$$1 - \frac{t^{n^2}}{(t-1)^2(t+1)(t^n-1)}$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$1-\frac{t^{n^2}}{(t-1)(t^2-1)(t^n-1)}$$

$$-\frac{t^{n^2}+t^{n+1}+t^{n+2}-t^{n+3}-t^n+t^3-t^2-t+1}{(t-1)^2(t+1)(t^n-1)}$$

Open code

Property as a real function:
Domain:

$$\{t\in\mathbb{R}: (t^n\neq 1 \text{ and } t>1) \text{ or } (t^n\neq 1 \text{ and } n\geq 1 \text{ and } -1<t<1 \text{ and } n^2\in\mathbb{Z} \text{ and } n\in\mathbb{Z}) \text{ or } (t^n\neq 1 \text{ and } -1<t<0 \text{ and } n^2\in\mathbb{Z} \text{ and } n\in\mathbb{Z}) \text{ or } (t^n\neq 1 \text{ and } t+1<0 \text{ and } n^2\in\mathbb{Z} \text{ and } n\in\mathbb{Z}) \text{ or } (t^n\neq 1 \text{ and } n\geq 1 \text{ and } t=0 \text{ and } n\in\mathbb{Z}) \text{ or } (t^n\neq 1 \text{ and } t<1 \text{ and } t>0) \text{ or } (t^n\neq 1 \text{ and } t<1 \text{ and } n>0 \text{ and } t\geq 0)\}$$

Open code

Series expansion at t = 0:

$$\frac{t^{n^2}\left(1+t+2t^2+2t^3+3t^4+3t^5+O(t^6)\right)}{1-t^n}+1$$

Open code

- Big-O notation

Enlarge Data Customize A Plaintext Interactive

Series expansion at t = ∞:

$$\frac{t^{n^2}\left(\left(\frac{1}{t}\right)^3+\left(\frac{1}{t}\right)^4+\frac{2}{t^5}+\frac{2}{t^6}+\frac{3}{t^7}+\frac{3}{t^8}+\frac{4}{t^9}+\frac{4}{t^{10}}+\frac{5}{t^{11}}+\frac{5}{t^{12}}+\frac{6}{t^{13}}+O\left(\left(\frac{1}{t}\right)^{14}\right)\right)-t^n+1}{1-t^n}$$

Open code

- Big-O notation

Derivative:

- Step-by-step solution

$$\frac{\partial}{\partial t}\left(1+\frac{t^{n^2}}{(1-t)(1-t^2)(1-t^n)}\right)=$$

$$\frac{t^{n^2-1}\left(-n^2(t^2-1)(t^n-1)+(3t+1)t(t^n-1)+n(t^2-1)t^n\right)}{(t-1)^3(t+1)^2(1-t^n)^2}$$

Now, for t = 0.9978917 and n = 55, we obtain:

1 + 0.9978917^(55^2)/((1-0.9978917)*(1-0.9978917^2)*(1-0.9978917^55))

Input interpretation:

$$1+\frac{0.9978917^{55^2}}{(1-0.9978917)(1-0.9978917^2)(1-0.9978917^{55})}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

1735.158328151581043951093615216460105399699342581889168872...

1735.158328...

This result is very near to the mass of candidate glueball $f_0(1710)$ meson.

((((1 + 0.9978917^(55^2)/((1-0.9978917)*(1-0.9978917^2)*(1-0.9978917^55))))))^1/3

Input interpretation:

$$\sqrt[3]{1+\frac{0.9978917^{55^2}}{(1-0.9978917)(1-0.9978917^2)(1-0.9978917^{55})}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

12.01654737559639399595195044806666042468648811713371011805...

12.01654...

This result is very near to the value of black hole entropy 12,1904

2 * ((((1 + 0.9978917^(55^2)/((1-0.9978917)*(1-0.9978917^2)*(1-0.9978917^55))))))^1/3

Input interpretation:

$$2\sqrt[3]{1+\frac{0.9978917^{55^2}}{(1-0.9978917)(1-0.9978917^2)(1-0.9978917^{55})}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

24.03309475119278799190390089613332084937297623426742023610...

Open code

24.03309...

This value is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 24 "modes" corresponding to the physical vibrations of a bosonic string.

And:

((((1 + 0.9978917^(55^2)/((1-0.9978917)*(1-0.9978917^2)*(1-0.9978917^55))))))^1/15

Input interpretation:

$$\sqrt[15]{1+\frac{0.9978917^{55^2}}{(1-0.9978917)(1-0.9978917^2)(1-0.9978917^{55})}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

1.644204909325213451310488497154671623560577216654638287049...

Open code

$$1.6442049... \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 ...$$

Continued fraction:

- Linear form

$$1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{4+\cfrac{1}{3+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{3+\cfrac{1}{125+\cfrac{1}{1+\cfrac{1}{10+\cfrac{1}{3+\cfrac{1}{11+\cfrac{1}{2+\cfrac{1}{2+\cfrac{1}{3+\cfrac{1}{1+\cfrac{1}{7+\cfrac{1}{2+\cfrac{1}{4+\cfrac{1}{\ldots}}}}}}}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

- More

π root of $1580 x^5 + 846 x^4 - 40 x^3 - 472 x^2 + 150 x - 69$ near $x = 0.523367$ ≈

1.644204909325213451325566

root of $26832 x^3 + 9400 x^2 - 71861 x - 26525$ near $x = 1.6442$ ≈

1.6442049093252134513133195

root of $3420 x^4 - 1178 x^3 - 239 x^2 - 9830 x - 2950$ near $x = 1.6442$ ≈

1.64420490932521345131017081

Now:

$$H(q) = \sum_{n=0}^{\infty} \frac{q^{n^2+n}}{(q;q)_n} = \frac{1}{(q^2;q^5)_\infty (q^3;q^5)_\infty} = 1 + q^2 + q^3 + q^4 + q^5 + 2q^6 + \cdots$$

From OEIS, we have:

The g.f. is the special case D=2 of Sum_{n>=0} x^(D*n*(n+1)/2) / Product_{k=1..n} (1-x^k)

H(q) = x^(D*n*(n+1)/2) / (1-x^k)

Input:

$$\frac{x^{D n \times (n+1)/2}}{1 - x^k}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Alternate forms:

$$-\frac{x^{1/2 D n (n+1)}}{x^k - 1}$$

Open code

$$-\frac{x^{D(n^2/2+n/2)}}{x^k - 1}$$

Roots:

- More roots

$\text{Re}(D) < 0, \quad \text{Re}(k) > 0,$

$$\frac{1}{2}\left(-\frac{|\text{Re}(D)|}{\sqrt{\text{Im}(D)^2 + \text{Re}(D)^2}} - 1\right) < \text{Re}(n) < \frac{1}{2}\left(\frac{|\text{Re}(D)|}{\sqrt{\text{Im}(D)^2 + \text{Re}(D)^2}} - 1\right), \quad x = 0$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$\mathrm{Re}(D) > 0\,, \quad \mathrm{Re}(k) > 0\,, \quad \mathrm{Re}(n) > \frac{1}{2}\left(\frac{|\mathrm{Re}(D)|}{\sqrt{\mathrm{Im}(D)^2 + \mathrm{Re}(D)^2}} - 1\right),$$

$$\frac{1}{2\,\mathrm{Re}(D)}\Big(-\frac{1}{|\mathrm{Re}(D)|}\mathrm{Re}(D)\,\sqrt{(4\,\mathrm{Im}(D)^2\,\mathrm{Re}(n)^2 + 4\,\mathrm{Im}(D)^2\,\mathrm{Re}(n) + \mathrm{Im}(D)^2 + 4\,\mathrm{Re}(D)^2\,\mathrm{Re}(n)^2 + 4\,\mathrm{Re}(D)^2\,\mathrm{Re}(n))} - 2\,\mathrm{Im}(D)\,\mathrm{Re}(n) - \mathrm{Im}(D)\Big) <$$

$$\mathrm{Im}(n) < \frac{1}{2\,\mathrm{Re}(D)}\Big(\frac{1}{|\mathrm{Re}(D)|}\mathrm{Re}(D)\,\sqrt{(4\,\mathrm{Im}(D)^2\,\mathrm{Re}(n)^2 + 4\,\mathrm{Im}(D)^2\,\mathrm{Re}(n) + \mathrm{Im}(D)^2 + 4\,\mathrm{Re}(D)^2\,\mathrm{Re}(n)^2 + 4\,\mathrm{Re}(D)^2\,\mathrm{Re}(n))} - 2\,\mathrm{Im}(D)\,\mathrm{Re}(n) - \mathrm{Im}(D)\Big), \quad x = 0$$

$$\mathrm{Re}(D) > 0\,, \quad \mathrm{Re}(k) > 0\,, \quad \mathrm{Re}(n) < \frac{1}{2}\left(-\frac{|\mathrm{Re}(D)|}{\sqrt{\mathrm{Im}(D)^2 + \mathrm{Re}(D)^2}} - 1\right),$$

$$\frac{1}{2\,\mathrm{Re}(D)}\Big(-\frac{1}{|\mathrm{Re}(D)|}\mathrm{Re}(D)\,\sqrt{(4\,\mathrm{Im}(D)^2\,\mathrm{Re}(n)^2 + 4\,\mathrm{Im}(D)^2\,\mathrm{Re}(n) + \mathrm{Im}(D)^2 + 4\,\mathrm{Re}(D)^2\,\mathrm{Re}(n)^2 + 4\,\mathrm{Re}(D)^2\,\mathrm{Re}(n))} - 2\,\mathrm{Im}(D)\,\mathrm{Re}(n) - \mathrm{Im}(D)\Big) <$$

$$\mathrm{Im}(n) < \frac{1}{2\,\mathrm{Re}(D)}\Big(\frac{1}{|\mathrm{Re}(D)|}\mathrm{Re}(D)\,\sqrt{(4\,\mathrm{Im}(D)^2\,\mathrm{Re}(n)^2 + 4\,\mathrm{Im}(D)^2\,\mathrm{Re}(n) + \mathrm{Im}(D)^2 + 4\,\mathrm{Re}(D)^2\,\mathrm{Re}(n)^2 + 4\,\mathrm{Re}(D)^2\,\mathrm{Re}(n))} - 2\,\mathrm{Im}(D)\,\mathrm{Re}(n) - \mathrm{Im}(D)\Big), \quad x = 0$$

$$\mathrm{Re}(D) < 0\,, \quad \mathrm{Re}(k) > 0\,, \quad \mathrm{Re}(n) > \frac{1}{2}\left(\frac{|\mathrm{Re}(D)|}{\sqrt{\mathrm{Im}(D)^2 + \mathrm{Re}(D)^2}} - 1\right),$$

$$\mathrm{Im}(n) > \frac{1}{2\,\mathrm{Re}(D)}\Big(\frac{1}{|\mathrm{Re}(D)|}\mathrm{Re}(D)\,\sqrt{(4\,\mathrm{Im}(D)^2\,\mathrm{Re}(n)^2 + 4\,\mathrm{Im}(D)^2\,\mathrm{Re}(n) + \mathrm{Im}(D)^2 + 4\,\mathrm{Re}(D)^2\,\mathrm{Re}(n)^2 + 4\,\mathrm{Re}(D)^2\,\mathrm{Re}(n))} - 2\,\mathrm{Im}(D)\,\mathrm{Re}(n) - \mathrm{Im}(D)\Big), \quad x = 0$$

$$\mathrm{Re}(D) < 0\,, \quad \mathrm{Re}(k) > 0\,, \quad \mathrm{Re}(n) > \frac{1}{2}\left(\frac{|\mathrm{Re}(D)|}{\sqrt{\mathrm{Im}(D)^2 + \mathrm{Re}(D)^2}} - 1\right),$$

$$\mathrm{Im}(n) < \frac{1}{2\,\mathrm{Re}(D)}\Big(-\frac{1}{|\mathrm{Re}(D)|}\mathrm{Re}(D)\,\sqrt{(4\,\mathrm{Im}(D)^2\,\mathrm{Re}(n)^2 + 4\,\mathrm{Im}(D)^2\,\mathrm{Re}(n) + \mathrm{Im}(D)^2 + 4\,\mathrm{Re}(D)^2\,\mathrm{Re}(n)^2 + 4\,\mathrm{Re}(D)^2\,\mathrm{Re}(n))} - 2\,\mathrm{Im}(D)\,\mathrm{Re}(n) - \mathrm{Im}(D)\Big), \quad x = 0$$

Derivative:

- Step-by-step solution

$$\frac{\partial}{\partial x}\left(\frac{x^{1/2\,D\,n\,(n+1)}}{1-x^k}\right)=\frac{x^{1/2\,D\,n\,(n+1)-1}\left(2\,k\,x^k-D\,n\,(n+1)\left(x^k-1\right)\right)}{2\left(1-x^k\right)^2}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Indefinite integral:

$$\int\frac{x^{1/2\,D\,n\,(n+1)}}{1-x^k}\,dx=\frac{2\,x^{1/2\,D\,n\,(n+1)+1}\,{}_2F_1\left(1,\frac{D\,n\,(n+1)+2}{2\,k};\frac{2\,k+D\,n\,(n+1)+2}{2\,k};x^k\right)}{D\,n\,(n+1)+2}+\text{constant}$$

Open code

- ${}_2F_1(a,b;c;x)$ is the hypergeometric function

For x = 0.9999, D = 2, k = 3.95 and n = 60, we obtain
H(q) = 0.9999^(2*60*(60+1)/2) / (1-0.9999^3.95)

Input:

$$\frac{0.9999^{2\times60\times(60+1)/2}}{1-0.9999^{3.95}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

1755.93…

1755.93… result in the range of the mass of candidate “glueball” $f_0(1710)$ (“glueball” =1760 ± 15 MeV).

((((0.9999^(2*60*(60+1)/2) / (1-0.9999^3.95)))))^1/3

Input:

$$\sqrt[3]{\frac{0.9999^{2\times60\times(60+1)/2}}{1-0.9999^{3.95}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

12.0643…

2 * ((((0.9999^(2*60*(60+1)/2) / (1-0.9999^3.95)))))^1/3

Input:

$$2\sqrt[3]{\frac{0.9999^{2\times 60\times(60+1)/2}}{1-0.9999^{3.95}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

24.1286...

Where 12.0643 and 24.1286 are very near to the values of black hole entropies 12,1904 and 23,9078

And:

((((0.9999^(2*60*(60+1)/2) / (1-0.9999^3.95)))))^1/15

Input:

$$\sqrt[15]{\frac{0.9999^{2\times 60\times(60+1)/2}}{1-0.9999^{3.95}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- Fewer digits
- More digits

1.6455098348663736954170067618999242606622996256027609063 45...

$1.64550983... \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 ...$

Continued fraction:

- Linear form

$$1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{4+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{2+\cfrac{1}{3+\cfrac{1}{2+\cfrac{1}{9+\cfrac{1}{1+\cfrac{1}{7+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{58+\cfrac{1}{1+\cfrac{1}{8+\cfrac{1}{2+\cfrac{1}{1+\cfrac{1}{15+\cfrac{1}{\dots}}}}}}}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

- More

$\frac{5650755078\,\pi}{10788371035} \approx 1.64550983486637369542535 8$

π root of $22142x^3 + 35720x^2 - 93935x + 36220$ near $x = 0.523782 \approx$ 1.6455098348663736954167562

root of $43255x^3 - 93889x^2 + 67120x - 48948$ near $x = 1.64551 \approx$ 1.6455098348663736954182385

Note that H(q)/G(q) = 1,0119712441172504175412267931796 and that:

(1.0119712441172504175412267931796)^7

Input interpretation:

$1.0119712441172504175412267931796^7$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

1.086869003485021898446808579352015838248015090049562274035...

Open code

And:

((((1.0119712441172504175412267931796)^7)))^6

Input interpretation:

$(1.0119712441172504175412267931796^7)^6$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

1.6484023290906156538901060517306743134881897996358821350 26...

(8^2 + 4^2)+10^3 (((((((1.0119712441172504175412267931796)^7)))^6))))

Input interpretation:

$(8^2 + 4^2) + 10^3 (1.0119712441172504175412267931796^7)^6$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

1728.4023290906156538901060517306743134881897996358821350 26...

1728.402329090615653890106051730674313488189799635882135026

This result is very near to the mass of candidate glueball $f_0(1710)$ meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. As a consequence, it is sometimes called a Zagier as a pun on the Gross–Zagier theorem. The number 1728 is one less than the Hardy–Ramanujan number 1729

Continued fraction:

- Linear form

$$1728+\cfrac{1}{2+\cfrac{1}{2+\cfrac{1}{16+\cfrac{1}{1+\cfrac{1}{3+\cfrac{1}{2+\cfrac{1}{2+\cfrac{1}{1+\cfrac{1}{8+\cfrac{1}{1+\cfrac{1}{6+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{15+\cfrac{1}{1+\cfrac{1}{3+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{\ldots}}}}}}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

- More

$\frac{1}{5}\left(-36\, e^{\pi} + 1282\, \pi + 174 \log(\pi) + 3351 \log(2\,\pi) - 721 \tan^{-1}(\pi)\right) \approx$ 1728.40232909061565389044634

$\frac{4261\,\pi!}{9} - \frac{4363}{3} + \frac{2251}{18\,\pi} - \frac{497\,\pi}{6} \approx 1728.40232909061565390156$

$\frac{16\,173\, e!}{43} + 369 + \frac{5730}{43\, e} - \frac{4622\, e}{43} \approx 1728.4023290906156538870 50$

We note that (from Wikipedia):

Given the functions $G(q)$ and $H(q)$ appearing in the Rogers–Ramanujan identities,

$$\begin{aligned}
G(q) &= \sum_{n=0}^{\infty} \frac{q^{n^2}}{(1-q)(1-q^2)\cdots(1-q^n)} = \sum_{n=0}^{\infty} \frac{q^{n^2}}{(q;q)_n} = \frac{1}{(q;q^5)_\infty (q^4;q^5)_\infty} \\
&= \prod_{n=1}^{\infty} \frac{1}{(1-q^{5n-1})(1-q^{5n-4})} \\
&= \sqrt[60]{qj}\, {}_2F_1\left(-\tfrac{1}{60}, \tfrac{19}{60}; \tfrac{4}{5}; \tfrac{1728}{j}\right) \\
&= \sqrt[60]{q\,(j-1728)}\, {}_2F_1\left(-\tfrac{1}{60}, \tfrac{29}{60}; \tfrac{4}{5}; -\tfrac{1728}{j-1728}\right) \\
&= 1 + q + q^2 + q^3 + 2q^4 + 2q^5 + 3q^6 + \cdots
\end{aligned}$$

and,

$$\begin{aligned}
H(q) &= \sum_{n=0}^{\infty} \frac{q^{n^2+n}}{(1-q)(1-q^2)\cdots(1-q^n)} = \sum_{n=0}^{\infty} \frac{q^{n^2+n}}{(q;q)_n} = \frac{1}{(q^2;q^5)_\infty (q^3;q^5)_\infty} \\
&= \prod_{n=1}^{\infty} \frac{1}{(1-q^{5n-2})(1-q^{5n-3})} \\
&= \frac{1}{\sqrt[60]{q^{11} j^{11}}}\, {}_2F_1\left(\tfrac{11}{60}, \tfrac{31}{60}; \tfrac{6}{5}; \tfrac{1728}{j}\right) \\
&= \frac{1}{\sqrt[60]{q^{11}(j-1728)^{11}}}\, {}_2F_1\left(\tfrac{11}{60}, \tfrac{41}{60}; \tfrac{6}{5}; -\tfrac{1728}{j-1728}\right) \\
&= 1 + q^2 + q^3 + q^4 + q^5 + 2q^6 + 2q^7 + \cdots
\end{aligned}$$

OEIS: A003114 and OEIS: A003106, respectively, where $(a\,;\,q)_\infty$ denotes the infinite q-Pochhammer symbol, j is the j-function, and ${}_2F_1$ is the hypergeometric function, then the Rogers–Ramanujan continued fraction is,

$$R(q) = \frac{q^{\frac{11}{60}} H(q)}{q^{-\frac{1}{60}} G(q)} = q^{\frac{1}{5}} \prod_{n=1}^{\infty} \frac{(1-q^{5n-1})(1-q^{5n-4})}{(1-q^{5n-2})(1-q^{5n-3})}$$

$$= \cfrac{q^{1/5}}{1+\cfrac{q}{1+\cfrac{q^2}{1+\cfrac{q^3}{1+\ddots}}}}$$

Note that, in the identities G(q) and H(q) is always present the value 1728 that is one less than the Hardy–Ramanujan number 1729

Now, from OEIS: A003114, we have:

A003114 Number of partitions of n into parts 5k+1 or 5k+4.
(Formerly M0266)

1, 1, 1, 1, 2, 2, 3, 3, 4, 5, 6, 7, 9, 10, 12, 14, 17, 19, 23, 26, 31, 35, 41, 46, 54, 61, 70, 79, 91, 102, 117, 131, 149, 167, 189, 211, 239, 266, 299, 333, 374, 415, 465, 515, 575, 637, 709, 783, 871, 961, 1065, 1174, 1299, 1429, 1579, 1735, 1913, 2100, 2311, 2533, 2785 (list; graph; refs; listen; history; text; internal format)

OFFSET 0,5

COMMENTS Expansion of Rogers-Ramanujan function G(x) in powers of x.
Same as number of partitions into distinct parts where the difference between successive parts is >= 2.
As a formal power series, the limit of polynomials S(n,x): S(n,x)=sum(T(i,x),0<=i<=n); T(i,x)=S(i-2,x).x^i; T(0,x)=1,T(1,x)=x; S(n,1)=A000045(n+1), the Fibonacci sequence. - Claude Lenormand (claude.lenormand(AT)free.fr), Feb 04 2001
The Rogers-Ramanujan identity is 1 + Sum_{n >= 1} t^(n^2)/((1-t)*(1-t^2)*...*(1-t^n)) = Product_{n >= 1} 1/((1-t^(5*n-1))*(1-t^(5*n-4))).

From the product formula, and to the second expression regarding G(q):

$$G(q) = \sum_{n=0}^{\infty} \frac{q^{n^2}}{(1-q)(1-q^2)\cdots(1-q^n)} = \sum_{n=0}^{\infty} \frac{q^{n^2}}{(q;q)_n} = \frac{1}{(q;q^5)_\infty (q^4;q^5)_\infty}$$
$$= \prod_{n=1}^{\infty} \frac{1}{(1-q^{5n-1})(1-q^{5n-4})}$$
$$= \sqrt[60]{qj}\, {}_2F_1\left(-\tfrac{1}{60}, \tfrac{19}{60}; \tfrac{4}{5}; \tfrac{1728}{j}\right)$$
$$= \sqrt[60]{q\,(j-1728)}\, {}_2F_1\left(-\tfrac{1}{60}, \tfrac{29}{60}; \tfrac{4}{5}; -\tfrac{1728}{j-1728}\right)$$
$$= 1 + q + q^2 + q^3 + 2q^4 + 2q^5 + 3q^6 + \cdots$$

we have:

1/((1-t^(5*n-1))*(1-t^(5*n-4)))

Input:

$$\frac{1}{(1-t^{5n-1})(1-t^{5n-4})}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Values:

n	
0	$\frac{1}{\left(1-\frac{1}{t^4}\right)\left(1-\frac{1}{t}\right)}$
1	$\frac{1}{(1-t)(1-t^4)}$
2	$\frac{1}{(1-t^6)(1-t^9)}$
3	$\frac{1}{(1-t^{11})(1-t^{14})}$

Alternate forms:

$$\frac{1}{(t^{5n-4}-1)(t^{5n-1}-1)}$$

Enlarge Data Customize A Plaintext Interactive

$$\frac{1}{t^{10n-5}-(t^3+1)t^{5n-4}+1}$$

Open code

$$\frac{t^5}{(t^{5n}-t)(t^{5n}-t^4)}$$

Open code

Root:

- Approximate form

$$\mathrm{Re}(n) < \frac{1}{10}, \quad t = 0$$

Open code

Integer roots:

- More roots

$$n = -10, \quad t = 0$$

$$n = -9, \quad t = 0$$

$n = -8, \quad t = 0$

$n = -7, \quad t = 0$

$n = -6, \quad t = 0$

Property as a real function:
Domain:

$\{t \in \mathbb{R} : (t^{5n-4} \neq 1 \text{ and } t^{5n-1} \neq 1 \text{ and } t \neq 0 \text{ and } 5n \in \mathbb{Z})$
$\text{or } (t^{5n-4} \neq 1 \text{ and } t^{5n-1} \neq 1 \text{ and } 5n > 4 \text{ and } t \geq 0)$
$\text{or } (t^{5n-4} \neq 1 \text{ and } t^{5n-1} \neq 1 \text{ and } t > 0)\}$

Open code

- $\mathbb{R}$ is the set of real numbers
  - $\mathbb{Z}$ is the set of integers

Enlarge Data Customize A Plaintext Interactive

Derivative:

- Step-by-step solution

$$\frac{\partial}{\partial t}\left(\frac{1}{(1-t^{5n-1})(1-t^{5n-4})}\right) = -\frac{t^{5n+4}\left(5(2n-1)t^{5n} + (1-5n)t^4 + (4-5n)t\right)}{(t-t^{5n})^2 (t^4 - t^{5n})^2}$$

Open code

From t = 0.5 and n = 1, we obtain:

$$\frac{t^5}{(t^{5n} - t)(t^{5n} - t^4)}$$

0.5^5 / (((0.5^5-0.5)(0.5^5-0.5^4)))

Input:

$$\frac{0.5^5}{(0.5^5 - 0.5)(0.5^5 - 0.5^4)}$$

Result:

2.133333333333333333333333333333333333333333333333333333333333...

2.13333…

11* ((((0.5^5 / (((0.5^5-0.5)(0.5^5-0.5^4)))))))

Input:

$$11 \times \frac{0.5^5}{(0.5^5 - 0.5)(0.5^5 - 0.5^4)}$$

- Enlarge
- Data
- Customize
- Plain Text

- Open code

Result:

- More digits

23.466666666666666666666666666666666666666666666666666...

23.46666… result very near to the black hole entropy 23.3621

Now, from:

ACTA ARITHMETICA
XC.1 (1999)

Ramanujan's formulas for the explicit evaluation of the Rogers–Ramanujan continued fraction and theta-functions

by

Soon-Yi Kang (Urbana, IL)

3. Ramanujan's explicit formulas for the Rogers–Ramanujan continued fraction

THEOREM 3.1 ([18], p. 208). *Let t_2 be given in Theorem 2.3. Then*

$$\text{(i)}\quad R(q) = \frac{1}{4t_2}\left(\left(1+t_2\frac{\sqrt{5}+1}{2}\right)\sqrt{1-t_2} - \sqrt{(1-t_2)\left(1+t_2\frac{\sqrt{5}+1}{2}\right)^2 - 2t_2(\sqrt{5}+1)}\right) \times \left(-\left(1-t_2\frac{\sqrt{5}-1}{2}\right)\sqrt{1-t_2} + \sqrt{(1-t_2)\left(1-t_2\frac{\sqrt{5}-1}{2}\right)^2 + 2t_2(\sqrt{5}-1)}\right),$$

$$\text{(ii)}\quad R(q^2) = \frac{1}{4t_2^2}\left(\left(1-t_2\frac{\sqrt{5}+1}{2}\right)\sqrt{1-t_2} - \sqrt{(1-t_2)\left(1+t_2\frac{\sqrt{5}+1}{2}\right)^2 - 2t_2(\sqrt{5}+1)}\right) \times \left(-\left(1+t_2\frac{\sqrt{5}-1}{2}\right)\sqrt{1-t_2} + \sqrt{(1-t_2)\left(1-t_2\frac{\sqrt{5}-1}{2}\right)^2 + 2t_2(\sqrt{5}-1)}\right).$$

For t = 3 and/or t = -3, we obtain:

For t = -3

(((((((1-3(((sqrt(5)+1))/2))) (sqrt(1+3)) - sqrt((((((1+3))((((((1-3(((sqrt(5)+1))/2))))))^2+6((sqrt(5)+1))))))))))

Input:

$$\left(1-3\left(\frac{1}{2}\left(\sqrt{5}+1\right)\right)\right)\sqrt{1+3}-\sqrt{(1+3)\left(\left(1-3\left(\frac{1}{2}\left(\sqrt{5}+1\right)\right)\right)^2+6\left(\sqrt{5}+1\right)\right)}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

$$2\left(1-\frac{3}{2}\left(1+\sqrt{5}\right)\right)-2\sqrt{6\left(1+\sqrt{5}\right)+\left(1-\frac{3}{2}\left(1+\sqrt{5}\right)\right)^2}$$

Decimal approximation:

- More digits

−19.416407864998738178455042012387657412643710157669154345 6...

((((((-(1+3(((sqrt(5)-1))/2))) (sqrt(1+3)) + sqrt((((((1+3))((((((1+3(((sqrt(5)-1))/2))))))^2-6((sqrt(5)-1))))))))))

Input:

$$-\left(1+3\left(\frac{1}{2}\left(\sqrt{5}-1\right)\right)\right)\sqrt{1+3}+\sqrt{(1+3)\left(\left(1+3\left(\frac{1}{2}\left(\sqrt{5}-1\right)\right)\right)^2-6\left(\sqrt{5}-1\right)\right)}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- Step-by-step solution

−4

R(q) = -1/12 * (((((((1-3(((sqrt(5)+1))/2))) (sqrt(1+3)) - sqrt((((((1+3))((((((1-3(((sqrt(5)+1))/2))))))^2+6((sqrt(5)+1)))))))))) * (-4)

Input:

$$-\frac{1}{12}\left(\left(\left(1-3\left(\frac{1}{2}\left(\sqrt{5}+1\right)\right)\right)\sqrt{1+3}-\sqrt{(1+3)\left(\left(1-3\left(\frac{1}{2}\left(\sqrt{5}+1\right)\right)\right)^2+6\left(\sqrt{5}+1\right)\right)}\right)\times(-4)\right)$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

$$\frac{1}{3}\left(2\left(1-\frac{3}{2}\left(1+\sqrt{5}\right)\right)-2\sqrt{6\left(1+\sqrt{5}\right)+\left(1-\frac{3}{2}\left(1+\sqrt{5}\right)\right)^2}\right)$$

Decimal approximation:

- More digits

$-6.4721359549995793928183473374625524708812367192230514485 4...$

Open code

(-1/48 * ((((((((1-3(((sqrt(5)+1))/2))) (sqrt(1+3)) - sqrt((((((1+3))((((((1-3(((sqrt(5)+1))/2))))))^2+6((sqrt(5)+1))))))))))) * (-4))

Input:

$$-\frac{1}{48}\left(\left(\left(1-3\left(\frac{1}{2}\left(\sqrt{5}+1\right)\right)\right)\sqrt{1+3}-\sqrt{(1+3)\left(\left(1-3\left(\frac{1}{2}\left(\sqrt{5}+1\right)\right)\right)^2+6\left(\sqrt{5}+1\right)\right)}\right)\times(-4)\right)$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

$$\frac{1}{12}\left(2\left(1-\frac{3}{2}\left(1+\sqrt{5}\right)\right)-2\sqrt{6\left(1+\sqrt{5}\right)+\left(1-\frac{3}{2}\left(1+\sqrt{5}\right)\right)^2}\right)$$

Decimal approximation:

- More digits

$-1.6180339887498948482045868343656381177203091798057628621 3...$

Open code

-1.6180339887498948482045868343656381177203091798057628621 3 = $-\phi$

Continued fraction:

- Linear form

$$-1+\cfrac{1}{-1+\cfrac{1}{-1+\cfrac{1}{-1+\cfrac{1}{-1+\cfrac{1}{-1+\cfrac{1}{-1+\cfrac{1}{-1+\cfrac{1}{-1+\cfrac{1}{-1+\cfrac{1}{-1+\cfrac{1}{-1+\cfrac{1}{-1+\cfrac{1}{-1+\cfrac{1}{-1+\cfrac{1}{-1+\cfrac{1}{\dots}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

- More

$-\frac{1}{\Phi} \approx$

-1.61803398874989484820458683436563811772030917980576286213544862

$-\frac{2}{\sqrt{5}-1} \approx$

-1.61803398874989484820458683436563811772030917980576286213544862

$-\Phi - 1 \approx$

-1.61803398874989484820458683436563811772030917980576286213544862

For t = 3, we obtain:

((((((1+3(((sqrt(5)+1))/2))) (sqrt(1-3)) - sqrt((((((1-3))((((((1+3(((sqrt(5)+1))/2))))))^2-6((sqrt(5)+1)))))))))

Input:

$$\left(1+3\left(\frac{1}{2}\left(\sqrt{5}+1\right)\right)\right)\sqrt{1-3}-\sqrt{(1-3)\left(\left(1+3\left(\frac{1}{2}\left(\sqrt{5}+1\right)\right)\right)^2-6\left(\sqrt{5}+1\right)\right)}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

$$i\sqrt{2}\left(1+\frac{3}{2}\left(1+\sqrt{5}\right)\right)-i\sqrt{2\left(\left(1+\frac{3}{2}\left(1+\sqrt{5}\right)\right)^2-6\left(1+\sqrt{5}\right)\right)}$$

Decimal approximation:

- More digits

2.828427124746190097603377448419396157139343750753896146353... i

Open code

((((((-(1-3(((sqrt(5)-1))/2))) (sqrt(1-3)) + sqrt((((((1-3))((((((1-3(((sqrt(5)-1))/2))))))^2+6((sqrt(5)-1)))))))))

Input:

$$-\left(1-3\left(\frac{1}{2}\left(\sqrt{5}-1\right)\right)\right)\sqrt{1-3}+\sqrt{(1-3)\left(\left(1-3\left(\frac{1}{2}\left(\sqrt{5}-1\right)\right)\right)^2+6\left(\sqrt{5}-1\right)\right)}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

$$i\sqrt{2}\left(\frac{3}{2}\left(\sqrt{5}-1\right)-1\right)+i\sqrt{2\left(6\left(\sqrt{5}-1\right)+\left(1-\frac{3}{2}\left(\sqrt{5}-1\right)\right)^2\right)}$$

Decimal approximation:

- More digits

5.244192293385852849591614460669061365449649791844806261042... i

1/24 * (((((((1+3(((sqrt(5)+1))/2))) (sqrt(1-3)) - sqrt((((((1-3))((((((1+3(((sqrt(5)+1))/2))))))^2-6((sqrt(5)+1))))))))))*
5.244192293385852849591614460669061365449649791844806261042 i

Input interpretation:

$$\frac{1}{24}\left(\left(\left(1+3\left(\frac{1}{2}\left(\sqrt{5}+1\right)\right)\right)\sqrt{1-3}-\sqrt{(1-3)\left(\left(1+3\left(\frac{1}{2}\left(\sqrt{5}+1\right)\right)\right)^2-6\left(\sqrt{5}+1\right)\right)}\right)\times 5.244192293385852849591614460669061365449649791844806261042\,i\right)$$

Open code

- i is the imaginary unit

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

−0.6180339887498948482045868343656381177203091798057628621 3...
-0.618033988749894848204586834365638117720309179805762862 13

Continued fraction:

- Linear form

$$\cfrac{1}{-1+\cfrac{1}{-1+\cfrac{1}{-1+\cfrac{1}{-1+\cfrac{1}{-1+\cfrac{1}{-1+\cfrac{1}{-1+\cfrac{1}{-1+\cfrac{1}{-1+\cfrac{1}{-1+\cfrac{1}{-1+\cfrac{1}{-1+\cfrac{1}{-1+\cfrac{1}{-1+\cfrac{1}{-1+\cfrac{1}{-1+\cfrac{1}{\cdots}}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

- More

$$-\frac{2}{1+\sqrt{5}} \approx$$
$-0.6180339887498948482045868343656381177203091798057628621354486$

$-\Phi \approx -0.6180339887498948482045868343656381177203091798057628621354486$

$$\frac{1}{2}\left(1-\sqrt{5}\right) \approx$$
$-0.6180339887498948482045868343656381177203091798057628621354486$

Now, from the result of the above calculated expression:

R(q) = -1/12 * (((((((1-3(((sqrt(5)+1))/2))) (sqrt(1+3)) - sqrt((((((1+3))((((((1-3(((sqrt(5)+1))/2))))))^2+6((sqrt(5)+1))))))))) * (-4)

Input:

$$-\frac{1}{12}\left(\left(\left(1-3\left(\frac{1}{2}\left(\sqrt{5}+1\right)\right)\right)\sqrt{1+3}-\sqrt{(1+3)\left(\left(1-3\left(\frac{1}{2}\left(\sqrt{5}+1\right)\right)\right)^2+6\left(\sqrt{5}+1\right)\right)}\right)\times(-4)\right)$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

$$\frac{1}{3}\left(2\left(1-\frac{3}{2}\left(1+\sqrt{5}\right)\right)-2\sqrt{6\left(1+\sqrt{5}\right)+\left(1-\frac{3}{2}\left(1+\sqrt{5}\right)\right)^2}\right)$$

Decimal approximation:

- More digits

$-6.4721359549995793928183473374625524708812367192230514485 4...$

Open code

We obtain:

-(6.4721359549995793928183473374625524708812367192230 48) * -(ln 2365502)^2

Where 2365502 is in the following partition function (note that the ln correspond to a black hole entropy):

$$\begin{aligned} Z_{88}(\tau) &= j^{11/3}(\tau) - 2728\, j^{8/3}(\tau) + 1984269\, j^{5/3}(\tau) - 302198519\, j^{2/3}(\tau) \\ &= q^{-11/3} + q^{-5/3} + q^{-2/3} + 2365502\, q^{1/3} + 907649518712\, q^{4/3} \\ &\quad + 4712143513485758\, q^{7/3} + 4723281033156413468\, q^{10/3} + \ldots\ . \end{aligned}$$

Input interpretation:

$-\log^2(2\,365\,502) \times (-6.472135954999579392818347337462552470881236719223048)$

Open code

- $\log(x)$ is the natural logarithm

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

1394.095989715100572766342160715184443275989311654535...

1394.095989715100572766342160715184443275989311654535

Result very near to the rest mass of Sigma baryon 1387.2

Series representations:

- More

$$-6.472135954999579392818347337462552470881236719223048000\,(-1)\log^2(2365502) = 6.472135954999579392818347337462552470881236719223048000\left(\log(2365501) - \sum_{k=1}^{\infty}\frac{\left(-\frac{1}{2365501}\right)^k}{k}\right)^2$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$-6.472135954999579392818347337462552470881236719223048000\,(-1)\log^2(2365502) = 6.472135954999579392818347337462552470881236719223048000\left(2\,i\,\pi\left\lfloor\frac{\arg(2365502-x)}{2\,\pi}\right\rfloor + \log(x) - \sum_{k=1}^{\infty}\frac{(-1)^k\,(2365502-x)^k\,x^{-k}}{k}\right)^2 \quad \text{for } x<0$$

Open code

$$-6.472135954999579392818347337462552470881236719223048000\,(-1)\log^2(2365502) = 6.472135954999579392818347337462552470881236719223048000\left(\log(z_0) + \left\lfloor\frac{\arg(2365502-z_0)}{2\,\pi}\right\rfloor\left(\log\left(\frac{1}{z_0}\right)+\log(z_0)\right) - \sum_{k=1}^{\infty}\frac{(-1)^k\,(2365502-z_0)^k\,z_0^{-k}}{k}\right)^2$$

Integral representations:

$$-6.472135954999579392818347337462552470881236719223048000\,(-1)\log^2(2365502) = 6.472135954999579392818347337462552470881236719223048000\left(\int_1^{2365502}\frac{1}{t}\,dt\right)^2$$

Open code

Enlarge Data Customize A Plaintext Interactive

$-6.472135954999579392818347337462552470881236719223048000$

$$(-1)\log^2(2365502) = \frac{1}{i^2\pi^2} 1.618033988749894848204586834365638117720309179805762000 \left(\int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{2365501^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\right)^2 \quad \text{for } -1<\gamma<0$$

Continued fraction:

- Linear form

$$1394+\cfrac{1}{10+\cfrac{1}{2+\cfrac{1}{2+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{5+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{3+\cfrac{1}{3+\cfrac{1}{4+\cfrac{1}{7+\cfrac{1}{3+\cfrac{1}{3+\cfrac{1}{2+\cfrac{1}{11+\cfrac{1}{7+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{\dots}}}}}}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

- More

$\text{root of } 7x^4 - 9758x^3 - 942x^2 + 7341x + 4050 \text{ near } x = 1394.1 \approx$
$1394.09598971510057273225 3$

$$\frac{1}{\text{root of } 4050x^4 + 7341x^3 - 942x^2 - 9758x + 7 \text{ near } x = 0.000717311} \approx$$
$1394.095989715100572732253$

$$\frac{1}{28}\left(1440e^\pi + 2132\pi + 381\log(\pi) - 503\log(2\pi) - 394\tan^{-1}(\pi)\right) \approx$$
$1394.0959897151005727676004$

From the result concerning the golden ratio with minus sign, we obtain:

(-1.6180339887498948482045868343656381177203091798057 62) * -((ln 4695630250012+ ln 8504046600192)/2))^2

Where 4695630250012 and 8504046600192 are in the following partition functions (note that the ln correspond to the black hole entropies):

$$Z_{48}(\tau) = j^2(\tau) - 1488\, j(\tau) + 159769$$
$$= q^{-2} + 1 + 42987520\, q + 40491909396\, q^2 + 8504046600192\, q^3 + \dots ,$$

$$Z_{80}(\tau) = j^{10/3}(\tau) - 2480\, j^{7/3}(\tau) + 1496361\, j^{4/3}(\tau) - 132423391\, j^{1/3}(\tau)$$
$$= q^{-10/3} + q^{-4/3} + q^{-1/3} + 173492852\, q^{2/3} + 4695630250012\, q^{5/3}$$
$$+ 8461738959649848\, q^{8/3} + 4293890043969667206\, q^{11/3} + \dots ,$$

Input interpretation:

$$-1.6180339887498948482045868343656381177203091798057620 \times (-1)\left(\frac{1}{2}(\log(4\,695\,630\,250\,012) + \log(8\,504\,046\,600\,192))\right)^2$$

Open code

- $\log(x)$ is the natural logarithm

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

1405.6711330590858298665411876251099527037966975667366...

1405.671133059085829866541187625109952703796697566736

Series representations:

- More

$$-\left(\frac{1}{2}(\log(4\,695\,630\,250\,012) + \log(8\,504\,046\,600\,192))\right)^2 (-1)$$
$$1.6180339887498948482045868343656381177203091798057620000 =$$
$$0.40450849718747371205114670859140952943007729495144050000$$
$$\left(\log(4\,695\,630\,250\,011) + \log(8\,504\,046\,600\,191) + \sum_{k=1}^{\infty} \frac{(-1)^k \left(-4\,695\,630\,250\,011^{-k} - 8\,504\,046\,600\,191^{-k}\right)}{k}\right)^2$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$-\left(\frac{1}{2}\left(\log(4\,695\,630\,250\,012)+\log(8\,504\,046\,600\,192)\right)\right)^2 (-1)$$

$$1.61803398874989484820458683436563811772030917980576 20000 = 0.40450849718747371205114670859140952943007729495144050000 \left(2\,i\,\pi\left\lfloor\frac{\arg(4\,695\,630\,250\,012-x)}{2\,\pi}\right\rfloor + 2\,i\,\pi\left\lfloor\frac{\arg(8\,504\,046\,600\,192-x)}{2\,\pi}\right\rfloor + 2\log(x) + \sum_{k=1}^{\infty}\frac{(-1)^{1+k}\left((4\,695\,630\,250\,012-x)^k+(8\,504\,046\,600\,192-x)^k\right)x^{-k}}{k}\right)^2$$

for $x < 0$

Open code

$$-\left(\frac{1}{2}\left(\log(4\,695\,630\,250\,012)+\log(8\,504\,046\,600\,192)\right)\right)^2 (-1)$$

$$1.61803398874989484820458683436563811772030917980576 20000 = 0.40450849718747371205114670859140952943007729495144050000 \left(2\log(z_0) + \left\lfloor\frac{\arg(4\,695\,630\,250\,012-z_0)}{2\,\pi}\right\rfloor\left(\log\left(\frac{1}{z_0}\right)+\log(z_0)\right) + \left\lfloor\frac{\arg(8\,504\,046\,600\,192-z_0)}{2\,\pi}\right\rfloor\left(\log\left(\frac{1}{z_0}\right)+\log(z_0)\right) + \sum_{k=1}^{\infty}\frac{(-1)^{1+k}\left((4\,695\,630\,250\,012-z_0)^k+(8\,504\,046\,600\,192-z_0)^k\right)z_0^{-k}}{k}\right)^2$$

Continued fraction:

- Linear form

$$1405+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{24+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{5+\cfrac{1}{4+\cfrac{1}{1+\cfrac{1}{6+\cfrac{1}{4+\cfrac{1}{7+\cfrac{1}{29+\cfrac{1}{6+\cfrac{1}{1+\cfrac{1}{3+\cfrac{1}{1+\cfrac{1}{3+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{3+\cfrac{1}{\dots}}}}}}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

- More

$\frac{1}{9}(914 e^{\pi} + 156\pi + 149\log(\pi) - 2908\log(2\pi) - 3022\tan^{-1}(\pi)) \approx$

1405.671133059085829868976 5

$\frac{251882 + 264995\pi + 3778\pi^2}{254\pi} \approx 1405.67113305908582985507 0$

$\frac{10964 e!}{51} + \frac{24850}{51} + \frac{5639}{17 e} - 44 e \approx 1405.67113305908582986751 21$

We observe that the two results
1394.0959897151005727663421607151844432759893116545 35
1405.6711330590858298665411876251099527037966975667 36

And the following mean:
1/2 *
(1394.095989715100572766342160715184443275989311654535+1405.671133059085829866541187625109952703796697566736)

Input interpretation:

$\frac{1}{2}(1394.095989715100572766342160715184443275989311654535 + 1405.671133059085829866541187625109952703796697566736)$

Open code

- Units »

Enlarge Data Customize A Plaintext Interactive

Result:

1399.883561387093201316441674170147197989893004610635 5

1399.88356...

Are practically equal to the Higgsino mass values 1,4 – 1,5 TeV that correspond to the values of 1400 – 1500 GeV

From the following expression:

$$R(q^2) - \frac{1}{4t_2^2}\left(\left(1 - t_2\frac{\sqrt{5}+1}{2}\right)\sqrt{1-t_2} - \sqrt{(1-t_2)\left(1+t_2\frac{\sqrt{5}+1}{2}\right)^2 - 2t_2(\sqrt{5}+1)}\right) \times \left(-\left(1+t_2\frac{\sqrt{5}-1}{2}\right)\sqrt{1-t_2} + \sqrt{(1-t_2)\left(1-t_2\frac{\sqrt{5}-1}{2}\right)^2 + 2t_2(\sqrt{5}-1)}\right).$$

We obtain for t = 3 or -3, or for any number belonging to the real numbers line (positive, negative, rational, irrational, transcendental numbers.... Note that the real numbers can be thought of as points on an infinitely long number line), the result is **always** equal to zero, except for a particular case that we will subsequently analyze. We have:

(((((((1-3(((sqrt(5)+1))/2))) (sqrt(1-3)) - sqrt((((((1-3))((((((1+3(((sqrt(5)+1))/2))))))^2-6((sqrt(5)+1))))))))))

Input:

$$\left(1-3\left(\frac{1}{2}\left(\sqrt{5}+1\right)\right)\right)\sqrt{1-3}-\sqrt{(1-3)\left(\left(1+3\left(\frac{1}{2}\left(\sqrt{5}+1\right)\right)\right)^2-6\left(\sqrt{5}+1\right)\right)}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

$$i\sqrt{2}\left(1-\frac{3}{2}\left(1+\sqrt{5}\right)\right)-i\sqrt{2\left(\left(1+\frac{3}{2}\left(1+\sqrt{5}\right)\right)^2-6\left(1+\sqrt{5}\right)\right)}$$

Decimal approximation:

- More digits

$-10.901046542878233044798369357507853679728337293352598553 7\ldots\, i$

-10.9010465428782330447983693575078536797283372933525985537 i

1/36 * (((((((1-3(((sqrt(5)+1))/2))) (sqrt(1-3)) - sqrt((((((1-3))((((((1+3(((sqrt(5)+1))/2))))))^2-6((sqrt(5)+1))))))))))

Input:

$$\frac{1}{36}\left(\left(1-3\left(\frac{1}{2}\left(\sqrt{5}+1\right)\right)\right)\sqrt{1-3}-\sqrt{(1-3)\left(\left(1+3\left(\frac{1}{2}\left(\sqrt{5}+1\right)\right)\right)^2-6\left(\sqrt{5}+1\right)\right)}\right)$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

$$\frac{1}{36}\left(i\sqrt{2}\left(1-\frac{3}{2}\left(1+\sqrt{5}\right)\right)-i\sqrt{2\left(\left(1+\frac{3}{2}\left(1+\sqrt{5}\right)\right)^2-6\left(1+\sqrt{5}\right)\right)}\right)$$

Decimal approximation:

- More digits

$-0.302806848413284251244399148819662602214676035926461070 93\ldots\, i$

Open code

-0.30280684841328425124439914881966260221467603592646107093 i

((((((-(1+3(((sqrt(5)-1))/2))) (sqrt(1-3)) + sqrt((((((1-3))((((((1-3(((sqrt(5)-1))/2))))))^2+6((sqrt(5)-1))))))))))

Input:

$$-\left(1+3\left(\frac{1}{2}\left(\sqrt{5}-1\right)\right)\right)\sqrt{1-3}+\sqrt{(1-3)\left(\left(1-3\left(\frac{1}{2}\left(\sqrt{5}-1\right)\right)\right)^2+6\left(\sqrt{5}-1\right)\right)}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

0

Open code

1/36 * (((((((1-3(((sqrt(5)+1))/2))) (sqrt(1-3)) - sqrt((((((1-3))((((((1+3(((sqrt(5)+1))/2))))))^2-6((sqrt(5)+1)))))))))) * 0

Input:

$$\frac{1}{36}\left(\left(\left(1-3\left(\frac{1}{2}\left(\sqrt{5}+1\right)\right)\right)\sqrt{1-3}-\sqrt{(1-3)\left(\left(1+3\left(\frac{1}{2}\left(\sqrt{5}+1\right)\right)\right)^2-6\left(\sqrt{5}+1\right)\right)}\right)\times 0\right)$$

Open code

Enlarge Data Customize A Plaintext Interactive

Exact result:

- Step-by-step solution

0

0 –

The number 0 is usually encoded as +0, but can be represented by either +0 or −0. Real arithmetic with signed zeros can be considered a variant of the extended real number line such that 1/−0 = −∞ and 1/+0 = +∞; division is only undefined for ±0/±0 and ±∞/±∞

The usual rule for signs is always followed when multiplying or dividing:

$$\frac{-0}{|x|}=-0$$

(for x different from 0)

$$(-0)\cdot(-0)=+0$$

In our case the result is 0-. This result could be translated, physically speaking, in the words of Ramanujan, into the absolute reality of zero that can be identified with the supersymmetry. The fact that zero is "negative", as it is multiplied by a complex number with a negative sign, could indicate that "symmetry breaking" occurs in imaginary time. Thus, further confirmation of the "no-boundary proposal" by Stephen

Hawking and Jim Hartle. Hawking stated: "I chose to adopt an Euclidean approach to quantum gravity to describe the beginning of the Universe. Here, ordinary real time is replaced by an imaginary time, which behaves like a fourth direction of space. According to the Euclidean approach, the history of the universe in an imaginary time is a four-dimensional curved surface, like the surface of the Earth, but with two other dimensions in addition". Hawking specified that he and Jim Hartle proposed a 'no boundary' condition: according to the scientist the boundaries of the universe are the non-boundaries. "In other words - he explained - Euclidean space-time is a closed surface without limits, like the surface of the Earth. Ordinary and real time can be considered as at the beginning of the South Pole, which is a smooth point of space-time in which the normal laws of physics hold up ". At this point, Hawking stated: "There is nothing south of the South Pole, so there was nothing before the Big Bang: the universe simply "is ".
(From: https://scienze.fanpage.it/cosa-c-era-prima-del-big-bang-secondo-stephen-hawking/http://scienze.fanpage.it/)

With regard to the following equation:

$$R(q^2) = \frac{1}{4t_2^2}\left(\left(1 - t_2\frac{\sqrt{5}+1}{2}\right)\sqrt{1-t_2} - \sqrt{(1-t_2)\left(1+t_2\frac{\sqrt{5}+1}{2}\right)^2 - 2t_2(\sqrt{5}+1)}\right) \times \left(-\left(1+t_2\frac{\sqrt{5}-1}{2}\right)\sqrt{1-t_2} + \sqrt{(1-t_2)\left(1-t_2\frac{\sqrt{5}-1}{2}\right)^2 + 2t_2(\sqrt{5}-1)}\right).$$

let us now analyze a particular case whose result provides a non-zero value. Indeed, for t = 3 and multiplying both sides for i^2, we obtain the following interesting expressions:

i^2 * (((((((1-3(((sqrt(5)+1))/2))) (sqrt(1-3)) -   sqrt((((((1-3))((((((1+3(((sqrt(5)+1))/2))))))^2-6((sqrt(5)+1))))))))))

Input:

$$i^2\left(\left(1-3\left(\frac{1}{2}\left(\sqrt{5}+1\right)\right)\right)\sqrt{1-3} - \sqrt{(1-3)\left(\left(1+3\left(\frac{1}{2}\left(\sqrt{5}+1\right)\right)\right)^2 - 6\left(\sqrt{5}+1\right)\right)}\right)$$

Open code

- i is the imaginary unit

Enlarge Data Customize A Plaintext Interactive

Result:

$$i\sqrt{2\left(\left(1+\frac{3}{2}\left(1+\sqrt{5}\right)\right)^2-6\left(1+\sqrt{5}\right)\right)}-i\sqrt{2}\left(1-\frac{3}{2}\left(1+\sqrt{5}\right)\right)$$

Decimal approximation:

- More digits

$10.901046542878233044798369357507853679728337293352598553 74\ldots\, i$

Open code

Polar coordinates:

- Exact form

$r \approx 10.901$ (radius), $\theta = 90°$ (angle)

Alternate forms:

- More forms
- Step-by-step solution

$$i\left(\sqrt{2}+3\sqrt{10}\right)$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$2\,i\sqrt{23+3\sqrt{5}}$$

Open code

$$\frac{i\left(2+6\sqrt{5}\right)}{\sqrt{2}}$$

Minimal polynomial:

$$x^4+184\,x^2+7744$$

Open code

Expanded form:

$$\frac{i}{\sqrt{2}}+3\,i\sqrt{\frac{5}{2}}+i\sqrt{2\left(\left(1+\frac{3}{2}\left(1+\sqrt{5}\right)\right)^2-6\left(1+\sqrt{5}\right)\right)}$$

i^2((((((-(1+3(((sqrt(5)-1))/2))) (sqrt(1-3)) + i^2 sqrt((((((1-3))((((((1-3(((sqrt(5)-1))/2))))))^2+6((sqrt(5)-1)))))))))

Input:

$$i^2\left(-\left(1+3\left(\frac{1}{2}\left(\sqrt{5}-1\right)\right)\right)\sqrt{1-3}+i^2\sqrt{(1-3)\left(\left(1-3\left(\frac{1}{2}\left(\sqrt{5}-1\right)\right)\right)^2+6\left(\sqrt{5}-1\right)\right)}\right)$$

Open code

- i is the imaginary unit

Enlarge Data Customize A Plaintext Interactive

Result:

$$i\sqrt{2\left(6\left(\sqrt{5}-1\right)+\left(1-\frac{3}{2}\left(\sqrt{5}-1\right)\right)^2\right)}-i\sqrt{2}\left(-1-\frac{3}{2}\left(\sqrt{5}-1\right)\right)$$

Decimal approximation:

- More digits

$8.07261941813204294719499190908845752258899354259870240739 5\ldots\, i$

Open code

Polar coordinates:

- Exact form

$r \approx 8.07262$ (radius), $\theta = 90°$ (angle)

Alternate forms:

- More forms
- Step-by-step solution

$$i\left(3\sqrt{10}-\sqrt{2}\right)$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$2\, i\sqrt{23-3\sqrt{5}}$$

Open code

$$\frac{1}{2}\, i\left(-\sqrt{2}+3\sqrt{10}+2\sqrt{23-3\sqrt{5}}\right)$$

Open code

Minimal polynomial:

$$x^4+184\,x^2+7744$$

i^2*1/36 * (10.90104654287823304 i)(8.072619418132042947194991909088457522588993542598702407395 i)

Input interpretation:

$$i^2\times\frac{1}{36}\,(10.90104654287823304\, i)\,(8.072619418132042947194991909088457522588993542598702407395\, i)$$

Open code

- i is the imaginary unit

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

$2.44444444444444444336846084303367570738407762843833652892 4\ldots$

Open code

(36/54.3693) * 1/36 i^2 * (10.90104654287823304 i) (8.07261941813204294719499190908845752258899354259870240 7395 i)

Where 54,3693 is the sum of two black hole entropies (30,4615 and 23,9078)

Input interpretation:

$$\left(\frac{36}{54.3693}\times\frac{1}{36}\right)(i^2\,(10.90104654287823304\,i))\,(8.072619418132042947194991909088457522588993542598702407395\,i)$$

Open code

- i is the imaginary unit

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

1.618560474385360855506040915538959035077273288855661467800...

Open code

1.618560474385360855506040915538959035077273288855661467800

Continued fraction:

- Linear form

$$1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{4+\cfrac{1}{27+\cfrac{1}{1+\cfrac{1}{18+\cfrac{1}{1+\cfrac{1}{9+\cfrac{1}{4748299+\cfrac{1}{2+\cfrac{1}{2+\cfrac{1}{4+\cfrac{1}{5+\cfrac{1}{\cdots}}}}}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

- More

$$\frac{418}{4175\,\mathcal{L}_{\text{Li}}-201}\approx 1.61856047438536085362184$$

$$\frac{3}{4}\pi\tan^2\left(\frac{4716248}{6814725}\right)\approx 1.618560474385360855545559$$

$$\pi\left[\text{root of }18609x^3+1705x^2+368x-3187\text{ near }x=0.515204\right]\approx$$

1.618560474385360855549725

1/2 (((((((((4 * i^2*1/36 * (10.9010465428782330 i) (8.0726194181320429 i)))))^1/4 + ((((4 * i^2*1/36 * (10.9010465428782330 i) (8.0726194181320429 i)))))^1/5)))))

Input interpretation:

$$\frac{1}{2}\left(\sqrt[4]{4\,i^2\times\frac{1}{36}\,(10.9010465428782330\,i)\,(8.0726194181320429\,i)}+\sqrt[5]{4\,i^2\times\frac{1}{36}\,(10.9010465428782330\,i)\,(8.0726194181320429\,i)}\right)$$

Open code

- i is the imaginary unit

Enlarge Data Customize A Plaintext Interactive

Result:

- Fewer digits
- More digits

1.673051215020874741645948135227262904273345284188470247860...

1.6730512150208747416459481352272629042733452841884702

Result very near to the proton mass

1/2 (((((((((2Pi * i^2*1/36 * (10.9010465428782330 i) (8.0726194181320429 i)))))^1/5 + ((((2Pi * i^2*1/36 * (10.9010465428782330 i) (8.0726194181320429 i)))))^1/7)))))

Input interpretation:

$$\frac{1}{2}\left(\sqrt[5]{2\,\pi\,i^2\times\frac{1}{36}\,(10.9010465428782330\,i)\,(8.0726194181320429\,i)}+\sqrt[7]{2\,\pi\,i^2\times\frac{1}{36}\,(10.9010465428782330\,i)\,(8.0726194181320429\,i)}\right)$$

Open code

- i is the imaginary unit

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

1.602128812618277745...

1.602128812618277745

Result very near to the elementary charge

Series representations:

- More

$$\frac{1}{2}\left(\sqrt[5]{\frac{2}{36}\pi\left(i^2 (10.901046542878233000000\, i)(8.0726194181320429000\, i)\right)} + \sqrt[7]{\frac{2}{36}\pi\left(i^2 (10.901046542878233000000\, i)(8.0726194181320429000\, i)\right)}\right) = 0.9061999544449106532 \sqrt[7]{i^4 \sum_{k=0}^{\infty} \frac{(-1)^k}{1+2k}} \left(0.8437487332292958166 + 1.0000000000000000000 \left(i^4 \sum_{k=0}^{\infty} \frac{(-1)^k}{1+2k}\right)^{2/35}\right)$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$\frac{1}{2}\left(\sqrt[5]{\frac{2}{36}\pi\left(i^2 (10.901046542878233000000\, i)(8.0726194181320429000\, i)\right)} + \sqrt[7]{\frac{2}{36}\pi\left(i^2 (10.901046542878233000000\, i)(8.0726194181320429000\, i)\right)}\right) = 0.7888928808009390 03 \left(0.8778389522660247 54 + 1.0000000000000000000 \left(i^4 \left(-1 + \sum_{k=1}^{\infty} \frac{2^k}{\binom{2k}{k}}\right)\right)^{2/35}\right) \sqrt[7]{i^4 \left(-1 + \sum_{k=1}^{\infty} \frac{2^k}{\binom{2k}{k}}\right)}$$

Open code

$$\frac{1}{2}\left(\sqrt[5]{\frac{2}{36}\pi\left(i^2 (10.901046542878233000000\, i)(8.0726194181320429000\, i)\right)} + \sqrt[7]{\frac{2}{36}\pi\left(i^2 (10.901046542878233000000\, i)(8.0726194181320429000\, i)\right)}\right) = 0.6867711417615595 65 \sqrt[7]{i^4 \left(x + 2\sum_{k=1}^{\infty} \frac{\sin(k x)}{k}\right)} \left(0.9133065280775890 89 + 1.0000000000000000000 \left(i^4 \left(x + 2\sum_{k=1}^{\infty} \frac{\sin(k x)}{k}\right)\right)^{2/35}\right)$$

for $(x \in \mathbb{R}$ and $x > 0)$

Integral representations:

- More

$$\frac{1}{2}\left(\sqrt[5]{\frac{2}{36}\pi\left(i^2\,(10.901046542878233000000\,i)\,(8.0726194181320429000\,i)\right)}+\sqrt[7]{\frac{2}{36}\pi\left(i^2\,(10.901046542878233000000\,i)\,(8.0726194181320429000\,i)\right)}\right)=$$

$$0.7888928808009390030\,\sqrt[7]{i^4\int_0^\infty\frac{1}{1+t^2}\,dt}\left(0.87783895226602447535+1.00000000000000000000\left(i^4\int_0^\infty\frac{1}{1+t^2}\,dt\right)^{2/35}\right)$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$\frac{1}{2}\left(\sqrt[5]{\frac{2}{36}\pi\left(i^2\,(10.901046542878233000000\,i)\,(8.0726194181320429000\,i)\right)}+\sqrt[7]{\frac{2}{36}\pi\left(i^2\,(10.901046542878233000000\,i)\,(8.0726194181320429000\,i)\right)}\right)=$$

$$0.7888928808009390030\,\sqrt[7]{i^4\int_0^\infty\frac{\sin(t)}{t}\,dt}\left(0.87783895226602447535+1.00000000000000000000\left(i^4\int_0^\infty\frac{\sin(t)}{t}\,dt\right)^{2/35}\right)$$

Open code

$$\frac{1}{2}\left(\sqrt[5]{\frac{2}{36}\pi\left(i^2\,(10.901046542878233000000\,i)\,(8.0726194181320429000\,i)\right)}+\sqrt[7]{\frac{2}{36}\pi\left(i^2\,(10.901046542878233000000\,i)\,(8.0726194181320429000\,i)\right)}\right)=$$

$$0.9061999544449106532\,\sqrt[7]{i^4\int_0^1\sqrt{1-t^2}\,dt}\left(0.8437487332292958166+1.00000000000000000000\left(i^4\int_0^1\sqrt{1-t^2}\,dt\right)^{2/35}\right)$$

1/2 (((((((((2Pi * i^2*1/36 * (10.9010465428 i) (8.0726194181 i)))))^1/5 + ((((2Pi * i^2*1/36 * (10.9010465428 i) (8.0726194181 i)))))^1/6)))))

Input interpretation:

$$\frac{1}{2}\left(\sqrt[5]{2\,\pi\,i^2\times\frac{1}{36}\,(10.9010465428\,i)\,(8.0726194181\,i)}+\sqrt[6]{2\,\pi\,i^2\times\frac{1}{36}\,(10.9010465428\,i)\,(8.0726194181\,i)}\right)$$

Open code

- i is the imaginary unit

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

1.65176892982...

1.65176892982 is very near to the 14th root of the following Ramanujan's class invariant $Q = (G_{505}/G_{101/5})^3 = 1164{,}2696$ i.e. 1,65578...

Series representations:

- More

$$\frac{1}{2}\left(\sqrt[5]{\frac{2}{36}\pi\left(i^2\,(10.90104654280000\,i)\,(8.07261941810000\,i)\right)} + \sqrt[6]{\frac{2}{36}\pi\left(i^2\,(10.90104654280000\,i)\,(8.07261941810000\,i)\right)}\right) = 0.90619995444289\,\sqrt[6]{i^4\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}}\left(0.90564430690896 + 1.00000000000000\,\sqrt[30]{i^4\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}}\right)$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$\frac{1}{2}\left(\sqrt[5]{\frac{2}{36}\pi\left(i^2\,(10.90104654280000\,i)\,(8.07261941810000\,i)\right)} + \sqrt[6]{\frac{2}{36}\pi\left(i^2\,(10.90104654280000\,i)\,(8.07261941810000\,i)\right)}\right) = 0.78889288079918\left(0.92681273912614 + 1.00000000000000\,\sqrt[30]{i^4\left(-1+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}\right)}\right)\sqrt[6]{i^4\left(-1+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}\right)}$$

Open code

$$\frac{1}{2}\left(\sqrt[5]{\frac{2}{36}\pi\left(i^2 (10.90104654280000\, i)(8.07261941810000\, i)\right)} + \sqrt[6]{\frac{2}{36}\pi\left(i^2 (10.90104654280000\, i)(8.07261941810000\, i)\right)}\right) = 0.686771141760029 \sqrt[6]{i^4\left(x+2\sum_{k=1}^{\infty}\frac{\sin(k\,x)}{k}\right)} \left(0.94847595999171 + 1.00000000000000 \sqrt[30]{i^4\left(x+2\sum_{k=1}^{\infty}\frac{\sin(k\,x)}{k}\right)}\right)$$

for $(x \in \mathbb{R}$ and $x > 0)$

Integral representations:

- More

$$\frac{1}{2}\left(\sqrt[5]{\frac{2}{36}\pi\left(i^2 (10.90104654280000\, i)(8.07261941810000\, i)\right)} + \sqrt[6]{\frac{2}{36}\pi\left(i^2 (10.90104654280000\, i)(8.07261941810000\, i)\right)}\right) = 0.78889288079918 \sqrt[6]{i^4 \int_0^{\infty}\frac{1}{1+t^2}\,dt} \left(0.92681273912614 + 1.00000000000000 \sqrt[30]{i^4 \int_0^{\infty}\frac{1}{1+t^2}\,dt}\right)$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$\frac{1}{2}\left(\sqrt[5]{\frac{2}{36}\pi\left(i^2 (10.90104654280000\, i)(8.07261941810000\, i)\right)} + \sqrt[6]{\frac{2}{36}\pi\left(i^2 (10.90104654280000\, i)(8.07261941810000\, i)\right)}\right) = 0.78889288079918 \sqrt[6]{i^4 \int_0^{\infty}\frac{\sin(t)}{t}\,dt} \left(0.92681273912614 + 1.00000000000000 \sqrt[30]{i^4 \int_0^{\infty}\frac{\sin(t)}{t}\,dt}\right)$$

Open code

$$\frac{1}{2}\left(\sqrt[5]{\frac{2}{36}\pi\left(i^2\,(10.90104654280000\,i)\,(8.07261941810000\,i)\right)}+\sqrt[6]{\frac{2}{36}\pi\left(i^2\,(10.90104654280000\,i)\,(8.07261941810000\,i)\right)}\right)=$$

$$0.90619995444289\sqrt[6]{i^4\int_0^1\sqrt{1-t^2}\,dt}\left(0.90564430690896+1.00000000000000\sqrt[30]{i^4\int_0^1\sqrt{1-t^2}\,dt}\right)$$

1/2(((1/2((((((((2Pi * i^2*1/36 * (10.9010465428 i) (8.0726194181 i)))))^1/5 + ((((2Pi * i^2*1/36 * (10.9010465428 i) (8.0726194181 i)))))^1/7)))))+1.65176892981917490)))))

Input interpretation:

$$\frac{1}{2}\left(\frac{1}{2}\left(\sqrt[5]{2\pi i^2\times\frac{1}{36}\,(10.9010465428\,i)\,(8.0726194181\,i)}+\sqrt[7]{2\pi i^2\times\frac{1}{36}\,(10.9010465428\,i)\,(8.0726194181\,i)}\right)+1.65176892981917490\right)$$

Open code

- i is the imaginary unit

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

1.62694887122...

1.62694887122

Series representations:

- More

$$\frac{1}{2}\left(\frac{1}{2}\left(\sqrt[5]{\frac{2}{36}\pi\left(i^2\,(10.90104654280000\,i)\,(8.07261941810000\,i)\right)}+\sqrt[7]{\frac{2}{36}\pi\left(i^2\,(10.90104654280000\,i)\,(8.07261941810000\,i)\right)}\right)+1.651768929819174900000\right)=0.453099977221445$$

$$\left(1.82274223444940+0.84374873322983\sqrt[7]{i^4\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}}+1.00000000000000\sqrt[5]{i^4\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}}\right)$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$\frac{1}{2}\left(\frac{1}{2}\left(\sqrt[5]{\frac{2}{36}\pi\left(i^2(10.90104654280000\,i)(8.07261941810000\,i)\right)}+\sqrt[7]{\frac{2}{36}\pi\left(i^2(10.90104654280000\,i)(8.07261941810000\,i)\right)}\right)+1.651768929819174900000\right)=0.394446440399590$$

$$\left(2.09378100629564+0.87783895226658\sqrt[7]{i^4\left(-1+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}\right)}+1.00000000000000\sqrt[5]{i^4\left(-1+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}\right)}\right)$$

Open code

$$\frac{1}{2}\left(\frac{1}{2}\left(\sqrt[5]{\frac{2}{36}\pi\left(i^2(10.90104654280000\,i)(8.07261941810000\,i)\right)}+\sqrt[7]{\frac{2}{36}\pi\left(i^2(10.90104654280000\,i)(8.07261941810000\,i)\right)}\right)+1.651768929819174900000\right)=0.343385570880014$$

$$\left(2.40512279765584+0.91330652807817\sqrt[7]{i^4\left(x+2\sum_{k=1}^{\infty}\frac{\sin(k\,x)}{k}\right)}+1.00000000000000\sqrt[5]{i^4\left(x+2\sum_{k=1}^{\infty}\frac{\sin(k\,x)}{k}\right)}\right)\quad \text{for } (x\in\mathbb{R} \text{ and } x>0)$$

Integral representations:

- More

$$\frac{1}{2}\left(\frac{1}{2}\left(\sqrt[5]{\frac{2}{36}\pi\left(i^2\,(10.90104654280000\,i)\,(8.07261941810000\,i)\right)}+\sqrt[7]{\frac{2}{36}\pi\left(i^2\,(10.90104654280000\,i)\,(8.07261941810000\,i)\right)}\right)+1.65176892981917490000\right)=0.394446440399590$$

$$\left(2.09378100629564+0.87783895226658\sqrt[7]{i^4\int_0^\infty\frac{1}{1+t^2}\,dt}+1.00000000000000\sqrt[5]{i^4\int_0^\infty\frac{1}{1+t^2}\,dt}\right)$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$\frac{1}{2}\left(\frac{1}{2}\left(\sqrt[5]{\frac{2}{36}\pi\left(i^2\,(10.90104654280000\,i)\,(8.07261941810000\,i)\right)}+\sqrt[7]{\frac{2}{36}\pi\left(i^2\,(10.90104654280000\,i)\,(8.07261941810000\,i)\right)}\right)+1.65176892981917490000\right)=0.394446440399590$$

$$\left(2.09378100629564+0.87783895226658\sqrt[7]{i^4\int_0^\infty\frac{\sin(t)}{t}\,dt}+1.00000000000000\sqrt[5]{i^4\int_0^\infty\frac{\sin(t)}{t}\,dt}\right)$$

Open code

$$\frac{1}{2}\left(\frac{1}{2}\left(\sqrt[5]{\frac{2}{36}\pi\left(i^2\,(10.90104654280000\,i)\,(8.07261941810000\,i)\right)}+\sqrt[7]{\frac{2}{36}\pi\left(i^2\,(10.90104654280000\,i)\,(8.07261941810000\,i)\right)}\right)+1.65176892981917490000\right)=0.453099977221445$$

$$\left(1.82274223444940+0.84374873322983\sqrt[7]{i^4\int_0^1\sqrt{1-t^2}\,dt}+1.00000000000000\sqrt[5]{i^4\int_0^1\sqrt{1-t^2}\,dt}\right)$$

1/2(((1/2* (((((((2Pi * i^2*1/36 * (10.9010465428 i) (8.0726194181 i)))))^1/5 + ((((2Pi * i^2*1/36 * (10.9010465428 i) (8.0726194181 i)))))^1/7)))))+1.62694887121872617))))

Input interpretation:

$$\frac{1}{2}\left(\frac{1}{2}\left(\sqrt[5]{2\,\pi\,i^2\times\frac{1}{36}\,(10.9010465428\,i)\,(8.0726194181\,i)}+\sqrt[7]{2\,\pi\,i^2\times\frac{1}{36}\,(10.9010465428\,i)\,(8.0726194181\,i)}\right)+1.62694887121872617\right)$$

Open code

- i is the imaginary unit

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

1.61453884192...

1.61453884192

Series representations:

- More

$$\frac{1}{2}\left(\frac{1}{2}\left(\sqrt[5]{\frac{2}{36}\,\pi\,(i^2\,(10.90104654280000\,i)\,(8.07261941810000\,i))}+\sqrt[7]{\frac{2}{36}\,\pi\,(i^2\,(10.90104654280000\,i)\,(8.07261941810000\,i))}\right)+1.626948871218726170000\right)=0.453099977221445\left(1.79535307107683+0.843748733222983\sqrt[7]{i^4\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2\,k}}+1.00000000000000\sqrt[5]{i^4\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2\,k}}\right)$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$\frac{1}{2}\left(\frac{1}{2}\left(\sqrt[5]{\frac{2}{36}\pi\left(i^2\,(10.90104654280000\,i)\,(8.07261941810000\,i)\right)}+\sqrt[7]{\frac{2}{36}\pi\left(i^2\,(10.90104654280000\,i)\,(8.07261941810000\,i)\right)}\right)+1.626948871218726170000\right)=0.394446440399590$$

$$\left(2.06231911938483+0.87783895226658\sqrt[7]{i^4\left(-1+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}\right)}+1.00000000000000\sqrt[5]{i^4\left(-1+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}\right)}\right)$$

Open code

$$\frac{1}{2}\left(\frac{1}{2}\left(\sqrt[5]{\frac{2}{36}\pi\left(i^2\,(10.90104654280000\,i)\,(8.07261941810000\,i)\right)}+\sqrt[7]{\frac{2}{36}\pi\left(i^2\,(10.90104654280000\,i)\,(8.07261941810000\,i)\right)}\right)+1.626948871218726170000\right)=0.343385570880014$$

$$\left(2.36898257991629+0.91330652807817\sqrt[7]{i^4\left(x+2\sum_{k=1}^{\infty}\frac{\sin(k\,x)}{k}\right)}+1.00000000000000\sqrt[5]{i^4\left(x+2\sum_{k=1}^{\infty}\frac{\sin(k\,x)}{k}\right)}\right)\quad \text{for } (x\in\mathbb{R} \text{ and } x>0)$$

Integral representations:

- More

$$\frac{1}{2}\left(\frac{1}{2}\left(\sqrt[5]{\frac{2}{36}\pi\left(i^2 (10.90104654280000\, i)(8.07261941810000\, i)\right)} + \sqrt[7]{\frac{2}{36}\pi\left(i^2 (10.90104654280000\, i)(8.07261941810000\, i)\right)}\right) + 1.626948871218726170000\right) = 0.394446440399590$$

$$\left(2.06231911938483 + 0.87783895226658\sqrt[7]{i^4 \int_0^\infty \frac{1}{1+t^2}\, dt} + 1.00000000000000\sqrt[5]{i^4 \int_0^\infty \frac{1}{1+t^2}\, dt}\right)$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$\frac{1}{2}\left(\frac{1}{2}\left(\sqrt[5]{\frac{2}{36}\pi\left(i^2 (10.90104654280000\, i)(8.07261941810000\, i)\right)} + \sqrt[7]{\frac{2}{36}\pi\left(i^2 (10.90104654280000\, i)(8.07261941810000\, i)\right)}\right) + 1.626948871218726170000\right) = 0.394446440399590$$

$$\left(2.06231911938483 + 0.87783895226658\sqrt[7]{i^4 \int_0^\infty \frac{\sin(t)}{t}\, dt} + 1.00000000000000\sqrt[5]{i^4 \int_0^\infty \frac{\sin(t)}{t}\, dt}\right)$$

Open code

$$\frac{1}{2}\left(\frac{1}{2}\left(\sqrt[5]{\frac{2}{36}\pi\left(i^2 (10.90104654280000\, i)(8.07261941810000\, i)\right)} + \sqrt[7]{\frac{2}{36}\pi\left(i^2 (10.90104654280000\, i)(8.07261941810000\, i)\right)}\right) + 1.626948871218726170000\right) = 0.453099977221445$$

$$\left(1.79535307107683 + 0.84374873322983\sqrt[7]{i^4 \int_0^1 \sqrt{1-t^2}\, dt} + 1.00000000000000\sqrt[5]{i^4 \int_0^1 \sqrt{1-t^2}\, dt}\right)$$

1/2 (((((((((4Pi * i^2*1/36 * (10.9010465428782330 i) (8.0726194181320429 i)))))^1/6 + ((((4PI * i^2*1/36 * (10.9010465428782330 i) (8.0726194181320429 i)))))^1/9)))))

Input interpretation:

$$\frac{1}{2}\left(\sqrt[6]{4\pi i^2 \times \frac{1}{36}(10.9010465428782330\, i)(8.0726194181320429\, i)} + \sqrt[9]{4\pi i^2 \times \frac{1}{36}(10.9010465428782330\, i)(8.0726194181320429\, i)}\right)$$

Open code

- i is the imaginary unit

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

1.61638309268319654...

1.61638309268319654

Series representations:

- More

$$\frac{1}{2}\left(\sqrt[6]{\frac{4}{36}\pi\left(i^2(10.901046542878233000\, i)(8.072619418132042900\, i)\right)} + \sqrt[9]{\frac{4}{36}\pi\left(i^2(10.901046542878233000\, i)(8.072619418132042900\, i)\right)}\right) =$$

$$0.92119879954143528 59 \sqrt[9]{i^4 \sum_{k=0}^{\infty} \frac{(-1)^k}{1+2k}} \left(0.8157158110430220049 + 1.0000000000000000000 \sqrt[18]{i^4 \sum_{k=0}^{\infty} \frac{(-1)^k}{1+2k}}\right)$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$\frac{1}{2}\left(\sqrt[6]{\frac{4}{36}\pi\left(i^2\,(10.901046542878233000000\,i)\,(8.0726194181320429000\,i)\right)}+\sqrt[9]{\frac{4}{36}\pi\left(i^2\,(10.901046542878233000000\,i)\,(8.0726194181320429000\,i)\right)}\right)=$$

$$0.8206948296638840 83\left(0.847740182446508466+1.000000000000000000\sqrt[18]{i^4\left(-1+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}\right)}\right)\sqrt[9]{i^4\left(-1+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}\right)}$$

Open code

$$\frac{1}{2}\left(\sqrt[6]{\frac{4}{36}\pi\left(i^2\,(10.901046542878233000000\,i)\,(8.0726194181320429000\,i)\right)}+\sqrt[9]{\frac{4}{36}\pi\left(i^2\,(10.901046542878233000000\,i)\,(8.0726194181320429000\,i)\right)}\right)=$$

$$0.731155971731958442\sqrt[9]{i^4\left(x+2\sum_{k=1}^{\infty}\frac{\sin(k\,x)}{k}\right)}\left(0.881021805885452104+1.000000000000000000\sqrt[18]{i^4\left(x+2\sum_{k=1}^{\infty}\frac{\sin(k\,x)}{k}\right)}\right)$$

for $(x\in\mathbb{R}$ and $x>0)$

Integral representations:

- More

$$\frac{1}{2}\left(\sqrt[6]{\frac{4}{36}\pi\left(i^2\,(10.901046542878233000000\,i)\,(8.0726194181320429000\,i)\right)}+\sqrt[9]{\frac{4}{36}\pi\left(i^2\,(10.901046542878233000000\,i)\,(8.0726194181320429000\,i)\right)}\right)=$$

$$0.8206948296638840 8311\sqrt[9]{i^4\int_0^{\infty}\frac{1}{1+t^2}\,dt}\left(0.8477401824465084661+1.0000000000000000000\sqrt[18]{i^4\int_0^{\infty}\frac{1}{1+t^2}\,dt}\right)$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$\frac{1}{2}\left(\sqrt[6]{\frac{4}{36}\pi\left(i^2 (10.901046542878233000000\, i)(8.0726194181320429000\, i)\right)} + \sqrt[9]{\frac{4}{36}\pi\left(i^2 (10.901046542878233000000\, i)(8.0726194181320429000\, i)\right)}\right) =$$

$$0.82069482966388408311 \sqrt[9]{i^4 \int_0^\infty \frac{\sin(t)}{t}\, dt} \left(0.84774018244650846661 + 1.0000000000000000000 \sqrt[18]{i^4 \int_0^\infty \frac{\sin(t)}{t}\, dt}\right)$$

Open code

$$\frac{1}{2}\left(\sqrt[6]{\frac{4}{36}\pi\left(i^2 (10.901046542878233000000\, i)(8.0726194181320429000\, i)\right)} + \sqrt[9]{\frac{4}{36}\pi\left(i^2 (10.901046542878233000000\, i)(8.0726194181320429000\, i)\right)}\right) =$$

$$0.92119879954143528859 \sqrt[9]{i^4 \int_0^1 \sqrt{1-t^2}\, dt} \left(0.81571581104302200049 + 1.0000000000000000000 \sqrt[18]{i^4 \int_0^1 \sqrt{1-t^2}\, dt}\right)$$

1/2 (((((((((4Pi * i^2*1/36 * (10.9010465428782330 i) (8.0726194181320429 i)))))^1/5 + ((((4PI * i^2*1/36 * (10.9010465428782330 i) (8.0726194181320429 i)))))^1/15)))))

Input interpretation:

$$\frac{1}{2}\left(\sqrt[5]{4\pi i^2 \times \frac{1}{36} (10.9010465428782330\, i)(8.0726194181320429\, i)} + \sqrt[15]{4\pi i^2 \times \frac{1}{36} (10.9010465428782330\, i)(8.0726194181320429\, i)}\right)$$

Open code

- i is the imaginary unit

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

1.62010003183015861...

1.62010003183015861

Series representations:

- More

$$\frac{1}{2}\left(\sqrt[5]{\frac{4}{36}\pi\left(i^2\,(10.901046542878233000000\,i)\,(8.0726194181320429000\,i)\right)}+\sqrt[15]{\frac{4}{36}\pi\left(i^2\,(10.901046542878233000000\,i)\,(8.0726194181320429000\,i)\right)}\right)=$$

$$1.0409503969692569288\sqrt[15]{i^4\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}}\left(0.6133287357705526168+1.0000000000000000000\left(i^4\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}\right)^{2/15}\right)$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$\frac{1}{2}\left(\sqrt[5]{\frac{4}{36}\pi\left(i^2\,(10.901046542878233000000\,i)\,(8.0726194181320429000\,i)\right)}+\sqrt[15]{\frac{4}{36}\pi\left(i^2\,(10.901046542878233000000\,i)\,(8.0726194181320429000\,i)\right)}\right)=$$

$$0.906199954444910653\left(0.672714278157666985+1.0000000000000000000\left(i^4\left(-1+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}\right)\right)^{2/15}\right)\sqrt[15]{i^4\left(-1+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}\right)}$$

Open code

$$\frac{1}{2}\left(\sqrt[5]{\frac{4}{36}\pi\left(i^2\,(10.901046542878233000000\,i)\,(8.0726194181320429000\,i)\right)}+\sqrt[15]{\frac{4}{36}\pi\left(i^2\,(10.901046542878233000000\,i)\,(8.0726194181320429000\,i)\right)}\right)$$

$$=0.788892880800939003\sqrt[15]{i^4\left(x+2\sum_{k=1}^{\infty}\frac{\sin(k\,x)}{k}\right)}\left(0.737849824480568051+1.0000000000000000000\left(i^4\left(x+2\sum_{k=1}^{\infty}\frac{\sin(k\,x)}{k}\right)\right)^{2/15}\right)$$

for ($x \in \mathbb{R}$ and $x > 0$)

Integral representations:

- More

$$\frac{1}{2}\left(\sqrt[5]{\frac{4}{36}\pi\left(i^2\,(10.901046542878233000000\,i)\,(8.0726194181320429000\,i)\right)}+\sqrt[15]{\frac{4}{36}\pi\left(i^2\,(10.901046542878233000000\,i)\,(8.0726194181320429000\,i)\right)}\right)=$$

$$0.9061999544449106532\sqrt[15]{i^4\int_0^\infty\frac{1}{1+t^2}\,dt}\left(0.6727142781576669850+1.0000000000000000000\left(i^4\int_0^\infty\frac{1}{1+t^2}\,dt\right)^{2/15}\right)$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$\frac{1}{2}\left(\sqrt[5]{\frac{4}{36}\pi\left(i^2\,(10.901046542878233000000\,i)\,(8.0726194181320429000\,i)\right)}+\sqrt[15]{\frac{4}{36}\pi\left(i^2\,(10.901046542878233000000\,i)\,(8.0726194181320429000\,i)\right)}\right)=$$

$$0.9061999544449106532\sqrt[15]{i^4\int_0^\infty\frac{\sin(t)}{t}\,dt}\left(0.6727142781576669850+1.0000000000000000000\left(i^4\int_0^\infty\frac{\sin(t)}{t}\,dt\right)^{2/15}\right)$$

Open code

$$\frac{1}{2}\left(\sqrt[5]{\frac{4}{36}\pi\left(i^2\,(10.901046542878233000000\,i)\,(8.0726194181320429000\,i)\right)}+\sqrt[15]{\frac{4}{36}\pi\left(i^2\,(10.901046542878233000000\,i)\,(8.0726194181320429000\,i)\right)}\right)=$$

$$1.0409503969692569288\sqrt[15]{i^4\int_0^1\sqrt{1-t^2}\,dt}\left(0.6133287357705526168+1.0000000000000000000\left(i^4\int_0^1\sqrt{1-t^2}\,dt\right)^{2/15}\right)$$

1/2(((((1/2 *((((((4Pi * i^2*1/36 * (10.9010465428782330 i) (8.0726194181320429 i)))))^1/6 + ((((4PI * i^2*1/36 * (10.9010465428782330 i) (8.0726194181320429 i)))))^1/9)))))+1.62010003183015861)))

Input interpretation:

$$\frac{1}{2}\left(\frac{1}{2}\left(\sqrt[6]{4\pi i^2 \times \frac{1}{36}(10.9010465428782330\, i)(8.0726194181320429\, i)} + \sqrt[9]{4\pi i^2 \times \frac{1}{36}(10.9010465428782330\, i)(8.0726194181320429\, i)}\right) + 1.62010003183015861\right)$$

Open code

- i is the imaginary unit

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

1.61824156225667758...

1.61824156225667758 ≈ ϕ

Series representations:

$$\frac{1}{2}\left(\frac{1}{2}\left(\sqrt[6]{\frac{4}{36}\pi\left(i^2(10.901046542878233000000\, i)(8.072619418132042900000\, i)\right)} + \left(\frac{4}{36}\pi\left(i^2(10.901046542878233000000\, i)(8.072619418132042900000\, i)\right)\right)\hat{}\,(1/9)\right) + 1.6201000318301586100000\right) = 0.4605993997707176429$$

$$\left(1.758686651173047828 + 0.8157158110430220049\sqrt[9]{i^4\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}} + 1.0000000000000000000\sqrt[6]{i^4\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}}\right)$$

$$\frac{1}{2}\left(\frac{1}{2}\left(\sqrt[6]{\frac{4}{36}\pi\left(i^2\,(10.901046542878233000000\,i)\,(8.0726194181320429000\,i)\right)}+\left(\frac{4}{36}\pi\left(i^2\,(10.901046542878233000000\,i)\,(8.0726194181320429000\,i)\right)\right)\wedge(1/9)\right)+1.62010003183015861000\right)=0.410347414831942042$$

$$\left(1.97405902081005100+0.84774018244650847\sqrt[9]{i^4\left(-1+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}\right)}+1.00000000000000000\sqrt[6]{i^4\left(-1+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}\right)}\right)$$

$$\frac{1}{2}\left(\frac{1}{2}\left(\left(\frac{4}{36}\pi\left(i^2\,(10.901046542878233000000\,i)\,(8.0726194181320429000\,i)\right)\right)\wedge(1/6)+\left(\frac{4}{36}\pi\left(i^2\,(10.901046542878233000000\,i)\,(8.0726194181320429000\,i)\right)\right)\wedge(1/9)\right)+1.62010003183015861000\right)=0.365577985865979221$$

$$\left(2.21580633198204499+0.88102180588545210\sqrt[9]{i^4\left(x+2\sum_{k=1}^{\infty}\frac{\sin(k\,x)}{k}\right)}+1.00000000000000000\sqrt[6]{i^4\left(x+2\sum_{k=1}^{\infty}\frac{\sin(k\,x)}{k}\right)}\right)\quad \text{for } (x\in\mathbb{R} \text{ and } x>0)$$

Integral representations:

- More

$$\frac{1}{2}\left(\frac{1}{2}\left(\sqrt[6]{\frac{4}{36}\pi\left(i^2\,(10.901046542878233000000\,i)\,(8.0726194181320429000\,i)\right)}+\left(\frac{4}{36}\pi\left(i^2\,(10.901046542878233000000\,i)\,(8.0726194181320429000\,i)\right)\right)\hat{}\,(1/9)\right)+1.620100031830158610000\right)=0.4103474148319420416$$

$$\left(1.974059020810051000+0.847740182446508466\,1\sqrt[9]{i^4\int_0^\infty\frac{1}{1+t^2}\,dt}+1.0000000000000000000\sqrt[6]{i^4\int_0^\infty\frac{1}{1+t^2}\,dt}\right)$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$\frac{1}{2}\left(\frac{1}{2}\left(\sqrt[6]{\frac{4}{36}\pi\left(i^2\,(10.901046542878233000000\,i)\,(8.0726194181320429000\,i)\right)}+\left(\frac{4}{36}\pi\left(i^2\,(10.901046542878233000000\,i)\,(8.0726194181320429000\,i)\right)\right)\hat{}\,(1/9)\right)+1.620100031830158610000\right)=0.4103474148319420416$$

$$\left(1.974059020810051000+0.847740182446508466\,1\sqrt[9]{i^4\int_0^\infty\frac{\sin(t)}{t}\,dt}+1.0000000000000000000\sqrt[6]{i^4\int_0^\infty\frac{\sin(t)}{t}\,dt}\right)$$

Open code

$$\frac{1}{2}\left(\frac{1}{2}\left(\sqrt[6]{\frac{4}{36}\pi\left(i^2\,(10.90104654287823300000\,i)\,(8.07261941813204290000\,i)\right)}+\left(\frac{4}{36}\pi\left(i^2\,(10.90104654287823300000\,i)\,(8.07261941813204290000\,i)\right)\right)\hat{}\,(1/9)\right)+1.62010003183015861000\right)=0.4605993997707176429$$

$$\left(1.758686651173047828+0.8157158110430220049\sqrt[9]{i^4\int_0^1\sqrt{1-t^2}\,dt}+1.0000000000000000000\sqrt[6]{i^4\int_0^1\sqrt{1-t^2}\,dt}\right)$$

Continued fraction:

- Linear form

$$1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{5+\cfrac{1}{6+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{9+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{2+\cfrac{1}{5+\cfrac{1}{\dots}}}}}}}}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

- More

$$\frac{7\,(45+46\,e+10\,e^2)}{-163+353\,e+35\,e^2}\approx 1.61824156225667757844$$

$$\frac{239\,699\,712\,\pi}{465\,343\,909}\approx 1.61824156225667577784$$

$$\pi\ \left(\text{root of } 2287\,x^4+720\,x^3+653\,x^2+684\,x-785 \text{ near } x=0.515102\right)\approx 1.61824156225667578665$$

Now, we have:

Ramanujan in approximately 1912. In his first two letters to G. H. Hardy [16], Ramanujan communicated several results concerning $R(q)$. In particular, he asserted that

$$R(e^{-2\pi}) = \sqrt{\frac{5+\sqrt{5}}{2}} - \frac{\sqrt{5}+1}{2}, \qquad (1.3)$$

$$S(e^{-\pi}) = \sqrt{\frac{5-\sqrt{5}}{2}} - \frac{\sqrt{5}-1}{2}, \qquad (1.4)$$

and

$$R(e^{-2\pi\sqrt{5}}) = \frac{\sqrt{5}}{1+\left(5^{3/4}\left(\frac{\sqrt{5}-1}{2}\right)^{5/2}-1\right)^{1/5}} - \frac{\sqrt{5}+1}{2}. \qquad (1.5)$$

From the right hand side of (1.3), we obtain:

(((sqrt(((5+sqrt(5))/2))))) - ((((sqrt(5)+1))/2)))

Input:

$$\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)} - \frac{1}{2}\left(\sqrt{5}+1\right)$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

$$\frac{1}{2}\left(-1-\sqrt{5}\right)+\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}$$

Decimal approximation:

- More digits

0.284079043840412296028291832393126169091088088445737582759...

1 + ((((((((((sqrt(((5+sqrt(5))/2))))) - ((((sqrt(5)+1))/2)))))))^1/3)))

Input:

$$1+\sqrt[3]{\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)} - \frac{1}{2}\left(\sqrt{5}+1\right)}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

$$1+\sqrt[3]{\frac{1}{2}\left(-1-\sqrt{5}\right)+\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}}$$

Decimal approximation:

- More digits

1.657374821424964816288213890727094464737564934522565372073...

1.6573748214... is very near to the 14th root of the following Ramanujan's class invariant $Q = \left(G_{505}/G_{101/5}\right)^3 = 1164{,}2696$ i.e. 1,65578...

Continued fraction:

- Linear form

$$1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{11+\cfrac{1}{3+\cfrac{1}{2+\cfrac{1}{3+\cfrac{1}{3+\cfrac{1}{1+\cfrac{1}{7+\cfrac{1}{464+\cfrac{1}{16+\cfrac{1}{1+\cfrac{1}{3+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{1+\cfrac{1}{7+\cfrac{1}{1+\cfrac{1}{\dots}}}}}}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

- More

$$\frac{4}{7}\pi\cot^2\left(\frac{6924827}{8598396}\right)\approx 1.65737482142496481662026$$

$$\frac{18320+3479\pi+1269\pi^2}{8023\pi}\approx 1.65737482142496481642540$$

$$\frac{2040\pi\,\pi!-8544-7971\pi-46\pi^2}{2310\pi}\approx 1.65737482142496481630290$$

•

10^3 * [1 + ((((((((((sqrt(((5+sqrt(5))/2))))) - ((((sqrt(5)+1))/2)))))))^1/3))))] + 24*3

Input:

$$10^3\left(1+\sqrt[3]{\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}-\frac{1}{2}\left(\sqrt{5}+1\right)}\right)+24\times 3$$

Open code

Enlarge Data Customize A Plaintext Interactive
Result:

$$72 + 1000 \left(1 + \sqrt[3]{\frac{1}{2}\left(-1 - \sqrt{5}\right) + \sqrt{\frac{1}{2}\left(5 + \sqrt{5}\right)}}\right)$$

Decimal approximation:

- More digits
  1729.374821424964816288213890727094464737564934522565372073...

1729.374821…

This result is very near to the mass of candidate glueball $f_0(1710)$ meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. As a consequence, it is sometimes called a Zagier as a pun on the Gross–Zagier theorem. The number 1728 is one less than the Hardy–Ramanujan number 1729

(((((10^3 * [1 + ((((((((((sqrt(((5+sqrt(5))/2)))) - ((((sqrt(5)+1))/2)))))))^1/3))))] + 24*3)))))^1/3

Input:

$$\sqrt[3]{10^3 \left(1 + \sqrt[3]{\sqrt{\frac{1}{2}\left(5 + \sqrt{5}\right)} - \frac{1}{2}\left(\sqrt{5} + 1\right)}\right) + 24 \times 3}$$

Open code

Enlarge Data Customize A Plaintext Interactive
Result:

$$\sqrt[3]{72 + 1000 \left(1 + \sqrt[3]{\frac{1}{2}\left(-1 - \sqrt{5}\right) + \sqrt{\frac{1}{2}\left(5 + \sqrt{5}\right)}}\right)}$$

Decimal approximation:

- More digits
  12.00318161337237724033067686835026554549919736201987048485...

12.00318…

This result is very near to the value of black hole entropy 12,1904

2 * (((((10^3 * [1 + ((((((((((sqrt(((5+sqrt(5))/2)))) - ((((sqrt(5)+1))/2)))))))^1/3))))] + 24*3)))))^1/3

Input:

$$\sqrt[3]{2}\sqrt{10^3\left(1+\sqrt[3]{\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}-\frac{1}{2}\left(\sqrt{5}+1\right)}\right)+24\times 3}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

$$\sqrt[3]{2}\sqrt{72+1000\left(1+\sqrt[3]{\frac{1}{2}\left(-1-\sqrt{5}\right)+\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}}\right)}$$

Decimal approximation:

- More digits

24.006363226744754480661353736700531090998394724039740969 70...

24.00636...

This value is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 24 "modes" corresponding to the physical vibrations of a bosonic string.

(((((10^3 * [1 + ((((((((((sqrt(((5+sqrt(5))/2))))) - ((((sqrt(5)+1))/2)))))))^1/3))))] + 24*3)))))^1/15

Input:

$$\sqrt[15]{10^3\left(1+\sqrt[3]{\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}-\frac{1}{2}\left(\sqrt{5}+1\right)}\right)+24\times 3}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

$$\sqrt[15]{72+1000\left(1+\sqrt[3]{\frac{1}{2}\left(-1-\sqrt{5}\right)+\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}}\right)}$$

Decimal approximation:

- More digits

1.6438389833214198877720258596478907736984684837198940211 43...

$$1.643838983... \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 ...$$

Continued fraction:

- Linear form

$$1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{4+\cfrac{1}{4+\cfrac{1}{1+\cfrac{1}{54+\cfrac{1}{1+\cfrac{1}{12+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{21+\cfrac{1}{2+\cfrac{1}{461+\cfrac{1}{18+\cfrac{1}{\cdots}}}}}}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

More

- $\frac{2855978687\,\pi}{5458151165} \approx 1.64383898332141988775 1683$
- $-\frac{2(-244\,e\,e! - 1228 - 1347\,e + 1033\,e^2)}{37\,e} \approx 1.64383898332141988794355$
- root of $61x^5 - 533x^4 - 310x^3 + 1097x^2 + 580x + 619$ near $x = 1.64384$ $\approx$ 1.6438389833214198887767750

From the right hand side of (1.4), we obtain:

(((((sqrt(((5-sqrt(5))/2))))) - ((((sqrt(5)-1))/2)))))))

Input:

$$\sqrt{\frac{1}{2}\left(5-\sqrt{5}\right)} - \frac{1}{2}\left(\sqrt{5}-1\right)$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

$$\frac{1}{2}\left(1-\sqrt{5}\right)+\sqrt{\frac{1}{2}\left(5-\sqrt{5}\right)}$$

Decimal approximation:

- More digits

0.5575365158350514101328250749125074194749956954805291200 09...

1 / (((((sqrt(((5-sqrt(5))/2))))) - ((((sqrt(5)-1))/2)))))))^3

Input:

$$\frac{1}{\left(\sqrt{\frac{1}{2}\left(5-\sqrt{5}\right)}-\frac{1}{2}\left(\sqrt{5}-1\right)\right)^3}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

$$\frac{1}{\left(\frac{1}{2}\left(1-\sqrt{5}\right)+\sqrt{\frac{1}{2}\left(5-\sqrt{5}\right)}\right)^3}$$

Decimal approximation:

- More digits

5.770056287152131078355647694490271982435555782434017543212...

0.5 [((((((1 / (((((sqrt(((5-sqrt(5))/2))))) - ((((sqrt(5)-1))/2)))))))^3))))^1/3 + ((((1 / (((((sqrt(((5-sqrt(5))/2))))) - ((((sqrt(5)-1))/2)))))))^3))))^1/4))))]

Input:

$$0.5\left(\sqrt[3]{\left(\frac{1}{\sqrt{\frac{1}{2}\left(5-\sqrt{5}\right)}-\frac{1}{2}\left(\sqrt{5}-1\right)}\right)^3}+\sqrt[4]{\left(\frac{1}{\sqrt{\frac{1}{2}\left(5-\sqrt{5}\right)}-\frac{1}{2}\left(\sqrt{5}-1\right)}\right)^3}\right)$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- Fewer digits
- More digits

1.671736783610430161199406873388879172307719900842877523757...

1.6717367836...

We note that 1.6717367836... is a result practically equal to the value of the formula:

$$m_{p'} = 2 \times \frac{\eta}{R} m_P = 1.6714213 \times 10^{-24} \text{ gm}$$

that is the holographic proton mass

Continued fraction:

- Linear form

$$1+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{21+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{3+\cfrac{1}{2+\cfrac{1}{1+\cfrac{1}{6+\cfrac{1}{13+\cfrac{1}{8+\cfrac{1}{4+\cfrac{1}{2+\cfrac{1}{55+\cfrac{1}{1+\cfrac{1}{57+\cfrac{1}{1+\cfrac{1}{\cdots}}}}}}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

More

- $e^{-7/2-e/2+17/(6\pi)+(5\pi)/6}\,\pi^{7-(2e)/3}\,\sin^{10}(e\pi)\,(-\cos(e\pi))^{10/3} \approx 1.6717367836104301607452$

$\frac{4608821831\,\pi}{8661076880} \approx 1.67173678361043016122064$

$\log\left(\frac{1}{75}\left(56+225\sqrt{2}+250\,e+70\,e^2+271\,\pi-205\,\pi^2\right)\right) \approx$

$1.67173678361043016110661 5$

10^3 * (1.67173678361043) + (32*2 - 8)

Input interpretation:

$10^3 \times 1.67173678361043 + (32 \times 2 - 8)$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

1727.73678361043

1727.7367…

This result is very near to the mass of candidate glueball $f_0(1710)$ meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. As a consequence, it is sometimes called a Zagier as a pun on the Gross–Zagier theorem. The number 1728 is one less than the Hardy–Ramanujan number 1729

(((10^3 * (1.67173678361043) + (32*2 - 8))))^1/3

Input interpretation:

$$\sqrt[3]{10^3 \times 1.67173678361043 + (32 \times 2 - 8)}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

11.9993906718624...

11.99939...

This result is very near to the value of black hole entropy 12,1904

2 * (((10^3 * (1.67173678361043) + (32*2 - 8))))^1/3

Input interpretation:

$$2\sqrt[3]{10^3 \times 1.67173678361043 + (32 \times 2 - 8)}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

23.9987813437248...

23.99878...

This result is very near to the value of black hole entropy 23,9078

(((10^3 * (1.67173678361043) + (32*2 - 8))))^1/15

Input interpretation:

$$\sqrt[15]{10^3 \times 1.67173678361043 + (32 \times 2 - 8)}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- Fewer digits
- More digits

1.643735136107480357671623010690468620888613502743373500463...

$$1.6437351361\ldots \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 \ldots$$

Continued fraction:

- Linear form

$$1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{4+\cfrac{1}{5+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{11+\cfrac{1}{1+\cfrac{1}{6+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{4+\cfrac{1}{13+\cfrac{1}{2+\cfrac{1}{8+\cfrac{1}{1+\cfrac{1}{13+\cfrac{1}{8+\cfrac{1}{\dots}}}}}}}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

- More

$$\frac{705638-18107\pi^2}{102040\pi}\approx 1.64373513610748035783735$$

$$\frac{1190842807\pi}{2276001122}\approx 1.64373513610748035765867$$

$$\frac{\sqrt[3]{\frac{22303933}{640810}}\pi}{3\times 3^{2/3}}\approx 1.64373513610748037168 3$$

From the right hand side of (1.5), we obtain:

((sqrt(5)/((1+((((((5^0.75*(((sqrt(5)-1))/2)))^2.5 - 1)))^1/5))) - ((sqrt(5)+1))/2))

Input:

$$\frac{\sqrt{5}}{1+\sqrt[5]{\left(5^{0.75}\left(\frac{1}{2}\left(\sqrt{5}-1\right)\right)\right)^{2.5}-1}}-\frac{1}{2}\left(\sqrt{5}+1\right)$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

−0.681390...

-1 + sin ((((((sqrt(5)/((1+((((((5^0.75*(((sqrt(5)-1))/2)))^2.5 - 1)))^1/5))) - ((sqrt(5)+1))/2))))))

Input:

$$-1+\sin\left(\frac{\sqrt{5}}{1+\sqrt[5]{\left(5^{0.75}\left(\frac{1}{2}\left(\sqrt{5}-1\right)\right)\right)^{2.5}-1}}-\frac{1}{2}\left(\sqrt{5}+1\right)\right)$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- Fewer digits
- More digits

$-1.629873122882346803775705467398592590947062421818157916 48\ldots$

-1.6298731228823468037757054673985925909470624218181 57

Series representations:

- More

$$-1+\sin\left(\frac{\sqrt{5}}{1+\sqrt[5]{\left(\frac{1}{2}\times 5^{0.75}\left(\sqrt{5}-1\right)\right)^{2.5}-1}}-\frac{1}{2}\left(\sqrt{5}+1\right)\right)=$$
$$-1+2\sum_{k=0}^{\infty}(-1)^k J_{1+2k}\left(-\frac{1}{2}+\left(-\frac{1}{2}+\frac{1}{1+\sqrt[5]{-1+3.61405\left(-1+\sqrt{5}\right)^{2.5}}}\right)\sqrt{5}\right)$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$-1+\sin\left(\frac{\sqrt{5}}{1+\sqrt[5]{\left(\frac{1}{2}\times 5^{0.75}\left(\sqrt{5}-1\right)\right)^{2.5}-1}}-\frac{1}{2}\left(\sqrt{5}+1\right)\right)=$$
$$-1+\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{1}{2}\left(-1-\sqrt{5}\right)+\frac{\sqrt{5}}{1+\sqrt[5]{-1+3.61405\left(-1+\sqrt{5}\right)^{2.5}}}\right)^{1+2k}}{(1+2k)!}$$

Open code

$$-1+\sin\left(\frac{\sqrt{5}}{1+\sqrt[5]{\left(\frac{1}{2}\times 5^{0.75}\left(\sqrt{5}-1\right)\right)^{2.5}-1}}-\frac{1}{2}\left(\sqrt{5}+1\right)\right)=$$

$$-1+\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-1-\pi+\left(-1+\frac{2}{1+\sqrt[5]{-1+3.61405\left(-1+\sqrt{5}\right)^{2.5}}}\right)\sqrt{5}\right)^{2k}}{(2k)!}$$

Integral representations:

$$-1+\sin\left(\frac{\sqrt{5}}{1+\sqrt[5]{\left(\frac{1}{2}\times 5^{0.75}\left(\sqrt{5}-1\right)\right)^{2.5}-1}}-\frac{1}{2}\left(\sqrt{5}+1\right)\right)=$$

$$-1+\frac{1}{2}\left(-1-\sqrt{5}\right)+\frac{\sqrt{5}}{1+\sqrt[5]{-1+3.61405\left(-1+\sqrt{5}\right)^{2.5}}}$$

$$\int_0^1\cos\left(t\left(\frac{1}{2}\left(-1-\sqrt{5}\right)+\frac{\sqrt{5}}{1+\sqrt[5]{-1+3.61405\left(-1+\sqrt{5}\right)^{2.5}}}\right)\right)dt$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$-1+\sin\left(\frac{\sqrt{5}}{1+\sqrt[5]{\left(\frac{1}{2}\times 5^{0.75}\left(\sqrt{5}-1\right)\right)^{2.5}-1}}-\frac{1}{2}\left(\sqrt{5}+1\right)\right)=$$

$$-1+\frac{\left(\frac{1}{2}\left(-1-\sqrt{5}\right)+\frac{\sqrt{5}}{1+\sqrt[5]{-1+3.61405\left(-1+\sqrt{5}\right)^{2.5}}}\right)\sqrt{\pi}}{4i\pi}$$

$$\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{\exp\left(s-\frac{\left(\frac{1}{2}\left(-1-\sqrt{5}\right)+\frac{\sqrt{5}}{1+\sqrt[5]{-1+3.61405\left(-1+\sqrt{5}\right)^{2.5}}}\right)^2}{4s}\right)}{s^{3/2}}\,ds \quad \text{for } \gamma>0$$

Continued fraction:

- Linear form

$$-1+\cfrac{1}{-1+\cfrac{1}{-1+\cfrac{1}{-1+\cfrac{1}{-2+\cfrac{1}{-2+\cfrac{1}{-1+\cfrac{1}{-4+\cfrac{1}{-1+\cfrac{1}{-13+\cfrac{1}{-3+\cfrac{1}{-1+\cfrac{1}{-3+\cfrac{1}{-1+\cfrac{1}{-13+\cfrac{1}{-1+\cfrac{1}{\dots}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

- More

$$-\frac{2\,301\,329\,987\,\pi}{4\,435\,830\,789} \approx -1.62987312288234680378470\,2$$

$$\text{root of } 55x^5 - 194x^4 + 654x^3 + 1567x^2 - 401x + 17 \text{ near } x = -1.62987 \approx$$

$$-1.6298731228823468037\,91327$$

$$-\frac{-2+\sqrt{2}+\sqrt{3}+e+3\pi-3\pi^2+\log\left(\frac{27}{16}\right)}{-3+7\sqrt{3}-e-4\pi-7\log(3)+\log(64)} \approx -1.62987312288234680\,45821$$

-

- 24*4 + (((((((10^3 * (-1 + sin ((((((sqrt(5)/((1+((((((5^0.75*(((sqrt(5)-1))/2)))^2.5 - 1)))^1/5))) - ((sqrt(5)+1))/2)))))))))))

Input:

$$-24\times 4+10^3\left(-1+\sin\left(\frac{\sqrt{5}}{1+\sqrt[5]{\left(5^{0.75}\left(\frac{1}{2}\left(\sqrt{5}-1\right)\right)\right)^{2.5}-1}}-\frac{1}{2}\left(\sqrt{5}+1\right)\right)\right)$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

$-1725.873\ldots$

-1725.873…

This result is very near to the mass of candidate glueball $f_0(1710)$ meson, with minus sign

Series representations:

- More

$$-24\times 4+10^3\left(-1+\sin\left(\frac{\sqrt{5}}{1+\sqrt[5]{\left(\frac{1}{2}\times 5^{0.75}\left(\sqrt{5}-1\right)\right)^{2.5}-1}}-\frac{1}{2}\left(\sqrt{5}+1\right)\right)\right)=$$

$$-1096+2000\sum_{k=0}^{\infty}(-1)^k J_{1+2k}\left(-\frac{1}{2}+\left(-\frac{1}{2}+\frac{1}{1+\sqrt[5]{-1+3.61405\left(-1+\sqrt{5}\right)^{2.5}}}\right)\sqrt{5}\right)$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$-24\times 4+10^3\left(-1+\sin\left(\frac{\sqrt{5}}{1+\sqrt[5]{\left(\frac{1}{2}\times 5^{0.75}\left(\sqrt{5}-1\right)\right)^{2.5}-1}}-\frac{1}{2}\left(\sqrt{5}+1\right)\right)\right)=$$

$$-1096+1000\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}+\left(-\frac{1}{2}+\frac{1}{1+\sqrt[5]{-1+3.61405\left(-1+\sqrt{5}\right)^{2.5}}}\right)\sqrt{5}\right)^{1+2k}}{(1+2k)!}$$

Open code

$$-24\times 4+10^3\left(-1+\sin\left(\frac{\sqrt{5}}{1+\sqrt[5]{\left(\frac{1}{2}\times 5^{0.75}\left(\sqrt{5}-1\right)\right)^{2.5}-1}}-\frac{1}{2}\left(\sqrt{5}+1\right)\right)\right)=$$

$$-1096+1000\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{1}{2}\left(-1-\sqrt{5}\right)+\frac{\sqrt{5}}{1+\sqrt[5]{-1+3.61405\left(-1+\sqrt{5}\right)^{2.5}}}\right)^{1+2k}}{(1+2k)!}$$

Integral representations:

$$-24\times 4+10^{3}\left(-1+\sin\left(\frac{\sqrt{5}}{1+\sqrt[5]{\left(\frac{1}{2}\times 5^{0.75}\left(\sqrt{5}-1\right)\right)^{2.5}-1}}-\frac{1}{2}\left(\sqrt{5}+1\right)\right)\right)=$$

$$-96+1000\left(-1+\frac{1}{2}\left(-1-\sqrt{5}\right)+\frac{\sqrt{5}}{1+\sqrt[5]{-1+3.61405\left(-1+\sqrt{5}\right)^{2.5}}}\right.$$

$$\left.\int_0^1\cos\left(t\left(\frac{1}{2}\left(-1-\sqrt{5}\right)+\frac{\sqrt{5}}{1+\sqrt[5]{-1+3.61405\left(-1+\sqrt{5}\right)^{2.5}}}\right)\right)dt\right)$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$-24\times 4+10^3\left(-1+\sin\left(\frac{\sqrt{5}}{1+\sqrt[5]{\left(\frac{1}{2}\times 5^{0.75}\left(\sqrt{5}-1\right)\right)^{2.5}-1}}-\frac{1}{2}\left(\sqrt{5}+1\right)\right)\right)=$$

$$-96+1000\left(-1+\frac{\left(\frac{1}{2}\left(-1-\sqrt{5}\right)+\frac{\sqrt{5}}{1+\sqrt[5]{-1+3.61405\left(-1+\sqrt{5}\right)^{2.5}}}\right)\sqrt{\pi}}{4\,i\,\pi}\right.$$

$$\left.\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{\exp\left(s-\frac{\left(\frac{1}{2}\left(-1-\sqrt{5}\right)+\frac{\sqrt{5}}{1+\sqrt[5]{-1+3.61405\left(-1+\sqrt{5}\right)^{2.5}}}\right)^2}{4\,s}\right)}{s^{3/2}}\,d\,s\right) \quad \text{for } \gamma>0$$

(((((((-(- 24*4 + (((((((10^3 * (-1 + sin ((((((sqrt(5)/((1+((((((5^0.75*(((sqrt(5)-1))/2)))^2.5 - 1)))^1/5))) - ((sqrt(5)+1))/2)))))))))))))))))^1/3

Input:

$$\sqrt[3]{-\left(-24\times 4+10^3\left(-1+\sin\left(\frac{\sqrt{5}}{1+\sqrt[5]{\left(5^{0.75}\left(\frac{1}{2}\left(\sqrt{5}-1\right)\right)\right)^{2.5}-1}}-\frac{1}{2}\left(\sqrt{5}+1\right)\right)\right)\right)}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

11.99507...

From which, we obtain the following result:

11.995074652027628976238470235879770650796948509370007 * 2

Input interpretation:

$11.995074652027628976238470235879770650796948509370007 \times 2$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

23.990149304055257952476940471759541301593897018740014

23.99014…

This result is very near to the value of black hole entropy 23,9078

(((((((-(- 24*4 + (((((((10^3 * (-1 + sin ((((((sqrt(5)/((1+((((((5^0.75*(((sqrt(5)-1))/2)))^2.5 - 1)))^1/5))) - ((sqrt(5)+1))/2)))))))))))))))))^1/15

Input:

$$\sqrt[15]{-\left(-24\times 4+10^3\left(-1+\sin\left(\frac{\sqrt{5}}{1+\sqrt[5]{\left(5^{0.75}\left(\frac{1}{2}\left(\sqrt{5}-1\right)\right)\right)^{2.5}-1}}-\frac{1}{2}\left(\sqrt{5}+1\right)\right)\right)\right)}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- Fewer digits
- More digits

1.643616873196168575601363995852259647704600764346310072574...

$1.6436168731961... \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 ...$

Continued fraction:

- Linear form

$$1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{4+\cfrac{1}{6+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{190+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{7+\cfrac{1}{1+\cfrac{1}{3+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{2+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{\cdots}}}}}}}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

More

- $\frac{-3121\, e\, e! + 60 - 6070\, e + 7198\, e^2}{134\, e} \approx 1.643616873196168575619420$

$-\frac{3(-270 - 231\pi + 19\pi^2)}{2(-664 + 421\pi + 8\pi^2)} \approx 1.643616873196168574 8059$

$\frac{4002100259\,\pi}{7649573923} \approx 1.643616873196168575 59816$

(-12+24*4) + 10^3 *(1.6436169)

Input interpretation:

$(-12 + 24\times 4) + 10^3 \times 1.6436169$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

1727.6169

1727.6169

This result is very near to the mass of candidate glueball $f_0(1710)$ meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. As a consequence, it is sometimes called a Zagier as a pun on the Gross–Zagier theorem. The number 1728 is one less than the Hardy–Ramanujan number 1729

(((-12+24*4) + 10^3 *(1.6436169)))^1/3

Input interpretation:

$$\sqrt[3]{(-12 + 24 \times 4) + 10^3 \times 1.6436169}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

11.999113...

2 * (((-12+24*4) + 10^3 *(1.6436169)))^1/3

Input interpretation:

$$2 \sqrt[3]{(-12 + 24 \times 4) + 10^3 \times 1.6436169}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

23.998226...

23.998226…

This result is very near to the value of black hole entropy 23,9078

(((-12+24*4) + 10^3 *(1.6436169)))^1/15

Input interpretation:

$$\sqrt[15]{(-12 + 24 \times 4) + 10^3 \times 1.6436169}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- Fewer digits
- More digits

1.643727532199070880187722295245095046341826970751773136709...

$$1.64372753219... \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 ...$$

Continued fraction:

- Linear form

$$1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{4+\cfrac{1}{5+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{5+\cfrac{1}{7+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{3+\cfrac{1}{3+\cfrac{1}{3+\cfrac{1}{2+\cfrac{1}{1+\cfrac{1}{9+\cfrac{1}{1+\cfrac{1}{55+\cfrac{1}{2+\cfrac{1}{\ldots}}}}}}}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

More

- root of $47x^5 - 475x^4 + 490x^3 + 86x^2 + 435x - 220$ near $x = 1.64373$ ≈ 1.643727532199070880143306

root of $139x^3 + 4391x^2 - 22345x + 24248$ near $x = 1.64373$ ≈ 1.643727532199070880000607

$$\frac{4693468833\,\pi}{8970444868} \approx 1.643727532199070880197795$$

Multiplying this last result by 11 (the dimension number of M-theory), we obtain:

1.6437275321990708801877222952450950463418269707517731 * 11

Input interpretation:

1.6437275321990708801877222952450950463418269707517731 × 11

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

18.0810028541897796820649452476960455097600966782695041

That is a result very near to the black hole entropy 18,0524

Now, we have:

THEOREM 3.2 ([18], p. 208). *Let* t_1 *be given in Theorem* 2.1 *and let*

$$k := R(q)R^2(q^2).$$

Then

$$\text{(i)} \qquad R(q) = k^{1/5}\left(\frac{1-k}{1+k}\right)^{2/5} \quad \textit{and} \quad R(q^2) = k^{2/5}\left(\frac{1+k}{1-k}\right)^{1/5}.$$

Furthermore,

$$\text{(ii)} \qquad k = \frac{1}{4t_1^6}\left(\sqrt{1-t_1^6} - \sqrt{1-t_1^6\left(\frac{\sqrt{5}+1}{2}\right)^6}\right) \times \left(\sqrt{1-t_1^6\left(\frac{\sqrt{5}-1}{2}\right)^6} - \sqrt{1-t_1^6}\right)$$

and

$$\text{(iii)} \qquad \frac{1-k}{1+k} = \frac{1}{4}\left(\sqrt{\left(\frac{\sqrt{5}+1}{2}\right)^6 - t_1^6} - \sqrt{1-t_1^6}\right) \times \left(\sqrt{\left(\frac{\sqrt{5}-1}{2}\right)^6 - t_1^6} + \sqrt{1-t_1^6}\right).$$

For $t_1^6 = -3$, we obtain, from (ii):

-1/12 * ((((((((sqrt(1+3)-(((sqrt(((((((1+3)((((sqrt5)+1))/2))^6))))))))) * (((sqrt(((((((1+3)((((sqrt5)-1))/2))^6)))))) -(sqrt(1+3)))))))

Input:

$$-\frac{1}{12}\left(\left(\sqrt{1+3} - \sqrt{(1+3)\left(\frac{1}{2}\left(\sqrt{5}+1\right)\right)^6}\right)\left(\sqrt{(1+3)\left(\frac{1}{2}\left(\sqrt{5}-1\right)\right)^6} - \sqrt{1+3}\right)\right)$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

$$-\frac{1}{12}\left(8\left(\sqrt{5}-1\right)^3-2\right)\left(2-8\left(1+\sqrt{5}\right)^3\right)$$

Decimal approximation:

- More digits

293.9638831466711531432709617337327736439334749949541178822...

Open code

Alternate forms:

- More forms
- Step-by-step solution

$$\frac{1}{3}\left(1025-64\sqrt{5}\right)$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$\frac{1025}{3} - \frac{64\sqrt{5}}{3}$$

Open code

$$\frac{1}{3}\left(32\sqrt{5} - 65\right)\left(63 + 32\sqrt{5}\right)$$

Open code

Minimal polynomial:

$$9x^2 - 6150x + 1\,030\,145$$

Open code

((((((-1/12 * ((((((((sqrt(1+3)-(((sqrt((((((1+3)((((sqrt5)+1))/2))^6))))))))) * (((sqrt((((((1+3)((((sqrt5)-1))/2))^6)))))) -(sqrt(1+3)))))))))))))^1/12

Input:

$$\sqrt[12]{-\frac{1}{12}\left(\left(\sqrt{1+3} - \sqrt{\left((1+3)\left(\frac{1}{2}\left(\sqrt{5}+1\right)\right)\right)^6}\right)\left(\sqrt{\left((1+3)\left(\frac{1}{2}\left(\sqrt{5}-1\right)\right)\right)^6} - \sqrt{1+3}\right)\right)}$$

Exact result:

$$\frac{\sqrt[12]{\frac{1}{3}\left(8\left(\sqrt{5}-1\right)^3 - 2\right)\left(8\left(1+\sqrt{5}\right)^3 - 2\right)}}{\sqrt[6]{2}}$$

Decimal approximation:

- More digits

1.605798931625643723857514847402705326689051568487710674513...

1.605798931625643723857514847402705326689051568487710674513

Alternate forms:

$$\sqrt[12]{\frac{1}{3}\left(1025 - 64\sqrt{5}\right)}$$

$$\sqrt[12]{\frac{1}{3}\left(32\sqrt{5} - 65\right)\left(63 + 32\sqrt{5}\right)}$$

$$\frac{\sqrt[12]{\frac{1}{3}(64\sqrt{5}-130)(126+64\sqrt{5})}}{\sqrt[6]{2}}$$

Continued fraction:

- Linear form

$$1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{6+\cfrac{1}{3+\cfrac{1}{2+\cfrac{1}{1+\cfrac{1}{3+\cfrac{1}{1+\cfrac{1}{8+\cfrac{1}{3+\cfrac{1}{1+\cfrac{1}{4+\cfrac{1}{13+\cfrac{1}{2+\cfrac{1}{2+\cfrac{1}{21+\cfrac{1}{4+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{\ldots}}}}}}}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

- More

$$\frac{500(11 C_{QA}-31)}{508 C_{QA}-3707} \approx 1.6057989316256437 37140$$

$$\frac{1}{44}(64 C + 126 - 30\pi^2 + 277\pi\log(2) - 122\pi\log(3)) \approx 1.605798931625643723 91419$$

$$\pi \ \text{root of } 532x^5 - 1000x^4 + 952x^3 - 15x^2 - 181x + 19 \text{ near } x = 0.511142 \approx$$
$$1.605798931625643723 8 25437$$

•

(((((((-1/12 * ((((((((((sqrt(1+3)-(((sqrt((((((1+3)((((sqrt5)+1))/2))^6))))))))) * (((sqrt((((((1+3)((((sqrt5)-1))/2))^6)))))) -(sqrt(1+3))))))))))))^1/11

Input:

$$\sqrt[11]{-\frac{1}{12}\left(\left(\sqrt{1+3}-\sqrt{\left((1+3)\left(\frac{1}{2}\left(\sqrt{5}+1\right)\right)\right)^6}\right)\left(\sqrt{\left((1+3)\left(\frac{1}{2}\left(\sqrt{5}-1\right)\right)\right)^6}-\sqrt{1+3}\right)\right)}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

$$\frac{\sqrt[11]{\frac{1}{3}\left(8\left(\sqrt{5}-1\right)^3-2\right)\left(8\left(1+\sqrt{5}\right)^3-2\right)}}{2^{2/11}}$$

Decimal approximation:

- More digits

1.676449059130659443332095553695551796439595217203744047107...

1.676449059130659443332095553695551796439595217203744047107

Alternate forms:

- More forms
- Step-by-step solution

$$\frac{1}{3}\sqrt[11]{1025-64\sqrt{5}}\ 3^{10/11}$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$\sqrt[11]{\frac{1}{3}\left(1025-64\sqrt{5}\right)}$$

Open code

$$\sqrt[11]{\frac{1}{3}\left(32\sqrt{5}-65\right)\left(63+32\sqrt{5}\right)}$$

Minimal polynomial:

$$9x^{22}-6150x^{11}+1030145$$

Continued fraction:

- Linear form

$$1+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{11+\cfrac{1}{40+\cfrac{1}{10+\cfrac{1}{1+\cfrac{1}{4+\cfrac{1}{1+\cfrac{1}{5+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{4+\cfrac{1}{83+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{7+\cfrac{1}{1+\cfrac{1}{\cdots}}}}}}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

- More

$\csc\left(\cot\left(\frac{160117205}{26215083}\right)\right) \approx 1.67644905913065944422312$

$\sqrt[4]{\frac{10293026}{32577791}}\sqrt{5} \approx 1.67644905913065944465050$

$\frac{\sqrt[4]{\frac{11343439}{1474293}}\sqrt{10}}{\pi} \approx 1.67644905913065944427378$

The mean of the two results is:

1/2 * (1.6763624429501756701905359895463577380347539286546918 + 1.6057989316256437238575148474027053266890515684877106 74513)

Input interpretation:

$\frac{1}{2}(1.6763624429501756701905359895463577380347539286546918 + 1.605798931625643723857514847402705326689051568487710674513)$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

1.6410806872879096970240254184745315323619027485712012 37256...

$1.6410806872879\ldots \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

-36+ 6 * (((((((-1/12 * (((((((((sqrt(1+3)-(((sqrt(((((((1+3)((((sqrt5)+1))/2))^6)))))))))) * (((sqrt(((((((1+3)((((sqrt5)-1))/2))^6)))))) -(sqrt(1+3))))))))))))

Input:

$-36 + 6\left(-\frac{1}{12}\left(\left(\sqrt{1+3} - \sqrt{(1+3)\left(\frac{1}{2}\left(\sqrt{5}+1\right)\right)^6}\right)\left(\sqrt{(1+3)\left(\frac{1}{2}\left(\sqrt{5}-1\right)\right)^6} - \sqrt{1+3}\right)\right)\right)$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

$-36 - \frac{1}{2}\left(8\left(\sqrt{5}-1\right)^3 - 2\right)\left(2 - 8\left(1+\sqrt{5}\right)^3\right)$

Decimal approximation:

- More digits

1727.7832988800269188596257704023966418636008499697247 07293...

Open code

1727.78329...

This result is very near to the mass of candidate glueball $f_0(1710)$ meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. As a consequence, it is sometimes called a Zagier as a pun on the Gross–Zagier theorem. The number 1728 is one less than the Hardy–Ramanujan number 1729

- Alternate forms:
  Step-by-step solution
  $2(1007 - 64\sqrt{5})$
  Open code

Enlarge Data Customize A Plaintext Interactive

$2014 - 128\sqrt{5}$

Open code

$-2(64\sqrt{5} - 1007)$

Minimal polynomial:

$x^2 - 4028x + 3974276$

Open code

(1727.7832988800269188596257704023966418636008499697247072930)^1/3

Input interpretation:

$\sqrt[3]{1727.7832988800269188596257704023966418636008499697247072930}$

Open code

Enlarge Data Customize A Plaintext Interactive

- Result:
  More digits
  11.999498356066838591371279779889510089587470296569030890 86...

2* (1727.7832988800269188596257704023966418636008499697247072930)^1/3

Input interpretation:

$2\sqrt[3]{1727.7832988800269188596257704023966418636008499697247072930}$

Open code

Enlarge Data Customize A Plaintext Interactive

- Result:
  More digits
  23.998996712133677182742559559779020179174940593138061781 72...

23.99899...

This result is very near to the value of black hole entropy 23,9078

(1727.783298880026918859625770402396641863600849969724707293)^1/15

Input interpretation:

$$\sqrt[15]{1727.783298880026918859625770402396641863600849969724707293}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

1.643738086318535761376946420436233721454518727740698413198...

$$1.64373808631... \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 ...$$

Continued fraction:

- Linear form

$$1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{4+\cfrac{1}{5+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{1+\cfrac{1}{3+\cfrac{1}{2+\cfrac{1}{3+\cfrac{1}{111+\cfrac{1}{1+\cfrac{1}{3+\cfrac{1}{11+\cfrac{1}{2+\cfrac{1}{1+\cfrac{1}{\dots}}}}}}}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

- More

$$\frac{20516597\pi}{39212324} \approx 1.64373808631853575388 3$$

$$\log\left(\frac{1}{56}\left(-67+254\sqrt{2}-71e+35e^2+104\pi-40\pi^2\right)\right) \approx 1.643738086318535761 16500$$

$$\frac{5595297563\pi}{10694006463} \approx 1.64373808631853576137 52833$$

•

From (iii), we obtain:

1/4 * (((((((sqrt(((((((sqrt5)+1))/2))^6)+3)))))))-((sqrt(1+3))))))) * (((((((sqrt(((((((sqrt5)-1))/2))^6)+3)))))))+((sqrt(1+3)))))))

Input:

$$\frac{1}{4}\left(\sqrt{\left(\frac{1}{2}\left(\sqrt{5}+1\right)\right)^6+3}-\sqrt{1+3}\right)\left(\sqrt{\left(\frac{1}{2}\left(\sqrt{5}-1\right)\right)^6+3}+\sqrt{1+3}\right)$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

$$\frac{1}{4}\left(2+\sqrt{3+\frac{1}{64}\left(\sqrt{5}-1\right)^6}\right)\left(\sqrt{3+\frac{1}{64}\left(1+\sqrt{5}\right)^6}-2\right)$$

Decimal approximation:

- More digits

2.414213562373095048801688724209698078569671875376948073176...

Alternate forms:

- More forms
- Step-by-step solution

$$1+\sqrt{2}$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$\left(1+\sqrt{3-\sqrt{5}}\right)\left(\sqrt{3+\sqrt{5}}-1\right)$$

Open code

$$\frac{1}{2}\left(2+2\sqrt{3-\sqrt{5}}\right)\left(\sqrt{3+\sqrt{5}}-1\right)$$

Minimal polynomial:

$$x^2-2x-1$$

(((tan ((((1/4 * (((((((sqrt(((((((sqrt5)+1))/2))^6)+3)))))))-((sqrt(1+3))))))) * (((((((sqrt(((((((sqrt5)-1))/2))^6)+3)))))))+((sqrt(1+3)))))

Input:

$$\tan\left(\left(\frac{1}{4}\left(\sqrt{\left(\frac{1}{2}\left(\sqrt{5}+1\right)\right)^6+3}-\sqrt{1+3}\right)\right)\left(\sqrt{\left(\frac{1}{2}\left(\sqrt{5}-1\right)\right)^6+3}+\sqrt{1+3}\right)\right)$$

Open code

Enlarge Data Customize A Plaintext Interactive

Exact result:

$$\tan\left(\frac{1}{4}\left(2+\sqrt{3+\frac{1}{64}\left(\sqrt{5}-1\right)^6}\right)\left(\sqrt{3+\frac{1}{64}\left(1+\sqrt{5}\right)^6}-2\right)\right)$$

Decimal approximation:

- More digits

$-0.890208627825124483389746861017907458536690804804533332 02...$

Open code

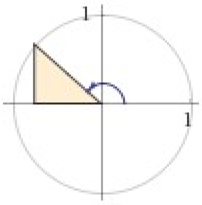
-0.89020862782512448338974686101790745853669080480453333202

Property:

$$\tan\left(\frac{1}{4}\left(2+\sqrt{3+\frac{1}{64}\left(-1+\sqrt{5}\right)^6}\right)\left(-2+\sqrt{3+\frac{1}{64}\left(1+\sqrt{5}\right)^6}\right)\right)$$

is a transcendental number

Reference triangle for angle 2.414 radians:



width	$\cos\left(\frac{1}{4}\left(2+\sqrt{3+\frac{1}{64}\left(\sqrt{5}-1\right)^6}\right)\left(\sqrt{3+\frac{1}{64}\left(1+\sqrt{5}\right)^6}-2\right)\right) \approx -0.74692$
height	$\sin\left(\frac{1}{4}\left(2+\sqrt{3+\frac{1}{64}\left(\sqrt{5}-1\right)^6}\right)\left(\sqrt{3+\frac{1}{64}\left(1+\sqrt{5}\right)^6}-2\right)\right) \approx 0.664914$

From the above result, we have:

1 + (-0.89020862782512448338974686101790745853669080480453333202)^4

Input interpretation:

$1+(-0.89020862782512448338974686101790745853669080480453333202)^4$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

1.6280109214889509252866724832115343909263309401458770581 22...

Open code

1.628010921488950925286672483211534390926330940145877058122

Continued fraction:

- Linear form

$$1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{4+\cfrac{1}{1+\cfrac{1}{4+\cfrac{1}{2+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{3+\cfrac{1}{12+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{8+\cfrac{1}{2+\cfrac{1}{1+\cfrac{1}{5+\cfrac{1}{2+\cfrac{1}{48+\cfrac{1}{1+\cfrac{1}{\cdots}}}}}}}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

- More

$\csc\left(\cos\left(\frac{113\,933\,288}{15\,976\,607}\right)\right) \approx 1.62801092148895092512024$

π root of $42\,210\,x^3 + 114\,750\,x^2 - 69\,868\,x - 483$ near $x = 0.518212$ $\approx$ 1.6280109214889509252848725

$\frac{1\,795\,351\,635\,\pi}{3\,464\,512\,082} \approx 1.62801092148895092523636187$

From the first result:

2.4142135623730950488016887242096980785696718753769480731766 that is equal to $1 + \sqrt{2}$, we obtain:

(((1+(sqt(2)))^8 + 24^2

Input:

$\left(1+\sqrt{2}\right)^8 + 24^2$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

$576 + \left(1+\sqrt{2}\right)^8$

Decimal approximation:

- More digits

1729.9991334482227799110889994775568160564261251537948138 56...

1729.99913...

This result is very near to the mass of candidate glueball $f_0(1710)$ meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. As a consequence, it is sometimes called a Zagier as a pun on the Gross–Zagier theorem. The number 1728 is one less than the Hardy–Ramanujan number 1729

- Alternate form:
  Step-by-step solution
  $1153 + 408\sqrt{2}$
  Open code

Enlarge Data Customize A Plaintext Interactive
Minimal polynomial:
$x^2 - 2306x + 996481$

((((((1+(sqt(2)))^8 + 24^2)))^1/3

Input:
$$\sqrt[3]{\left(1+\sqrt{2}\right)^8 + 24^2}$$
Open code

Enlarge Data Customize A Plaintext Interactive
Result:
$$\sqrt[3]{576 + \left(1+\sqrt{2}\right)^8}$$

- Decimal approximation:
  More digits
  12.00462584029373604812862359235275480674373458163589583040...
  Open code

- Alternate form:
  Step-by-step solution
  $\sqrt[3]{1153 + 408\sqrt{2}}$
  Open code

Enlarge Data Customize A Plaintext Interactive
Minimal polynomial:
$x^6 - 2306x^3 + 996481$

2 * ((((((1+(sqt(2)))^8 + 24^2)))^1/3

Input:
$$2\sqrt[3]{\left(1+\sqrt{2}\right)^8 + 24^2}$$
Open code

Enlarge Data Customize A Plaintext Interactive
Result:

$$2\sqrt[3]{576+\left(1+\sqrt{2}\right)^8}$$

- Decimal approximation:
  More digits
  24.00925168058747209625724718470550961348746916327179166080...
  Open code

This value is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 24 "modes" corresponding to the physical vibrations of a bosonic string.

- Alternate form:
  Step-by-step solution

$$2\sqrt[3]{1153+408\sqrt{2}}$$

Open code

Enlarge Data Customize A Plaintext Interactive
Minimal polynomial:

$$x^6 - 18448\,x^3 + 63774784$$

Open code

((((((1+(sqt(2)))^8 + 24^2)))^1/15

Input:

$$\sqrt[15]{\left(1+\sqrt{2}\right)^8+24^2}$$

Open code

Enlarge Data Customize A Plaintext Interactive
Result:

$$\sqrt[15]{576+\left(1+\sqrt{2}\right)^8}$$

- Decimal approximation:
  More digits
  1.643878538871588611410138295892600477016746983426800246346...

$$1.643878538871... \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 ...$$

- Alternate form:
  Step-by-step solution

$$\sqrt[15]{1153+408\sqrt{2}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Minimal polynomial:

$$x^{30}-2306\,x^{15}+996\,481$$

Continued fraction:

- Linear form

$$1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{4+\cfrac{1}{4+\cfrac{1}{1+\cfrac{1}{3+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{3+\cfrac{1}{2+\cfrac{1}{2+\cfrac{1}{1+\cfrac{1}{7+\cfrac{1}{4+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{6+\cfrac{1}{17+\cfrac{1}{1+\cfrac{1}{\dots}}}}}}}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

- More

$$\frac{443\,644\,454\,\pi}{847\,842\,541}\approx 1.64387853887158861170030$$

$$\pi\ \left[\text{root of } 81\,560\,x^3+72\,070\,x^2-54\,992\,x-2643 \text{ near } x=0.523263\right]\approx$$

$$1.64387853887158861141 32288$$

$$\left[\text{root of } 5245\,x^4-1484\,x^3-8864\,x^2-4753\,x+57 \text{ near } x=1.64388\right]\approx$$

$$1.643878538871588611410 55674$$

We have that:

COROLLARY 4.2.

$$S(e^{-\pi\sqrt{3/5}})=\left(\frac{-(3+5\sqrt{5})+\sqrt{30(5+\sqrt{5})}}{4}\right)^{1/5}$$

((((((-((((((((3+5 sqrt(5)) + sqrt((((30(5+ sqrt(5)))))))) / 4))))))^1/5

Input:

$$\sqrt[5]{-\left(\frac{1}{4}\left(\left(3+5\sqrt{5}\right)+\sqrt{30\left(5+\sqrt{5}\right)}\right)\right)}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

$$\frac{\sqrt[5]{-3-5\sqrt{5}-\sqrt{30\left(5+\sqrt{5}\right)}}}{2^{2/5}}$$

Decimal approximation:

- More digits

1.2016207356505497767921476210812879719200420676474070479... + 0.8730285669832119110738520845842169782866953608267990914 4... i

Open code

Polar coordinates:

- Exact form

$r \approx 1.48528$ (radius), $\theta = 36°$ (angle)

Open code

Alternate forms:

- Step-by-step solution

$$\frac{1}{2}\sqrt[5]{-\left(\sqrt{30\left(5+\sqrt{5}\right)}+5\sqrt{5}+3\right)}\,2^{3/5}$$

Open code

Enlarge Data Customize A Plaintext Interactive

root of $x^{20}+3x^{15}-31x^{10}-3x^5+1$ near $x = 1.20162+0.873029\,i$

Open code

$$\frac{\sqrt[5]{3+5\sqrt{5}+\sqrt{30\left(5+\sqrt{5}\right)}}}{4\times 2^{2/5}}+\frac{\sqrt{5}\sqrt[5]{3+5\sqrt{5}+\sqrt{30\left(5+\sqrt{5}\right)}}}{4\times 2^{2/5}}+\frac{i\sqrt{\frac{5}{8}-\frac{\sqrt{5}}{8}}\sqrt[5]{3+5\sqrt{5}+\sqrt{30\left(5+\sqrt{5}\right)}}}{2^{2/5}}$$

1/2 * ((((((-((((((((3+5 sqrt(5)) + sqrt((((30(5+ sqrt(5)))))))) / 4))))))^(3/5)

Input:

$$\frac{1}{2}\left(-\left(\frac{1}{4}\left(\left(3+5\sqrt{5}\right)+\sqrt{30\left(5+\sqrt{5}\right)}\right)\right)\right)^{3/5}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

$$\frac{\left(-3-5\sqrt{5}-\sqrt{30\left(5+\sqrt{5}\right)}\right)^{3/5}}{4\sqrt[5]{2}}$$

Decimal approximation:

- More digits

$-0.50626939816000689913158494084418791005889207723118809 81\ldots + 1.55813699209267675990845298527608710851339187408720 1563\ldots\, i$

Open code

Polar coordinates:

- Exact form

$r \approx 1.63832$ (radius), $\theta = 108°$ (angle)

1.63832

Alternate forms:

- Step-by-step solution

$$\frac{1}{8}\left(\left(\sqrt{30\left(5+\sqrt{5}\right)}+5\sqrt{5}+3\right)(-1)\right)^{3/5}\ 2^{4/5}$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$\frac{(-1)^{3/5}\sqrt[5]{297+205\sqrt{5}+3\sqrt{30\left(1105+451\sqrt{5}\right)}}}{2\times 2^{2/5}}$$

Open code

$$\frac{\left(3+5\sqrt{5}+\sqrt{30\left(5+\sqrt{5}\right)}\right)^{3/5}}{16\sqrt[5]{2}}-\frac{\sqrt{5}\left(3+5\sqrt{5}+\sqrt{30\left(5+\sqrt{5}\right)}\right)^{3/5}}{16\sqrt[5]{2}}+\frac{i\sqrt{\frac{5}{8}+\frac{\sqrt{5}}{8}}\left(3+5\sqrt{5}+\sqrt{30\left(5+\sqrt{5}\right)}\right)^{3/5}}{4\sqrt[5]{2}}$$

-(24*10) + 10^3 * 1/2 * (((((((-((((((((3+5 sqrt(5)) + sqrt((((30(5+ sqrt(5)))))))) / 4))))))^(3/5)

Input:

$$-(24\times 10)+10^3\times\frac{1}{2}\left(-\left(\frac{1}{4}\left(\left(3+5\sqrt{5}\right)+\sqrt{30\left(5+\sqrt{5}\right)}\right)\right)\right)^{3/5}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

$$125\times 2^{4/5}\left(-3-5\sqrt{5}-\sqrt{30\left(5+\sqrt{5}\right)}\right)^{3/5}-240$$

Decimal approximation:

- More digits

$$-746.26939816000689913158494084418791005889207723118809815\ldots+1558.13699209267675990845298527608710851339187408720156 35\ldots i$$

Open code

Polar coordinates:

- Exact form

$r\approx 1727.63$ (radius), $\theta\approx 115.592°$ (angle)

1727,63

This result is very near to the mass of candidate glueball $f_0(1710)$ meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. As a consequence, it is sometimes called a Zagier as a pun on the Gross–Zagier theorem. The number 1728 is one less than the Hardy–Ramanujan number 1729

Alternate forms:

- Step-by-step solution

$$5\left(25\times 2^{4/5}\left(-\sqrt{30\left(5+\sqrt{5}\right)}-5\sqrt{5}-3\right)^{3/5}-48\right)$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$-240+\frac{125\left(3+5\sqrt{5}+\sqrt{30\left(5+\sqrt{5}\right)}\right)^{3/5}}{2\sqrt[5]{2}}-\frac{125\sqrt{5}\left(3+5\sqrt{5}+\sqrt{30\left(5+\sqrt{5}\right)}\right)^{3/5}}{2\sqrt[5]{2}}+125\,i\,2^{4/5}\sqrt{\frac{5}{8}+\frac{\sqrt{5}}{8}}\left(3+5\sqrt{5}+\sqrt{30\left(5+\sqrt{5}\right)}\right)^{3/5}$$

Continued fraction:

- Linear form

$$(-746+1558\,i)+\cfrac{1}{(-3-i)+\cfrac{1}{2\,i+\cfrac{1}{5+\cfrac{1}{-2\,i+\cfrac{1}{(-3+i)+\cfrac{1}{(-1+i)+\cfrac{1}{(-1-i)+\cfrac{1}{(-2+i)+\cfrac{1}{2\,i+\cfrac{1}{\dots}}}}}}}}}}$$

(using the Hurwitz expansion)

(((((((((((-(24*10) + 10^3 * 1/2 * (((((((-((((((((3+5 sqrt(5)) + sqrt((((30(5+sqrt(5)))))))) / 4))))))^(3/5)))))))))))^1/3

Input:

$$\sqrt[3]{-(24\times 10)+10^3\times\frac{1}{2}\left(-\left(\frac{1}{4}\left(\left(3+5\sqrt{5}\right)+\sqrt{30\left(5+\sqrt{5}\right)}\right)\right)\right)^{3/5}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

$$\sqrt[3]{125\times 2^{4/5}\left(-3-5\sqrt{5}-\sqrt{30\left(5+\sqrt{5}\right)}\right)^{3/5}-240}$$

Decimal approximation:

- More digits

  9.38662648314947644391662241636578751704486117871680391649... +
  7.47467343741470531035908084047548693249757250619543676668... i

Open code

Polar coordinates:

- Exact form

  $r \approx 11.9991$ (radius), $\theta \approx 38.5307°$ (angle)

2 * (((((((((((-(24*10) + 10^3 * 1/2 * (((((((-((((((((3+5 sqrt(5)) + sqrt((((30(5+sqrt(5)))))))) / 4))))))^(3/5)))))))))))^1/3

Input:

$$2\sqrt[3]{-(24\times 10)+10^3\times\frac{1}{2}\left(-\left(\frac{1}{4}\left(\left(3+5\sqrt{5}\right)+\sqrt{30\left(5+\sqrt{5}\right)}\right)\right)\right)^{3/5}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

$$2\sqrt[3]{125\times 2^{4/5}\left(-3-5\sqrt{5}-\sqrt{30\left(5+\sqrt{5}\right)}\right)^{3/5}-240}$$

Decimal approximation:

- More digits

$18.773252966298952887833244832731575034089722357433607832 9\ldots +$
$14.949346874829410620718161680950973864995145012390873533 3\ldots\, i$

Open code

Polar coordinates:

- Exact form

$r \approx 23.9983$ (radius), $\theta \approx 38.5307°$ (angle)

23.9983

This result is very near to the value of black hole entropy 23,9078

((((((((((((-(24*10) + 10^3 * 1/2 * (((((((-((((((((3+5 sqrt(5)) + sqrt((((30(5+sqrt(5)))))))) / 4))))))^(3/5)))))))))))^1/15

Input:

$$\sqrt[15]{-(24\times 10)+10^3\times\frac{1}{2}\left(-\left(\frac{1}{4}\left(\left(3+5\sqrt{5}\right)+\sqrt{30\left(5+\sqrt{5}\right)}\right)\right)\right)^{3/5}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

$$\sqrt[15]{125\times 2^{4/5}\left(-3-5\sqrt{5}-\sqrt{30\left(5+\sqrt{5}\right)}\right)^{3/5}-240}$$

Decimal approximation:

- More digits

$1.628883650281702333180583022993424493473988833889053085 6\ldots +$
$0.220411423985877652471320600658612159178041420299535764 42\ldots\, i$

Open code

Polar coordinates:

- Exact form

$r \approx 1.64373$ (radius), $\theta \approx 7.70614°$ (angle)

$1{,}64373 \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

Continued fraction:

- Linear form

$$1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{4+\cfrac{1}{5+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{2+\cfrac{1}{3+\cfrac{1}{1+\cfrac{1}{6+\cfrac{1}{\cdots}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

- More

$\frac{120}{73} \approx 1.64383561$

$\frac{4\sqrt{\frac{5}{3}}}{\pi} \approx 1.643745184$

$-\frac{\mathcal{H}_4^3}{22} \approx 1.643721186$

Now, we have:

COROLLARY 4.3 ([18], p. 210).

$$S^5(e^{-\pi/\sqrt{5}}) = \sqrt{\left(\frac{5\sqrt{5}-11}{2}\right)^2+1} - \frac{5\sqrt{5}-11}{2}.$$

sqrt((((((((((((5(sqrt(5)) -11))/2)))))^2)+1))))))) – (((5 sqrt(5) – 11))/2)))

Input:

$$\sqrt{\left(\frac{1}{2}\left(5\sqrt{5}-11\right)\right)^2+1}-\frac{1}{2}\left(5\sqrt{5}-11\right)$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

$$\frac{1}{2}\left(11-5\sqrt{5}\right)+\sqrt{1+\frac{1}{4}\left(5\sqrt{5}-11\right)^2}$$

Decimal approximation:

- More digits

0.913887135681662158326054191335520123051426404580519095428...

Open code

Alternate forms:

- More forms
- Step-by-step solution

$$\frac{1}{2}\left(\sqrt{10\left(25-11\sqrt{5}\right)}-5\sqrt{5}+11\right)$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$\frac{1}{2}\left(11-5\sqrt{5}+\sqrt{250-110\sqrt{5}}\right)$$

Open code

$$\frac{11}{2}-\frac{5\sqrt{5}}{2}+\sqrt{\frac{125}{2}-\frac{55\sqrt{5}}{2}}$$

Open code

Minimal polynomial:

$$x^4-22x^3-6x^2+22x+1$$

1 + ((((((((sqrt((((((((((((5(sqrt(5)) -11))/2)))))^2)+1))))))) – (((5 sqrt(5) – 11))/2)))))))))^5

Input:

$$1+\left(\sqrt{\left(\frac{1}{2}\left(5\sqrt{5}-11\right)\right)^2+1}-\frac{1}{2}\left(5\sqrt{5}-11\right)\right)^5$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

$$1+\left(\frac{1}{2}\left(11-5\sqrt{5}\right)+\sqrt{1+\frac{1}{4}\left(5\sqrt{5}-11\right)^2}\right)^5$$

Decimal approximation:

- More digits

1.637474504654351329400557489007278277125352076210008248711...

Alternate forms:

- More forms
- Step-by-step solution

$$\frac{1}{32}\left(2000\sqrt{10\left(375125-167761\sqrt{5}\right)}-19402000\sqrt{5}+492000\sqrt{1525-682\sqrt{5}}-220000\sqrt{5\left(1525-682\sqrt{5}\right)}-1353000\sqrt{2\left(25-11\sqrt{5}\right)}+605080\sqrt{10\left(25-11\sqrt{5}\right)}+43384208\right)$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$\frac{1}{2}\left(2711513-1212625\sqrt{5}+15\sqrt{10\left(6535372825-2922707579\sqrt{5}\right)}\right)$$

Open code

$$1+\frac{1}{32}\left(11-5\sqrt{5}+\sqrt{250-110\sqrt{5}}\right)^5$$

Open code

Minimal polynomial:

$$x^4-5423026x^3+11219066x^2-746036x-5050004$$

(24*4-4) + [1+(((((((((sqrt((((((((((((5(sqrt(5)) -11))/2)))))^2)+1))))))) – (((5 sqrt(5) – 11))/2)))))))))^5] * 10^3

Input:

$$(24\times 4-4)+\left(1+\left(\sqrt{\left(\frac{1}{2}\left(5\sqrt{5}-11\right)\right)^2+1}-\frac{1}{2}\left(5\sqrt{5}-11\right)\right)^5\right)\times 10^3$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

$$92+1000\left(1+\left(\frac{1}{2}\left(11-5\sqrt{5}\right)+\sqrt{1+\frac{1}{4}\left(5\sqrt{5}-11\right)^2}\right)^5\right)$$

Decimal approximation:

- More digits

1729.474504654351329400557489007278277125352076210008248711...

Open code

1729.4745...

This result is very near to the mass of candidate glueball $f_0(1710)$ meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. As a consequence, it is sometimes called a Zagier as a pun on the Gross–Zagier theorem. The number 1728 is one less than the Hardy–Ramanujan number 1729

((((((24*4-4) + [1+(((((((((sqrt((((((((((((5(sqrt(5)) -11))/2)))))^2)+1))))))) – (((5 sqrt(5) – 11))/2)))))))))^5] * 10^3))))))^1/3

Input:

$$\sqrt[3]{(24\times 4-4)+\left(1+\left(\sqrt{\left(\frac{1}{2}\left(5\sqrt{5}-11\right)\right)^2+1}-\frac{1}{2}\left(5\sqrt{5}-11\right)\right)^5\right)\times 10^3}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

$$\sqrt[3]{92+1000\left(1+\left(\frac{1}{2}\left(11-5\sqrt{5}\right)+\sqrt{1+\frac{1}{4}\left(5\sqrt{5}-11\right)^2}\right)^5\right)}$$

Decimal approximation:

- More digits

12.003412234847550745312750966605546509530877466311039391 38...

Alternate forms:

- More forms
- Step-by-step solution

$$\frac{1}{2}\left(\left(250\,000\sqrt{10\left(375\,125-167\,761\sqrt{5}\right)}-2\,425\,250\,000\sqrt{5}+61\,500\,000\sqrt{1525-682\sqrt{5}}-27\,500\,000\sqrt{5\left(1525-682\sqrt{5}\right)}-169\,125\,000\sqrt{2\left(25-11\sqrt{5}\right)}+75\,635\,000\sqrt{10\left(25-11\sqrt{5}\right)}+5\,423\,026\,368\right)2\right)\text{^}(1/3)$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$2^{2/3}\sqrt[3]{338\,939\,148-151\,578\,125\sqrt{5}+1875\sqrt{10\left(6\,535\,372\,825-2\,922\,707\,579\sqrt{5}\right)}}$$

Open code

$$\sqrt[3]{92+1000\left(1+\frac{1}{32}\left(11-5\sqrt{5}+\sqrt{250-110\sqrt{5}}\right)^5\right)}$$

2*((((((24*4-4) + [1+(((((((sqrt((((((((((5(sqrt(5)) -11))/2)))))^2)+1))))))) – (((5 sqrt(5) – 11))/2)))))))))^5] * 10^3))))))^1/3

Input:

$$2\sqrt[3]{(24\times 4-4)+\left(1+\left(\sqrt{\left(\frac{1}{2}\left(5\sqrt{5}-11\right)\right)^2+1}-\frac{1}{2}\left(5\sqrt{5}-11\right)\right)^5\right)\times 10^3}$$

Open code

Enlarge Data Customize A Plaintext Interactive
Result:

$$2\sqrt[3]{92+1000\left(1+\left(\frac{1}{2}\left(11-5\sqrt{5}\right)+\sqrt{1+\frac{1}{4}\left(5\sqrt{5}-11\right)^2}\right)^5\right)}$$

Decimal approximation:

- More digits

24.006824469695101490625501933211093019061754932622078782 77...

24.00682...

This value is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 24 "modes" corresponding to the physical vibrations of a bosonic string.

Alternate forms:

- More forms
- Step-by-step solution

$$\left(\left(250000\sqrt{10\left(375125-167761\sqrt{5}\right)}-2425250000\sqrt{5}+61500000\sqrt{1525-682\sqrt{5}}-27500000\sqrt{5\left(1525-682\sqrt{5}\right)}-169125000\sqrt{2\left(25-11\sqrt{5}\right)}+75635000\sqrt{10\left(25-11\sqrt{5}\right)}+5423026368\right)2\right)\hat{}\,(1/3)$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$2\times 2^{2/3}\sqrt[3]{338939148-151578125\sqrt{5}+1875\sqrt{10\left(6535372825-2922707579\sqrt{5}\right)}}$$

Open code

$$2\sqrt[3]{92+1000\left(1+\frac{1}{32}\left(11-5\sqrt{5}+\sqrt{250-110\sqrt{5}}\right)^5\right)}$$

Open code

((((((24*4-4) + [1+((((((((sqrt((((((((((((5(sqrt(5)) -11))/2)))))^2)+1))))))) – (((5 sqrt(5) – 11))/2))))))))^5] * 10^3))))))^1/15

Input:

$$\sqrt[15]{(24\times4-4)+\left(1+\left(\sqrt{\left(\frac{1}{2}\left(5\sqrt{5}-11\right)\right)^2+1}-\frac{1}{2}\left(5\sqrt{5}-11\right)\right)^5\right)\times10^3}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Exact result:

$$\sqrt[15]{92+1000\left(1+\left(\frac{1}{2}\left(11-5\sqrt{5}\right)+\sqrt{1+\frac{1}{4}\left(5\sqrt{5}-11\right)^2}\right)^5\right)}$$

Decimal approximation:

- More digits

1.643845300007611541743522159108399786092991157294168471047...

$$1.6438453... \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ ...$$

Continued fraction:

- Linear form

$$1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{4+\cfrac{1}{4+\cfrac{1}{1+\cfrac{1}{18+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{3+\cfrac{1}{16+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{7+\cfrac{1}{4+\cfrac{1}{2+\cfrac{1}{2+\cfrac{1}{1+\cfrac{1}{\dots}}}}}}}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

- More

$$\frac{8}{5}\pi\sinh^{-1}\left(\frac{2366391}{3920779}\right)^2 \approx 1.643845300007611541728637$$

$$\frac{4305987395\,\pi}{8229277029} \approx 1.643845300007611541725431$$

$$3\left(\frac{1436899}{34166630}\right)^{2/3}\sqrt[3]{3}\,\pi \approx 1.643845300007611149925$$

-

We have:

$$S^5(e^{-\pi\sqrt{101/5}}) = \sqrt{c^2+1} - c, \qquad \text{where}$$
$$2c = \left(\frac{\sqrt{5\sqrt{505}+113} - \sqrt{5\sqrt{505}+105}}{(\sqrt{13\sqrt{101}+58\sqrt{5}+1} - \sqrt{13\sqrt{101}+58\sqrt{5}-1})^2}\sqrt{\frac{5}{2}}\right)^3 - 11$$

Ref: [7]

From the formula, we obtain:

((((((((((sqrt(5/2)) (((((5 sqrt(505)+113))^1/2 - ((5 sqrt(505)+105))^1/2)))))

Input:

$$\sqrt{\frac{5}{2}}\left(\sqrt{5\sqrt{505}+113} - \sqrt{5\sqrt{505}+105}\right)$$

Open code

Enlarge Data Customize A Plaintext Interactive

Decimal approximation:

- More digits

0.4251059122612897313585106888369509731348111936312819183 97...

Open code

[0.4251059122612897313585106888 / (((((((13 sqrt(101)+58 sqrt(5)+1))^1/2 - ((13 sqrt(101)+58 sqrt(5)-1))^1/2)))))))^2]^3 - 11

Input interpretation:

$$\left(\frac{0.4251059122612897313585106888}{\left(\sqrt{13\sqrt{101}+58\sqrt{5}+1} - \sqrt{13\sqrt{101}+58\sqrt{5}-1}\right)^2}\right)^3 - 11$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

$1.3555247044264157112435134 49... \times 10^6$

Thence 2c = 1355524.7044264; c = 677762,3522132078555

((sqrt(677762.3522132078555^2 + 1)) - 677762.3522132078555

Input interpretation:

$$\sqrt{677762.3522132078555^2+1} - 677762.3522132078555$$

Open code

Enlarge Data Customize A Plaintext Interactive
Result:
- More digits
  $7.377217... \times 10^{-7}$

Note that:

((((((sqrt(677762.3522132078555^2 + 1)) - 677762.3522132078555))))^6

Input interpretation:

$$\left(\sqrt{677762.3522132078555^2+1}-677762.3522132078555\right)^6$$

Open code

Enlarge Data Customize A Plaintext Interactive
Result:
- More digits
  $1.61196... \times 10^{-37}$

And

10^2 * ((((((sqrt(677762.3522132078555^2 + 1)) - 677762.3522132078555))))^6

Input interpretation:

$$10^2\left(\sqrt{677762.3522132078555^2+1}-677762.3522132078555\right)^6$$

Open code

Enlarge Data Customize A Plaintext Interactive
Result:
- More digits
  $1.61196... \times 10^{-35}$

Or:
((24.4233*20.552)/5) * ((((((sqrt(677762.3522132078555^2 + 1)) - 677762.3522132078555))))^6

Input interpretation:

$$\frac{24.4233\times 20.552}{5}\left(\sqrt{677762.3522132078555^2+1}-677762.3522132078555\right)^6$$

Open code

Enlarge Data Customize A Plaintext Interactive
Result:
- More digits
  $1.61824... \times 10^{-35}$

This value is a good approximation to the Planck's length, that is equal to $1.616255(18)\times10^{-35}$ m

We have also that:

[0.4251059122612897313585106888 / (((((((13 sqrt(101)+58 sqrt(5)+1))^1/2 - ((13 sqrt(101)+58 sqrt(5)-1))^1/2)))))))^2]^3 - 11

Input interpretation:

$$\left(\frac{0.4251059122612897313585106888}{\left(\sqrt{13\sqrt{101}+58\sqrt{5}+1}-\sqrt{13\sqrt{101}+58\sqrt{5}-1}\right)^2}\right)^3-11$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits
  $1.3555247044264157112435134449\ldots\times10^6$

that is the value of 2c.

We obtain from this value, the following results:

((((((([0.4251059122612897313585106888 / (((((((13 sqrt(101)+58 sqrt(5)+1))^1/2 - ((13 sqrt(101)+58 sqrt(5)-1))^1/2)))))))^2]^3 - 11)))))))^1/28

Input interpretation:

$$\sqrt[28]{\left(\frac{0.4251059122612897313585106888}{\left(\sqrt{13\sqrt{101}+58\sqrt{5}+1}-\sqrt{13\sqrt{101}+58\sqrt{5}-1}\right)^2}\right)^3-11}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits
  1.6557845924296682362154050701...

1.65578459… is equal to the 14th root of the following Ramanujan's class invariant $Q=\left(G_{505}/G_{101/5}\right)^3 = 1164{,}2696$ i.e. 1,65578...

Indeed:

$$\sqrt[14]{\left(\sqrt{\frac{113+5\sqrt{505}}{8}}+\sqrt{\frac{105+5\sqrt{505}}{8}}\right)^3} = 1{,}65578\ldots \Rightarrow$$

$$\Rightarrow \sqrt[28]{\left(\frac{0.4251059122612897313585106888}{\left(\sqrt{13\sqrt{101}+58\sqrt{5}+1}-\sqrt{13\sqrt{101}+58\sqrt{5}-1}\right)^2}\right)^3-11}$$

$= 1.65578459$

(((((([0.4251059122612897313585106888 / (((((((13 sqrt(101)+58 sqrt(5)+1))^1/2 - ((13 sqrt(101)+58 sqrt(5)-1))^1/2)))))))^2]^3 - 11)))))))^1/29

Input interpretation:

$$\sqrt[29]{\left(\frac{0.4251059122612897313585106888}{\left(\sqrt{13\sqrt{101}+58\sqrt{5}+1}-\sqrt{13\sqrt{101}+58\sqrt{5}-1}\right)^2}\right)^3-11}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

  1.6272413835903117497530181451...

1/2*(((((((((((([0.4251059122612897313585106888 / (((((((13 sqrt(101)+58 sqrt(5)+1))^1/2 - ((13 sqrt(101)+58 sqrt(5)-1))^1/2)))))))^2]^3 - 11)))))))^1/28 + 1.6272413835903117497530181451))))))

Input interpretation:

$$\frac{1}{2}\left(\sqrt[28]{\left(\frac{0.4251059122612897313585106888}{\left(\sqrt{13\sqrt{101}+58\sqrt{5}+1}-\sqrt{13\sqrt{101}+58\sqrt{5}-1}\right)^2}\right)^3-11}+1.6272413835903117497530181451\right)$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

  1.6415129880099899929842116076...

$1.6415129\ldots \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

And, in conclusion:

1/2*((((((((((((([0.425105912261289731358510 6888 / (((((((13 sqrt(101)+58 sqrt(5)+1))^1/2 - ((13 sqrt(101)+58 sqrt(5)-1))^1/2)))))))^2]^3 - 11)))))))^1/30 + 1.6272413835903117497530181451))))))

Input interpretation:

$$\frac{1}{2}\left(\sqrt[30]{\left(\frac{0.4251059122612897313585106888}{\left(\sqrt{13\sqrt{101}+58\sqrt{5}+1}-\sqrt{13\sqrt{101}+58\sqrt{5}-1}\right)^2}\right)^3-11}+1.6272413835903117497530181451\right)$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

1.614143270286545970345285 2354...

From:

TOPOLOGICAL STRINGS, QUIVER VARIETIES AND ROGERS-RAMANUJAN IDENTITIES

SHENGMAO ZHU

https://arxiv.org/abs/1707.00831v2

…Moreover, the existence of Ooguri-Vafa invariants implies an infinite product formula. In particular, we find that the $\tau = 1$ case of such infinite product formula is closely related to the celebrated Rogers-Ramanujan identities

2.1. **Partitions and symmetric functions.** A partition λ is a finite sequence of positive integers $(\lambda_1, \lambda_2, ..)$ such that $\lambda_1 \geq \lambda_2 \geq \cdots$. The length of λ is the total number of parts in λ and denoted by $l(\lambda)$. The weight of λ is defined by $|\lambda| = \sum_{i=1}^{l(\lambda)} \lambda_i$. If $|\lambda| = d$, we say λ is a partition of d and denoted as $\lambda \vdash d$. The automorphism group of λ, denoted by $\mathrm{Aut}(\lambda)$, contains

all the permutations that permute parts of λ by keeping it as a partition. Obviously, $\mathrm{Aut}(\lambda)$ has the order $|\mathrm{Aut}(\lambda)| = \prod_{i=1}^{l(\lambda)} m_i(\lambda)!$ where $m_i(\lambda)$ denotes the number of times that i occurs in λ. Define $\mathfrak{z}_\lambda = |\mathrm{Aut}(\lambda)| \prod_{i=1}^{\lambda} \lambda_i$.

Every partition is identified to a Young diagram. The Young diagram of λ is a graph with λ_i boxes on the i-th row for $j = 1, 2, .., l(\lambda)$, where we have enumerated the rows from top to bottom and the columns from left to right. Given a partition λ, we define the conjugate partition λ^t whose Young diagram is the transposed Young diagram of λ: the number of boxes on j-th column of λ^t equals to the number of boxes on j-th row of λ, for $1 \leq j \leq l(\lambda)$. For a box $x = (i, j) \in \lambda$, the hook length and content are defined to be $hl(x) = \lambda_i + \lambda_j^t - i - j + 1$ and $cn(x) = j - i$ respectively.

3.3. **Open string model on $\mathbb{C}^3$.** In this subsection, we focus on the open string model on $\mathbb{C}^3$ with Aganagic-Vafa A-brane $\mathcal{D}_\tau$, where $\tau \in \mathbb{Z}$ denotes the framing [4, 5]. The topological (open) string partition function of $(\mathbb{C}^3, \mathcal{D}_\tau)$ is given by the Mariño-Vafa formula [58] which was proved by [53] and [63] respectively:

$$Z^{(\mathbb{C}^3, \mathcal{D}_\tau)}(\mathbf{x}; q) = \sum_{\lambda \in \mathcal{P}} \mathcal{H}_\lambda(q; \tau) s_\lambda(\mathbf{x}), \tag{30}$$

and where

$$\mathcal{H}_\lambda(q; \tau) = (-1)^{|\lambda|\tau} q^{\frac{\kappa_\lambda \tau}{2}} \prod_{x \in \lambda} \frac{q^{cn(x)/2}}{q^{hl(x)/2} - q^{-hl(x)/2}}, \tag{31}$$

where $\kappa_\lambda = \sum_{i=1}^{l(\lambda)} \lambda_i(\lambda_i - 2i + 1)$.

The partition function $Z^{(\mathbb{C}^3, \mathcal{D}_\tau)}(\mathbf{x}; q)$ is in fact a certain generating function of terms which are the coefficients of highest order of a in the corresponding terms appearing in the open string partition function of the resolved conifold. That's why the parameter a does not appear in the expression $Z^{(\mathbb{C}^3, \mathcal{D}_\tau)}(\mathbf{x}; q)$. We refer to [54] for more details.

Applying the Ooguri-Vafa Conjecture 3.1 to $Z^{(\mathbb{C}^3, \mathcal{D}_\tau)}(g_s, \mathbf{x})$, it follows that for any $\tau \in \mathbb{Z}$ and $\mu \in \mathcal{P}_+$, we have

$$f_\mu^\tau(q) = (q^{\frac{1}{2}} - q^{-\frac{1}{2}}) \langle \mathrm{Log}(Z^{(\mathbb{C}^3, \mathcal{D}_\tau)}(\mathbf{x}; q)), s_\mu(\mathbf{x}) \rangle \in \mathbb{Z}[q^{\pm\frac{1}{2}}]. \tag{32}$$

In particular, if we let $\mathbf{x} = (x, 0, 0, ...)$, then

$$\begin{aligned} Z^{(\mathbb{C}^3, \mathcal{D}_\tau)}(g_s, \mathbf{x} = (x, 0, 0, ..)) &= \sum_{n \geq 0} \mathcal{H}_{(n)}(q; \tau) x^n \\ &= \sum_{n \geq 0} \frac{(-1)^{n(\tau-1)} q^{\frac{n(n-1)}{2}\tau + \frac{n^2}{2}}}{(1-q)(1-q^2)\cdots(1-q^n)} x^n, \end{aligned} \tag{33}$$

and

$$f_n^\tau(q) := f_{(n)}^\tau(q) = (q^{\frac{1}{2}} - q^{-\frac{1}{2}})[x^n] \mathrm{Log}\left(\sum_{n \geq 0} \frac{(-1)^{n(\tau-1)} q^{\frac{n(n-1)}{2}\tau + \frac{n^2}{2}}}{(1-q)(1-q^2)\cdots(1-q^n)} x^n \right) \tag{34}$$

Therefore, formula (32) implies that for any $\tau \in \mathbb{Z}$ and $n \in \mathbb{Z}_{\geq 1}$,

$$f_n^\tau(q) \in \mathbb{Z}[q^{\pm\frac{1}{2}}]. \tag{35}$$

(We remember that, the set of integers consists of zero (0), the positive natural numbers (1, 2, 3, ...), also called *whole numbers* or *counting numbers*, and their additive inverses (the **negative integers**, i.e., −1, −2, −3, ...). The set of integers is often denoted by a boldface Z ("**Z**") or blackboard bold Z . We have that **Z** is a subset of the set of all rational numbers **Q**, in turn a subset of the real numbers **R**. Like the natural numbers, **Z** is countably infinite).

From (33) and (34), for q = 0.5 (as for the usual Ramanujan expressions) n =2, x = 3 and τ = 1, (for ∑ n = 0 to 2, we take n = 2) we obtain:

$$(33) \qquad Z^{(\mathbb{C}^3,\mathcal{D}_\tau)}(g_s;\mathbf{x}=(x,0,0,..)) = \sum_{n\geq 0}\mathcal{H}_{(n)}(q;\tau)x^n = \sum_{n\geq 0}\frac{(-1)^{n(\tau-1)}q^{\frac{n(n-1)}{2}\tau+\frac{n^2}{2}}}{(1-q)(1-q^2)\cdots(1-q^n)}x^n,$$

(((0.5^3) * 9))) / ((((1-0.5^1) (1-0.5^2) (1-0.5^3) (1-0.5^4) (1-0.5^5))))

Input:

$$\frac{0.5^3\times 9}{(1-0.5^1)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

3.775115207373271889400921658986175115207373271889400921658...

Open code

Repeating decimal:

$3.7\overline{75115207373271889400921658986}$ (period 30)

From this formula, we have obtained:

1/2 * (((((([((((((((0.5^3) * 9))) / ((((1-0.5^1) (1-0.5^2) (1-0.5^3) (1-0.5^4) (1-0.5^5)))))))^1/2] + [((((((0.5^3) * 9))) / ((((1-0.5^1) (1-0.5^2) (1-0.5^3) (1-0.5^4) (1-0.5^5)))))^1/5])))))

Input:

$$\frac{1}{2}\left(\sqrt{\frac{0.5^3 \times 9}{(1-0.5^1)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}} + \sqrt[5]{\frac{0.5^3 \times 9}{(1-0.5^1)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}}\right)$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- Fewer digits
- More digits

1.623645620733008622402889927361587407509299955882684956034...

1.6236456207330086224028899273615874075092999558826849

Continued fraction:

- Linear form

$$1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{10+\cfrac{1}{1+\cfrac{1}{10+\cfrac{1}{3+\cfrac{1}{7+\cfrac{1}{4+\cfrac{1}{5+\cfrac{1}{2+\cfrac{1}{1+\cfrac{1}{3+\cfrac{1}{1+\cfrac{1}{14+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{\dots}}}}}}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

- More

$\log\left(\frac{1}{9}\left(183 - 70\sqrt{2} - 68e - 62e^2 - 461\pi + 208\pi^2\right)\right) \approx 1.623645620733008622281009$

$\frac{3112187071\pi}{6021772186} \approx 1.62364562073300862237345$

π [root of $25870x^3 + 45585x^2 + 39129x - 35970$ near $x = 0.516822$] $\approx$ 1.62364562073300862240002716

From the formula (34):

$$(34) \qquad f_n^\tau(q) := f_{(n)}^\tau(q) = (q^{\frac{1}{2}} - q^{-\frac{1}{2}})[x^n]\mathrm{Log}\left(\sum_{n\geq 0}\frac{(-1)^{n(\tau-1)}q^{\frac{n(n-1)}{2}\tau+\frac{n^2}{2}}}{(1-q)(1-q^2)\cdots(1-q^n)}x^n\right)$$

we obtain:

(((0.5^(0.5)-0.5^(-0.5))) * 9 * ln[(((0.5^3) * 9))) / ((((1-0.5^1) (1-0.5^2) (1-0.5^3) (1-0.5^4) (1-0.5^5))))]

Input:

$$\left(\sqrt{0.5} - \frac{1}{0.5^{0.5}}\right) \times 9 \log\left(\frac{0.5^3 \times 9}{(1-0.5^1)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}\right)$$

Open code

- $\log(x)$ is the natural logarithm

Enlarge Data Customize A Plaintext Interactive

Result:

- Fewer digits
- More digits

−8.454082484289510560707014855257373704395762700665890679 85...

Series representations:

- More

$$\left(\sqrt{0.5} - \frac{1}{0.5^{0.5}}\right) 9 \log\left(\frac{0.5^3 \times 9}{(1-0.5^1)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}\right) = -6.36396 \log(2.77512) + 6.36396 \sum_{k=1}^{\infty} \frac{(-1)^k e^{-1.02069 k}}{k}$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$\left(\sqrt{0.5} - \frac{1}{0.5^{0.5}}\right) 9 \log\left(\frac{0.5^3 \times 9}{(1-0.5^1)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}\right) = -12.7279\, i \pi \left\lfloor \frac{\arg(3.77512 - x)}{2\pi} \right\rfloor - 6.36396 \log(x) + 6.36396 \sum_{k=1}^{\infty} \frac{(-1)^k (3.77512 - x)^k x^{-k}}{k} \quad \text{for } x < 0$$

Open code

$$\left(\sqrt{0.5} - \frac{1}{0.5^{0.5}}\right) 9 \log\left(\frac{0.5^3 \times 9}{(1-0.5^1)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}\right) = -6.36396 \left\lfloor \frac{\arg(3.77512 - z_0)}{2\pi} \right\rfloor \log\left(\frac{1}{z_0}\right) - 6.36396 \log(z_0) - 6.36396 \left\lfloor \frac{\arg(3.77512 - z_0)}{2\pi} \right\rfloor \log(z_0) + 6.36396 \sum_{k=1}^{\infty} \frac{(-1)^k (3.77512 - z_0)^k z_0^{-k}}{k}$$

Integral representations:

$$\left(\sqrt{0.5} - \frac{1}{0.5^{0.5}}\right) 9 \log\left(\frac{0.5^3 \times 9}{(1-0.5^1)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}\right) = -6.36396 \int_1^{3.77512} \frac{1}{t}\, dt$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$\left(\sqrt{0.5} - \frac{1}{0.5^{0.5}}\right) 9 \log\left(\frac{0.5^3 \times 9}{(1-0.5^1)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}\right) = -\frac{3.18198}{i\pi} \int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{e^{-1.02069 s}\, \Gamma(-s)^2\, \Gamma(1+s)}{\Gamma(1-s)}\, ds \quad \text{for } -1 < \gamma < 0$$

(((((-(((0.5^(0.5)-0.5^(-0.5))) * 9 * ln[(((0.5^3) * 9))) / ((((1-0.5^1) (1-0.5^2) (1-0.5^3) (1-0.5^4) (1-0.5^5))))])))))^1/4

Input:

$$\sqrt[4]{-\left(\left(\sqrt{0.5} - \frac{1}{0.5^{0.5}}\right) \times 9 \log\left(\frac{0.5^3 \times 9}{(1-0.5^1)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}\right)\right)}$$

Open code

- $\log(x)$ is the natural logarithm

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

1.70517...

1.7051658261295916785702869415560120153229291903852505

1/2 * ((((1.7051658261295916785702869415560120153229291903852505))+(((((-(((0.5^(0.5)-0.5^(-0.5))) * 9 * ln[(((0.5^3) * 9))) / ((((1-0.5^1) (1-0.5^2) (1-0.5^3) (1-0.5^4) (1-0.5^5))))])))))^1/5)))))

Input interpretation:

$$\frac{1}{2}\left(1.7051658261295916785702869415560120153229291903852505 + \sqrt[5]{-\left(\left(\sqrt{0.5} - \frac{1}{0.5^{0.5}}\right) \times 9 \log\left(\frac{0.5^3 \times 9}{(1-0.5^1)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}\right)\right)}\right)$$

Open code

- $\log(x)$ is the natural logarithm

Enlarge Data Customize A Plaintext Interactive

Result:

- Fewer digits
- More digits

1.618855520040095210722242023179216458855002053742419579245...

1.618855520040095210722242023179216458855002053742419 5

Series representations:

- More

$$\frac{1}{2}\left(1.705165826129591678570286941556 0000+\sqrt[5]{-\left(\left(\sqrt{0.5}-\frac{1}{0.5^{0.5}}\right)9\log\left(\frac{0.5^3\times 9}{(1-0.5^1)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}\right)\right)}\right)=0.852583+0.723962\sqrt[5]{\log(2.77512)-\sum_{k=1}^{\infty}\frac{(-1)^k e^{-1.02069k}}{k}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$\frac{1}{2}\left(1.705165826129591678570286941556 0000+\left(-\left(\left(\sqrt{0.5}-\frac{1}{0.5^{0.5}}\right)9\log\left(\frac{0.5^3\times 9}{(1-0.5^1)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}\right)\right)\right)\text{^}(1/5)\right)=0.852583+0.723962\sqrt[5]{2i\pi\left\lfloor\frac{\arg(3.77512-x)}{2\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k(3.77512-x)^k x^{-k}}{k}}\quad\text{for } x<0$$

Open code

$$\frac{1}{2}\left(1.705165826129591678570286941556 0000+\sqrt[5]{-\left(\left(\sqrt{0.5}-\frac{1}{0.5^{0.5}}\right)9\log\left(\frac{0.5^3\times 9}{(1-0.5^1)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}\right)\right)}\right)=0.852582913064795839285143470778 00000+0.723962\left(\log(z_0)+\left\lfloor\frac{\arg(3.77512-z_0)}{2\pi}\right\rfloor\left(\log\left(\frac{1}{z_0}\right)+\log(z_0)\right)-\sum_{k=1}^{\infty}\frac{(-1)^k(3.77512-z_0)^k z_0^{-k}}{k}\right)\text{^}(1/5)$$

Integral representations:

$$\frac{1}{2}\left(1.7051658261295916785702869415560000 + \sqrt[5]{-\left(\left(\sqrt{0.5} - \frac{1}{0.5^{0.5}}\right) 9 \log\left(\frac{0.5^3 \times 9}{(1-0.5^1)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}\right)\right)}\right)$$

$$= 0.852583 + 0.723962 \sqrt[5]{\int_1^{3.77512} \frac{1}{t}\, dt}$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$\frac{1}{2}\left(1.7051658261295916785702869415560000 + \left(-\left(\left(\sqrt{0.5} - \frac{1}{0.5^{0.5}}\right) 9 \log\left(\frac{0.5^3 \times 9}{(1-0.5^1)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}\right)\right)\right) \char`^ (1/5)\right) =$$

$$0.852583 + 0.630245 \sqrt[5]{\frac{1}{i\pi} \int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{e^{-1.02069 s}\, \Gamma(-s)^2\, \Gamma(1+s)}{\Gamma(1-s)}\, ds} \quad \text{for}$$

$$-1 < \gamma < 0$$

Continued fraction:

- Linear form

$$1 + \cfrac{1}{1 + \cfrac{1}{1 + \cfrac{1}{1 + \cfrac{1}{1 + \cfrac{1}{1 + \cfrac{1}{1 + \cfrac{1}{1 + \cfrac{1}{11 + \cfrac{1}{5 + \cfrac{1}{2 + \cfrac{1}{2 + \cfrac{1}{33 + \cfrac{1}{1 + \cfrac{1}{3 + \cfrac{1}{2 + \cfrac{1}{1 + \cfrac{1}{10 + \cfrac{1}{1 + \cfrac{1}{1 + \cfrac{1}{1 + \cfrac{1}{\dots}}}}}}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

- More

$$\sec\left(\cot\left(\frac{20\,450\,844}{6\,235\,349}\right)\right) \approx 1.618855520040095264008$$

$$\frac{1\,109\,013\,603\,\pi}{2\,152\,180\,318} \approx 1.61885552004009521074548 4$$

π | root of $1722x^4 - 4843x^3 + 5719x^2 + 11x - 983$ near $x = 0.515298$ | $\approx$
1.6188555200400952107741892

Now, from:

$$(56) \qquad (q^{1/2} - q^{-1/2})\mathrm{Log}\left(\sum_{n\geq 0} \frac{(-1)^{n(\tau-1)} q^{\frac{n(n-1)}{2}\tau + \frac{n^2}{2}}}{(1-q)(1-q^2)\cdots(1-q^n)} x^n\right)$$
$$= -\sum_{n\geq 0} \mathbb{H}^s_{1^{n(k)}}(q)^{1/2-n/2}(-1)^{(\tau-1)n} x^n$$
$$= -\sum_{n\geq 0}\sum_j \dim(H_c^{2j}(\mathcal{Q}_{\tilde{n}(k)};\mathbb{C})^{S_n}) q^{\frac{1-n}{2}+d_{\tilde{n}(k)}-j}(-1)^{(\tau-1)n} x^n$$

We obtain:

(((0.5^(0.5)-0.5^(-0.5))) ln[(((0.5^3) * 9))) / ((((1-0.5^1) (1-0.5^2) (1-0.5^3) (1-0.5^4) (1-0.5^5))))]

With the previous values (see eq.(33)), we obtain:

Input:

$$\left(\sqrt{0.5} - \frac{1}{0.5^{0.5}}\right)\log\left(\frac{0.5^3 \times 9}{(1-0.5^1)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}\right)$$

Open code

- $\log(x)$ is the natural logarithm

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

−0.939342...

Series representations:

- More

$$\left(\sqrt{0.5} - \frac{1}{0.5^{0.5}}\right)\log\left(\frac{0.5^3 \times 9}{(1-0.5^1)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}\right) =$$
$$-0.707107\log(2.77512) + 0.707107\sum_{k=1}^{\infty}\frac{(-1)^k e^{-1.02069k}}{k}$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$\left(\sqrt{0.5} - \frac{1}{0.5^{0.5}}\right)\log\left(\frac{0.5^3 \times 9}{(1-0.5^1)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}\right) = -1.41421\, i\,\pi \left\lfloor \frac{\arg(3.77512 - x)}{2\pi} \right\rfloor - 0.707107\log(x) + 0.707107 \sum_{k=1}^{\infty} \frac{(-1)^k (3.77512 - x)^k x^{-k}}{k} \quad \text{for } x < 0$$

Open code

$$\left(\sqrt{0.5} - \frac{1}{0.5^{0.5}}\right)\log\left(\frac{0.5^3 \times 9}{(1-0.5^1)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}\right) = -0.707107 \left\lfloor \frac{\arg(3.77512 - z_0)}{2\pi} \right\rfloor \log\left(\frac{1}{z_0}\right) - 0.707107\log(z_0) - 0.707107 \left\lfloor \frac{\arg(3.77512 - z_0)}{2\pi} \right\rfloor \log(z_0) + 0.707107 \sum_{k=1}^{\infty} \frac{(-1)^k (3.77512 - z_0)^k z_0^{-k}}{k}$$

Open code

- $\arg(z)$ is the complex argument
- $\lfloor x \rfloor$ is the floor function
- i is the imaginary unit

Integral representations:

$$\left(\sqrt{0.5} - \frac{1}{0.5^{0.5}}\right)\log\left(\frac{0.5^3 \times 9}{(1-0.5^1)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}\right) = -0.707107 \int_1^{3.77512} \frac{1}{t}\, dt$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$\left(\sqrt{0.5} - \frac{1}{0.5^{0.5}}\right)\log\left(\frac{0.5^3 \times 9}{(1-0.5^1)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}\right) = -\frac{0.353553}{i\pi} \int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{e^{-1.02069 s}\, \Gamma(-s)^2\, \Gamma(1+s)}{\Gamma(1-s)}\, ds \quad \text{for } -1 < \gamma < 0$$

Open code

- $\Gamma(x)$ is the gamma function

1 / ((((((((((0.5^(0.5)-0.5^(-0.5))) ln[(((0.5^3) * 9))) / ((((1-0.5^1) (1-0.5^2) (1-0.5^3) (1-0.5^4) (1-0.5^5))))]))))^8)))

Input:

$$\frac{1}{\left(\left(\sqrt{0.5} - \frac{1}{0.5^{0.5}}\right)\log\left(\frac{0.5^3 \times 9}{(1-0.5^1)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}\right)\right)^8}$$

Open code

- $\log(x)$ is the natural logarithm

Enlarge Data Customize A Plaintext Interactive

Result:

- Fewer digits
- More digits

1.6497123629442054893167984314573450128517000384658359806 59...

$$1.649712362944... \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 ...$$

Series representations:

- More

$$\frac{1}{\left(\left(\sqrt{0.5} - \frac{1}{0.5^{0.5}}\right)\log\left(\frac{0.5^3 \times 9}{(1-0.5^1)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}\right)\right)^8} = \frac{16.}{\left(\log(2.77512) - \sum_{k=1}^{\infty} \frac{(-1)^k e^{-1.02069 k}}{k}\right)^8}$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$\frac{1}{\left(\left(\sqrt{0.5} - \frac{1}{0.5^{0.5}}\right)\log\left(\frac{0.5^3 \times 9}{(1-0.5^1)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}\right)\right)^8} = \frac{16.}{\left(2 i \pi \left\lfloor \frac{\arg(3.77512-x)}{2\pi} \right\rfloor + \log(x) - \sum_{k=1}^{\infty} \frac{(-1)^k (3.77512-x)^k x^{-k}}{k}\right)^8} \quad \text{for } x < 0$$

Open code

$$\frac{1}{\left(\left(\sqrt{0.5} - \frac{1}{0.5^{0.5}}\right)\log\left(\frac{0.5^3 \times 9}{(1-0.5^1)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}\right)\right)^8} = \frac{16.}{\left(\log(z_0) + \left\lfloor \frac{\arg(3.77512-z_0)}{2\pi} \right\rfloor \left(\log\left(\frac{1}{z_0}\right) + \log(z_0)\right) - \sum_{k=1}^{\infty} \frac{(-1)^k (3.77512-z_0)^k z_0^{-k}}{k}\right)^8}$$

Open code

- $\arg(z)$ is the complex argument
- $\lfloor x \rfloor$ is the floor function
- i is the imaginary unit

Integral representations:

$$\frac{1}{\left(\left(\sqrt{0.5} - \frac{1}{0.5^{0.5}}\right)\log\left(\frac{0.5^3 \times 9}{(1-0.5^1)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}\right)\right)^8} = \frac{16.}{\left(\int_1^{3.77512} \frac{1}{t} \, dt\right)^8}$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$\frac{1}{\left(\left(\sqrt{0.5}-\frac{1}{0.5^{0.5}}\right)\log\left(\frac{0.5^3\times 9}{(1-0.5^1)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}\right)\right)^8} = \frac{4096.\, i^8\, \pi^8}{\left(\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma} \frac{e^{-1.02069\, s}\, \Gamma(-s)^2\, \Gamma(1+s)}{\Gamma(1-s)}\, ds\right)^8} \quad \text{for } -1<\gamma<0$$

Open code

- $\Gamma(x)$ is the gamma function
-

Continued fraction:

- Linear form

$$1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{5+\cfrac{1}{1+\cfrac{1}{7+\cfrac{1}{1+\cfrac{1}{5+\cfrac{1}{3+\cfrac{1}{4+\cfrac{1}{3+\cfrac{1}{21+\cfrac{1}{1+\cfrac{1}{19+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{3+\cfrac{1}{1+\cfrac{1}{8+\cfrac{1}{2+\cfrac{1}{\cdots}}}}}}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

- More

$$\sqrt{\frac{1}{41}(-113+786\,e+698\,\pi-5922\log(2))} \approx 1.64971236294420548 82463$$

$$\frac{3\,873\,624\,001\,\pi}{7\,376\,648\,789} \approx 1.64971236294420548 928975$$

$$\frac{4}{11}\,\pi\tanh^{-1}\left(\frac{74\,181\,418}{88\,928\,209}\right)^2 \approx 1.649712362944205489 342782$$

- $\log(x)$ is the natural logarithm
- $\tanh^{-1}(x)$ is the inverse hyperbolic tangent function

(64+16) + 10^3 * 1 / (((((((((((0.5^(0.5)-0.5^(-0.5))) ln[(((0.5^3) * 9))) / ((((1-0.5^1) (1-0.5^2) (1-0.5^3) (1-0.5^4) (1-0.5^5))))]))))^8)))

Input:

$$(64+16)+10^3\times\frac{1}{\left(\left(\sqrt{0.5}-\frac{1}{0.5^{0.5}}\right)\log\left(\frac{0.5^3\times 9}{(1-0.5^1)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}\right)\right)^8}$$

Open code

- $\log(x)$ is the natural logarithm

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

1729.71...

1729.71…

This result is very near to the mass of candidate glueball $f_0(1710)$ meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. As a consequence, it is sometimes called a Zagier as a pun on the Gross–Zagier theorem. The number 1728 is one less than the Hardy–Ramanujan number 1729

Series representations:

- More

$$(64+16)+\frac{10^3}{\left(\left(\sqrt{0.5}-\frac{1}{0.5^{0.5}}\right)\log\left(\frac{0.5^3\times 9}{(1-0.5^1)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}\right)\right)^8}=$$
$$80+\frac{16000.}{\left(\log(2.77512)-\sum_{k=1}^{\infty}\frac{(-1)^k e^{-1.02069 k}}{k}\right)^8}$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$(64+16)+\frac{10^3}{\left(\left(\sqrt{0.5}-\frac{1}{0.5^{0.5}}\right)\log\left(\frac{0.5^3\times 9}{(1-0.5^1)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}\right)\right)^8}=$$
$$80+\frac{16000.}{\left(2 i\pi\left\lfloor\frac{\arg(3.77512-x)}{2\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k(3.77512-x)^k x^{-k}}{k}\right)^8}\quad\text{for } x<0$$

Open code

$$(64+16)+\frac{10^3}{\left(\left(\sqrt{0.5}-\frac{1}{0.5^{0.5}}\right)\log\left(\frac{0.5^3\times 9}{(1-0.5^1)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}\right)\right)^8}=$$
$$80+\frac{16\,000.}{\left(\log(z_0)+\left\lfloor\frac{\arg(3.77512-z_0)}{2\pi}\right\rfloor\left(\log\left(\frac{1}{z_0}\right)+\log(z_0)\right)-\sum_{k=1}^{\infty}\frac{(-1)^k(3.77512-z_0)^k z_0^{-k}}{k}\right)^8}$$

Integral representations:

$$(64+16)+\frac{10^3}{\left(\left(\sqrt{0.5}-\frac{1}{0.5^{0.5}}\right)\log\left(\frac{0.5^3\times 9}{(1-0.5^1)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}\right)\right)^8}=$$
$$80+\frac{16\,000.}{\left(\int_1^{3.77512}\frac{1}{t}\,dt\right)^8}$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$(64+16)+\frac{10^3}{\left(\left(\sqrt{0.5}-\frac{1}{0.5^{0.5}}\right)\log\left(\frac{0.5^3\times 9}{(1-0.5^1)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}\right)\right)^8}=$$
$$80+\frac{4.096\times 10^6\, i^8\,\pi^8}{\left(\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{e^{-1.02069\,s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\right)^8}\quad\text{for } -1<\gamma<0$$

((((((((((((80) + 10^3 * 1 / ((((((((((((0.5^(0.5)-0.5^(-0.5))) ln[(((0.5^3) * 9))) / ((((1-0.5^1) (1-0.5^2) (1-0.5^3) (1-0.5^4) (1-0.5^5))))]))))^8))))))))))))^1/3

Input:

$$\sqrt[3]{80+10^3\times\frac{1}{\left(\left(\sqrt{0.5}-\frac{1}{0.5^{0.5}}\right)\log\left(\frac{0.5^3\times 9}{(1-0.5^1)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}\right)\right)^8}}$$

Open code

- $\log(x)$ is the natural logarithm

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

12.0040...

2*(((((((80) + 10^3 * 1 / ((((((((((((0.5^(0.5)-0.5^(-0.5))) ln[(((0.5^3) * 9))) / ((((1-0.5^1) (1-0.5^2) (1-0.5^3) (1-0.5^4) (1-0.5^5))))]))))^8))))))))))))^1/3

Input:

$$2\sqrt[3]{80+10^3\times\frac{1}{\left(\left(\sqrt{0.5}-\frac{1}{0.5^{0.5}}\right)\log\left(\frac{0.5^3\times 9}{(1-0.5^1)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}\right)\right)^8}}$$

Open code

- $\log(x)$ is the natural logarithm

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

24.0079...

24.0079...

This value is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 24 "modes" corresponding to the physical vibrations of a bosonic string.

Series representations:

- More

$$2\sqrt[3]{80+\frac{10^3}{\left(\left(\sqrt{0.5}-\frac{1}{0.5^{0.5}}\right)\log\left(\frac{0.5^3\times 9}{(1-0.5^1)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}\right)\right)^8}} = 2\sqrt[3]{80+\frac{16000.}{\left(\log(2.77512)-\sum_{k=1}^{\infty}\frac{(-1)^k e^{-1.02069\,k}}{k}\right)^8}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$2\sqrt[3]{80+\frac{10^3}{\left(\left(\sqrt{0.5}-\frac{1}{0.5^{0.5}}\right)\log\left(\frac{0.5^3\times 9}{(1-0.5^1)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}\right)\right)^8}} = 2\sqrt[3]{80+\frac{16000.}{\left(2\,i\,\pi\left\lfloor\frac{\arg(3.77512-x)}{2\,\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k(3.77512-x)^k x^{-k}}{k}\right)^8}} \quad \text{for } x<0$$

Open code

$$2\sqrt[3]{80+\frac{10^3}{\left(\left(\sqrt{0.5}-\frac{1}{0.5^{0.5}}\right)\log\left(\frac{0.5^3\times 9}{(1-0.5^1)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}\right)\right)^8}} = 2\sqrt[3]{80+\frac{16000.}{\left(\log(z_0)+\left\lfloor\frac{\arg(3.77512-z_0)}{2\,\pi}\right\rfloor\left(\log\left(\frac{1}{z_0}\right)+\log(z_0)\right)-\sum_{k=1}^{\infty}\frac{(-1)^k(3.77512-z_0)^k z_0^{-k}}{k}\right)^8}}$$

Integral representations:

$$2\sqrt[3]{80+\frac{10^3}{\left(\left(\sqrt{0.5}-\frac{1}{0.5^{0.5}}\right)\log\left(\frac{0.5^3\times 9}{(1-0.5^1)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}\right)\right)^8}} =$$

$$2\sqrt[3]{80+\frac{16\,000.}{\left(\int_1^{3.77512}\frac{1}{t}\,dt\right)^8}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$2\sqrt[3]{80+\frac{10^3}{\left(\left(\sqrt{0.5}-\frac{1}{0.5^{0.5}}\right)\log\left(\frac{0.5^3\times 9}{(1-0.5^1)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}\right)\right)^8}} =$$

$$2\sqrt[3]{80+\frac{4.096\times 10^6\, i^8\,\pi^8}{\left(\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{e^{-1.02069\,s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\right)^8}} \quad \text{for } -1<\gamma<0$$

(((((((80) + 10^3 * 1 / ((((((((((((0.5^(0.5)-0.5^(-0.5))) ln[(((0.5^3) * 9))) / ((((1-0.5^1) (1-0.5^2) (1-0.5^3) (1-0.5^4) (1-0.5^5))))]))))^8))))))))))))))^1/15

Input:

$$\sqrt[15]{80+10^3\times\frac{1}{\left(\left(\sqrt{0.5}-\frac{1}{0.5^{0.5}}\right)\log\left(\frac{0.5^3\times 9}{(1-0.5^1)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}\right)\right)^8}}$$

Open code

- $\log(x)$ is the natural logarithm

Enlarge Data Customize A Plaintext Interactive

Result:

- Fewer digits
- More digits

1.643860371141949216175213601075599731483956400824441832698...

$$1.643860371141... \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ ...$$

Continued fraction:

- Linear form

$$1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{4+\cfrac{1}{4+\cfrac{1}{1+\cfrac{1}{6+\cfrac{1}{1+\cfrac{1}{3+\cfrac{1}{2+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{3+\cfrac{1}{1+\cfrac{1}{4+\cfrac{1}{2+\cfrac{1}{1+\cfrac{1}{25+\cfrac{1}{2+\cfrac{1}{1+\cfrac{1}{3+\cfrac{1}{\cdots}}}}}}}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

More

- $-\frac{2(13\,\delta_F-485)}{220\,\delta_F-511} \approx 1.64386037114194916007$
- $\frac{23-160\,e+140\,e^2}{2(-210+11\,e+50\,e^2)} \approx 1.643860371141949217950 2$
- $\frac{11}{4}\pi\sin^2\left(\frac{2795597}{6193478}\right) \approx 1.64386037114194921263 70$

We have that:

Similarly, letting $x = q^{\frac{3}{2}}$, identity (58) becomes

$$\text{(62)}\qquad \sum_{n\geq 0}\frac{q^{n^2+n}}{(1-q)\cdots(1-q^n)} = \prod_{m\geq 1}\prod_{k\in\mathbb{Z}}\prod_{l\geq 0}\left(1-q^{\frac{3m+k+1}{2}+l}\right)^{(-1)^m n_{m,k}} = \prod_{i}\prod_{l\geq 0}(1-q^{i+l})^{r_i}$$

where $r_i = \sum_{3m+k+1-2i}(-1)^m n_{m,k}$, we find that:

$$r_i = \begin{cases} -1, & i = 5k+2, \text{ for } k \geq 0 \\ 1, & i = 5k+4, \text{ for } k \geq 0 \\ 0, & \text{otherwise,} \end{cases}$$

Hence formula (62) gives the second Rogers-Ramanujan identity (12).

From the right hand side of (62), for q = 0.5 and n = 2,

$$\sum_{n\geq 0} \frac{q^{n^2+n}}{(1-q)\cdots(1-q^n)}$$

we obtain:

(((0.5)^6)) / ((((1-0.5) (1-0.5^2) (1-0.5^3) (1-0.5^4) (1-0.5^5))))

Input:

$$\frac{0.5^6}{(1-0.5)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

0.052432155657962109575012800819252432155657962109575012800...

Open code

Repeating decimal:

$0.0\overline{524321556579621095750128008192}$ (period 30)

((((((1 / ((((((0.5)^6)) / ((((1-0.5) (1-0.5^2) (1-0.5^3) (1-0.5^4) (1-0.5^5)))))))^1/6

Input:

$$\frac{1}{\sqrt[6]{\frac{0.5^6}{(1-0.5)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- Fewer digits
- More digits

1.634558171576677278669531636528976919699501858726265554460...

1.6345581715766772786695316365289769196995018587262655

Continued fraction:

- Linear form

$$1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{1+\cfrac{1}{3+\cfrac{1}{1+\cfrac{1}{5+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{12+\cfrac{1}{3+\cfrac{1}{1+\cfrac{1}{11+\cfrac{1}{2+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{1+\cfrac{1}{17+\cfrac{1}{4+\cfrac{1}{\dots}}}}}}}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

- More

  $-e^{-69-73/e-6e+13/\pi+46\pi}\,\pi^{1-12e}\tan(e\pi)\approx 1.63455817157667727 10995$

  $\frac{1754034911\,\pi}{3371224889}\approx 1.634558171576677278 59944$

  $\frac{1}{312}\left(10\,C+169+412\,\pi+89\,\pi^2+20\,\pi\log(2)-546\,\pi\log(3)\right)\approx$
  $1.634558171576677278 655681$

- $\log(x)$ is the natural logarithm
- C is Catalan's constant

Note that:

5 * 10^53 * ((((((1 / ((((((0.5)^6)) / ((((1-0.5) (1-0.5^2) (1-0.5^3) (1-0.5^4) (1-0.5^5)))))))^1/6

Input:

$$5\times 10^{53}\times\frac{1}{\sqrt[6]{\frac{0.5^6}{(1-0.5)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

  $8.17279\ldots\times 10^{53}$

Comparisons:

$\approx$ the size of the Monster group ($\approx 8.1\times 10^{53}$)

((((((1 / ((((((0.5)^6)) / ((((1-0.5) (1-0.5^2) (1-0.5^3) (1-0.5^4) (1-0.5^5)))))))^1/8

Input:

$$\frac{1}{\sqrt[8]{\frac{0.5^6}{(1-0.5)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- Fewer digits
- More digits

1.4456071441555453509259412239720149203480765817657118655 85...

1/2 * ((((((1.445607144155 + ((((((1 / ((((((0.5)^6)) / ((((1-0.5) (1-0.5^2) (1-0.5^3) (1-0.5^4) (1-0.5^5)))))))^1/5))))))

Input interpretation:

$$\frac{1}{2}\left(1.445607144155 + \frac{1}{\sqrt[5]{\frac{0.5^6}{(1-0.5)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}}}\right)$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- Fewer digits
- More digits

1.6244794713747849283722175835981092076845310809344079808 84...

1.6244794713747849283722175835981092076845310809344079

Note that:

10^53 * 5/2 * ((((((1.445607144155 + ((((((1 / ((((((0.5)^6)) / ((((1-0.5) (1-0.5^2) (1-0.5^3) (1-0.5^4) (1-0.5^5)))))))^1/5))))))

Input interpretation:

$$10^{53} \times \frac{5}{2}\left(1.445607144155 + \frac{1}{\sqrt[5]{\frac{0.5^6}{(1-0.5)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}}}\right)$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

$8.12240... \times 10^{53}$

Comparisons:

≈ the size of the Monster group ($\approx 8.1\times10^{53}$)

(8^2+3^3)+10^3 (((((((1 / ((((((0.5)^6)) / ((((1-0.5) (1-0.5^2) (1-0.5^3) (1-0.5^4) (1-0.5^5)))))))^1/6

Input:

$$\left(8^2+3^3\right)+10^3\times\frac{1}{\sqrt[6]{\frac{0.5^6}{(1-0.5)\left(1-0.5^2\right)\left(1-0.5^3\right)\left(1-0.5^4\right)\left(1-0.5^5\right)}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

1725.56...

1725.56... result in the range of the mass of candidate "glueball" $f_0(1710)$ ("glueball" =1760 ± 15 MeV).

((((((((((((8^2+3^3)+10^3 (((((((1 / ((((((0.5)^6)) / ((((1-0.5) (1-0.5^2) (1-0.5^3) (1-0.5^4) (1-0.5^5)))))))^1/6)))))))))))^1/3

Input:

$$\sqrt[3]{\left(8^2+3^3\right)+10^3\times\frac{1}{\sqrt[6]{\frac{0.5^6}{(1-0.5)\left(1-0.5^2\right)\left(1-0.5^3\right)\left(1-0.5^4\right)\left(1-0.5^5\right)}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

11.9943...

2*((((((((((((8^2+3^3)+10^3 (((((((1 / ((((((0.5)^6)) / ((((1-0.5) (1-0.5^2) (1-0.5^3) (1-0.5^4) (1-0.5^5)))))))^1/6)))))))))))^1/3

Input:

$$2\sqrt[3]{\left(8^2+3^3\right)+10^3\times\frac{1}{\sqrt[6]{\frac{0.5^6}{(1-0.5)\left(1-0.5^2\right)\left(1-0.5^3\right)\left(1-0.5^4\right)\left(1-0.5^5\right)}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

23.9887...

23.9887...

This result is very near to the value of black hole entropy 23,9078

(((((((((((8^2+3^3)+10^3 ((((((1 / ((((((0.5)^6)) / ((((1-0.5) (1-0.5^2) (1-0.5^3) (1-0.5^4) (1-0.5^5)))))))^1/6))))))))))^1/15

Input:

$$\sqrt[15]{(8^2+3^3)+10^3\times\frac{1}{\sqrt[6]{\frac{0.5^6}{(1-0.5)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- Fewer digits
- More digits

1.6435968754584826362489686091323136870264331809460312205 06...

$1.6435968754584... \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934...$

Continued fraction:

- Linear form

$$1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{4+\cfrac{1}{6+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{6+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{7+\cfrac{1}{1+\cfrac{1}{8+\cfrac{1}{1+\cfrac{1}{344+\cfrac{1}{1+\cfrac{1}{6+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{8+\cfrac{1}{\ldots}}}}}}}}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

- More

$$\frac{-702 - 281 e + 477 e^2}{7(-43 + 30 e + 19 e^2)} \approx 1.643596875458482635978 1$$

$$\frac{4984208827 \pi}{9526882211} \approx 1.6435968754584826362403341$$

$$\text{root of } 37450 x^3 - 70965 x^2 + 12622 x + 4681 \text{ near } x = 1.6436 \approx$$

1.643596875458482636255919

Note that:

5*10^53 ((((((((((((8^2+3^3)+10^3 ((((((1 / ((((((0.5)^6)) / ((((1-0.5) (1-0.5^2) (1-0.5^3) (1-0.5^4) (1-0.5^5)))))))^1/6)))))))))))^1/15

Input interpretation:

$$5 \times 10^{53} \sqrt[15]{(8^2 + 3^3) + 10^3 \times \frac{1}{\sqrt[6]{\frac{0.5^6}{(1-0.5)(1-0.5^2)(1-0.5^3)(1-0.5^4)(1-0.5^5)}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

$8.217984... \times 10^{53}$

Comparisons:

≈ the size of the Monster group ($\approx 8.1 \times 10^{53}$)

From:

A FRAMEWORK OF ROGERS–RAMANUJAN IDENTITIES AND THEIR ARITHMETIC PROPERTIES

MICHAEL J. GRIFFIN, KEN ONO, AND S. OLE WARNAAR

https://arxiv.org/abs/1401.7718v4

In 1974 Andrews [1] extended (1.1) and (1.2) to an infinite family of Rogers–Ramanujan-type identities by proving that

$$\sum_{r_1\geq\cdots\geq r_m\geq 0} \frac{q^{r_1^2+\cdots+r_m^2+r_i+\cdots+r_m}}{(q)_{r_1-r_2}\cdots(q)_{r_{m-1}-r_m}(q)_{r_m}} = \frac{(q^{2m+3};q^{2m+3})_\infty}{(q)_\infty}\cdot\theta(q^i;q^{2m+3}), \tag{1.5}$$

where $1\leq i\leq m+1$. As usual, here we have that

$$(a)_k=(a;q)_k:=\begin{cases}(1-a)(1-aq)\cdots(1-aq^{k-1}) & \text{if } k\geq 0,\\ \prod_{j=0}^{\infty}(1-aq^j) & \text{if } k=\infty,\end{cases}$$

and

$$\theta(a;q):=(a;q)_\infty(q/a;q)_\infty$$

is a modified theta function. The identities (1.5), which can be viewed as the analytic counterpart of Gordon's partition theorem [36], are now commonly referred to as the Andrews–Gordon (AG) identities.

Remark. The specializations of $\theta(a;q)$ in (1.5) are (up to powers of q) modular functions, where $q:=\mathrm{e}^{2\pi i\tau}$ and τ is any complex point with $\mathrm{Im}(\tau)>0$. It should be noted that this differs from our use of q and τ above where we required τ to be a quadratic irrational point. Such infinite product modular functions were studied extensively by Klein and Siegel.

Theorem 1.1 ($\mathrm{A}_{2n}^{(2)}$ RR and AG identities). *If m and n are positive integers and $\kappa:=2m+2n+1$, then we have that*

$$\sum_{\substack{\lambda\\ \lambda_1\leq m}} q^{|\lambda|}P_{2\lambda}(1,q,q^2,\dots;q^{2n-1}) \tag{1.7a}$$

$$=\frac{(q^\kappa;q^\kappa)_\infty^n}{(q)_\infty^n}\cdot\prod_{i=1}^{n}\theta(q^{i+m};q^\kappa)\prod_{1\leq i<j\leq n}\theta(q^{j-i},q^{i+j-1};q^\kappa)$$

$$=\frac{(q^\kappa;q^\kappa)_\infty^m}{(q)_\infty^m}\cdot\prod_{i=1}^{m}\theta(q^{i+1};q^\kappa)\prod_{1\leq i<j\leq m}\theta(q^{j-i},q^{i+j+1};q^\kappa),$$

and

$$\sum_{\substack{\lambda\\ \lambda_1\leq m}} q^{2|\lambda|}P_{2\lambda}(1,q,q^2,\dots;q^{2n-1}) \tag{1.7b}$$

$$=\frac{(q^\kappa;q^\kappa)_\infty^n}{(q)_\infty^n}\cdot\prod_{i=1}^{n}\theta(q^{i};q^\kappa)\prod_{1\leq i<j\leq n}\theta(q^{j-i},q^{i+j};q^\kappa)$$

$$=\frac{(q^\kappa;q^\kappa)_\infty^m}{(q)_\infty^m}\cdot\prod_{i=1}^{m}\theta(q^{i};q^\kappa)\prod_{1\leq i<j\leq m}\theta(q^{j-i},q^{i+j};q^\kappa).$$

we illustrate Theorem 1.1 when $m=n=2$.

The series in (1.7b) is

$$\sum_{\substack{\lambda \\ \lambda_1 \le 2}} q^{2|\lambda|} P_{2\lambda}(1, q, q^2, \ldots; q^3) = \prod_{n=1}^{\infty} \frac{(1-q^{9n})(1-q^{9n-1})(1-q^{9n-8})}{(1-q^n)(1-q^{9n-4})(1-q^{9n-5})}.$$

From this last formula, from the right hand side, for q = 535,49165 for n = 2 (we note that $n! = \prod_{k=1}^{n} k = 1 \cdot 2 \cdot 3 \cdot \ldots \cdot (n-1) \cdot n$ for 2! = 2

(1-535.49^18) (1-535.49^17) (1-535.49^10) / (1-535.49^2) (1-535.49^14) (1-535.49^13)

((((1-535.49^18) (1-535.49^17) (1-535.49^10)))) / ((((1-535.49^2) (1-535.49^14) (1-535.49^13))))

Input interpretation:

$$\frac{(1-535.49^{18})(1-535.49^{17})(1-535.49^{10})}{(1-535.49^{2})(1-535.49^{14})(1-535.49^{13})}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits
  $4.5711277087146733611026300186742120954955338565736091\ldots \times 10^{43}$

Open code

Note that:

((((((((1-535.49^18) (1-535.49^17) (1-535.49^10)))) / ((((1-535.49^2) (1-535.49^14) (1-535.49^13))))))))^1/16

Input interpretation:

$$\sqrt[16]{\frac{(1-535.49^{18})(1-535.49^{17})(1-535.49^{10})}{(1-535.49^{2})(1-535.49^{14})(1-535.49^{13})}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits
  535.490…

((((((((1-535.49^18) (1-535.49^17) (1-535.49^10)))) / ((((1-535.49^2) (1-535.49^14) (1-535.49^13))))))))^1/48

Input interpretation:

$$\sqrt[48]{\frac{(1-535.49^{18})(1-535.49^{17})(1-535.49^{10})}{(1-535.49^{2})(1-535.49^{14})(1-535.49^{13})}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

8.12052...

(((((((((1-535.49^18) (1-535.49^17) (1-535.49^10)))) / ((((1-535.49^2) (1-535.49^14) (1-535.49^13)))))))^1/64

Input interpretation:

$$\sqrt[64]{\frac{(1-535.49^{18})(1-535.49^{17})(1-535.49^{10})}{(1-535.49^{2})(1-535.49^{14})(1-535.49^{13})}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

4.81047...

1/3 * (((((((((1-535.49^18) (1-535.49^17) (1-535.49^10)))) / ((((1-535.49^2) (1-535.49^14) (1-535.49^13)))))))^1/64

Input interpretation:

$$\frac{1}{3}\sqrt[64]{\frac{(1-535.49^{18})(1-535.49^{17})(1-535.49^{10})}{(1-535.49^{2})(1-535.49^{14})(1-535.49^{13})}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- Fewer digits
- More digits

1.6034913083564404235031059333181007728381093749270149 22511...

1.603491308356440423503105933318100772838109374927014 9

Result very near to the elementary charge

(((((((((1-535.49^18) (1-535.49^17) (1-535.49^10)))) / ((((1-535.49^2) (1-535.49^14) (1-535.49^13)))))))^1/13.605)))) * 1/10^3

Input interpretation:

$$\sqrt[13.605]{\frac{(1-535.49^{18})(1-535.49^{17})(1-535.49^{10})}{(1-535.49^{2})(1-535.49^{14})(1-535.49^{13})}} \times \frac{1}{10^3}$$

Open code

Enlarge Data Customize A Plaintext Interactive
Result:
- Fewer digits
- More digits

1.618512332226516612800333953423723069401035714030053723535...

1.61851233222651661280033395342372306940103571403005 37

(((((((((1-535.49^18) (1-535.49^17) (1-535.49^10)))) / ((((1-535.49^2) (1-535.49^14) (1-535.49^13)))))))^1/((17.5764+9.3664)*0.5)) - 12.1904

where 17.5764, 9.3664 and 12.1904 are black hole entropies

Input interpretation:

$$\sqrt[(17.5764+9.3664)\times 0.5]{\frac{(1-535.49^{18})(1-535.49^{17})(1-535.49^{10})}{(1-535.49^2)(1-535.49^{14})(1-535.49^{13})}} - 12.1904$$

Open code

Enlarge Data Customize A Plaintext Interactive
Result:
- More digits

1729.38...

1729.38…

This result is very near to the mass of candidate glueball $f_0(1710)$ meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. As a consequence, it is sometimes called a Zagier as a pun on the Gross–Zagier theorem. The number 1728 is one less than the Hardy–Ramanujan number 1729

2 * ((((((((((((1-535.49^18) (1-535.49^17) (1-535.49^10)))) / ((((1-535.49^2) (1-535.49^14) (1-535.49^13)))))))^1/((17.5764+9.3664)*0.5)) - 12.1904)))))^1/3

Input interpretation:

$$2\sqrt[3]{\sqrt[(17.5764+9.3664)\times 0.5]{\frac{(1-535.49^{18})(1-535.49^{17})(1-535.49^{10})}{(1-535.49^2)(1-535.49^{14})(1-535.49^{13})}} - 12.1904}$$

Open code

Enlarge Data Customize A Plaintext Interactive
Result:
- More digits

24.0064...

24.0064...

This value is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 24 "modes" corresponding to the physical vibrations of a bosonic string.

((((((((((((1-535.49^18) (1-535.49^17) (1-535.49^10)))) / ((((1-535.49^2) (1-535.49^14) (1-535.49^13)))))))^1/((17.5764+9.3664)*0.5)) - 12.1904)))))^1/15

Input interpretation:

$$\sqrt[15]{\sqrt[(17.5764+9.3664)\times 0.5]{\frac{(1-535.49^{18})(1-535.49^{17})(1-535.49^{10})}{(1-535.49^{2})(1-535.49^{14})(1-535.49^{13})}}-12.1904}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- Fewer digits
- More digits

1.643839505761754026696836914536118557968570170795880490549...

$$1.643839505761\ldots \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$$

Continued fraction:

- Linear form

$$1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{4+\cfrac{1}{4+\cfrac{1}{1+\cfrac{1}{47+\cfrac{1}{2+\cfrac{1}{3+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{12+\cfrac{1}{1+\cfrac{1}{7+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{6+\cfrac{1}{1+\cfrac{1}{8+\cfrac{1}{\ldots}}}}}}}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

- More

$\csc\left(\coth\left(\frac{4608155}{31744763}\right)\right) \approx 1.643839505761754028 4131$

$\frac{-66 - 14\pi + 45\pi^2}{2(362 - 130\pi + 15\pi^2)} \approx 1.6438395057617540260 9546$

$5\left(\frac{2429558}{31307957}\right)^{3/4}\sqrt{5} \approx 1.6438395057617540 32398$

For q = 0.5 (as usual), we obtain:

((((1-0.5^18) (1-0.5^17) (1-0.5^10)))) / ((((1-0.5^2) (1-0.5^14) (1-0.5^13))))

Input:

$$\frac{(1-0.5^{18})(1-0.5^{17})(1-0.5^{10})}{(1-0.5^2)(1-0.5^{14})(1-0.5^{13})}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

1.3322599403056223522098217634099408931840210953236936 01565...

((((((2* ((((1-0.5^18) (1-0.5^17) (1-0.5^10)))) / ((((1-0.5^2) (1-0.5^14) (1-0.5^13)))))))))))^1/2

Input:

$$\sqrt{2\times\frac{(1-0.5^{18})(1-0.5^{17})(1-0.5^{10})}{(1-0.5^2)(1-0.5^{14})(1-0.5^{13})}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- Fewer digits
- More digits

1.6323357132070733152478555644184892052827201103376712 74125...

Now, we have that:

Lastly, Theorem 1.7 (3) applies, and we know that the ratio

$$\frac{\Phi_{1a}(2,2;\tau)}{\Phi_{1b}(2,2;\tau)} = q^{-2/3}\prod_{n=1}^{\infty}\frac{(1-q^{9n-4})(1-q^{9n-5})}{(1-q^{9n-1})(1-q^{9n-8})}$$
$$= q^{-2/3}(1+q+q^2+q^3-q^5-q^6-q^7+\cdots)$$

With the previous values, from the formula

$$q^{-2/3} \prod_{n=1}^{\infty} \frac{(1-q^{9n-4})(1-q^{9n-5})}{(1-q^{9n-1})(1-q^{9n-8})}$$

535.49^(-2/3) * [(((1-535.49^14) (1-535.49^13)))) / ((((1-535.49^17) (1-535.49^10)))]

Input interpretation:

$$535.49^{-2/3} \times \frac{(1-535.49^{14})(1-535.49^{13})}{(1-535.49^{17})(1-535.49^{10})}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

0.0151647...

1 / (((((535.49^(-2/3) * [(((1-535.49^14) (1-535.49^13)))) / ((((1-535.49^17) (1-535.49^10)))])))))

Input interpretation:

$$\frac{1}{535.49^{-2/3} \times \frac{(1-535.49^{14})(1-535.49^{13})}{(1-535.49^{17})(1-535.49^{10})}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

65.9428...

((((((((((((((((1 / (((((535.49^(-2/3) * (((1-535.49^14) (1-535.49^13)))) / ((((1-535.49^17) (1-535.49^10))))))))))))))))))))^1/(89/10)

Input interpretation:

$$\sqrt[\frac{89}{10}]{\frac{1}{\frac{535.49^{-2/3}((1-535.49^{14})(1-535.49^{13}))}{(1-535.49^{17})(1-535.49^{10})}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- Fewer digits
- More digits

1.601035093043293192327867108109976161182876132410476542501...

1.6010350930432931923278671081099761611828761324104765

Result very near to the elementary charge

Continued fraction:

- Linear form

$$1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{38+\cfrac{1}{22+\cfrac{1}{1+\cfrac{1}{3+\cfrac{1}{1+\cfrac{1}{7+\cfrac{1}{2+\cfrac{1}{2+\cfrac{1}{11+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{3+\cfrac{1}{30+\cfrac{1}{2+\cfrac{1}{\dots}}}}}}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

- More

$$\frac{2\,(462-67\,e+110\,e^2)}{778+167\,e+18\,e^2}\approx 1.601035093043293192361047$$

$$\frac{1838576196\,\pi}{3607701977}\approx 1.601035093043293192396409$$

$$\frac{559186}{109881\,\pi}-\frac{293\,\pi}{48836}\approx 1.601035093043293192229040$$

(30.5963+30.4615+17.5764)/3 * 1 / (((((535.49^(-2/3) * [(((1-535.49^14) (1-535.49^13)))) / ((((1-535.49^17) (1-535.49^10)))])))))

Where 30.5963, 30.4615 and 17.5764 are black hole entropies

Input interpretation:

$$\left(\frac{1}{3}\,(30.5963+30.4615+17.5764)\right)\times\frac{1}{535.49^{-2/3}\times\frac{(1-535.49^{14})(1-535.49^{13})}{(1-535.49^{17})(1-535.49^{10})}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits
  1728.45…
  1728.45…

This result is very near to the mass of candidate glueball $f_0(1710)$ meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. As a consequence, it is sometimes called a Zagier as a pun on the Gross–Zagier theorem. The number 1728 is one less than the Hardy–Ramanujan number 1729

((((((((((26.2114 * 1 / (((((535.49^(-2/3) * (((((1-535.49^14) (1-535.49^13)))) / ((((1-535.49^17) (1-535.49^10))))))))))))^1/3

Input interpretation:

$$\sqrt[3]{26.2114\times\frac{1}{535.49^{-2/3}\times\frac{(1-535.49^{14})(1-535.49^{13})}{(1-535.49^{17})(1-535.49^{10})}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive
Result:

- More digits
  12.0011…

2 * ((((((((((26.2114 * 1 / (((((535.49^(-2/3) * (((((1-535.49^14) (1-535.49^13)))) / ((((1-535.49^17) (1-535.49^10))))))))))))^1/3

Input interpretation:

$$2\sqrt[3]{26.2114\times\frac{1}{535.49^{-2/3}\times\frac{(1-535.49^{14})(1-535.49^{13})}{(1-535.49^{17})(1-535.49^{10})}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive
Result:

- More digits
  24.0021…
  24.0021…

This value is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 24 "modes" corresponding to the physical vibrations of a bosonic string.

((((((((((26.2114 * 1 / (((((535.49^(-2/3) * (((((1-535.49^14) (1-535.49^13)))) / ((((1-535.49^17) (1-535.49^10)))))))))))))^1/15

Input interpretation:

$$\sqrt[15]{26.2114 \times \frac{1}{535.49^{-2/3} \times \frac{(1-535.49^{14})(1-535.49^{13})}{(1-535.49^{17})(1-535.49^{10})}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- Fewer digits
- More digits

1.643780609123027944957189771466249105529298945969965378723...

$1.64378060912302... \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 ...$

Continued fraction:

- Linear form

$$1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{4+\cfrac{1}{5+\cfrac{1}{3+\cfrac{1}{4+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{4+\cfrac{1}{4+\cfrac{1}{1+\cfrac{1}{8+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{9+\cfrac{1}{13+\cfrac{1}{1+\cfrac{1}{3+\cfrac{1}{\ldots}}}}}}}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

- More

$\frac{10}{3} \pi \sin^2\left(\frac{11981524}{29412067}\right) \approx 1.6437806091230279449 94814$

π root of $4416 x^4 - 4400 x^3 + 4993 x^2 - 1857 x - 96$ near $x = 0.523232$ $\approx$

1.6437806091230279449 37407

$$-\frac{2\,(221+81\,e+169\,e^2)}{-305-791\,e+54\,e^2} \approx 1.64378060912302794483813$$

Now, from:

SOME THEOREMS ON THE ROGERS–RAMANUJAN CONTINUED FRACTION IN RAMANUJAN'S LOST NOTEBOOK

Bruce C. Berndt, Sen-Shan Huang, Jaebum Sohn, and Seung Hwan Son

We have:

Theorem 9.2 (p. 47). *Let $K, K', L,$ and L' denote complete elliptic integrals of the first kind associated with the moduli $k, k', \ell,$ and ℓ', respectively. If $K'/K = \sqrt{39}$, $L'/L = \sqrt{13/3}$, and $t := t_{39} := (k_{39}k'_{39}/\ell_{13/3}\ell'_{13/3})^{1/12}$, then*

$$1 - \frac{t}{1} - \frac{t^2}{1} - \frac{t^3}{1} = 0. \tag{9.10}$$

Moreover,

$$t_{39} = e^{-\pi\sqrt{13/3}/12}\frac{(-q_{13/3};q_{13/3}^2)_\infty}{(-q_{13/3}^3;q_{13/3}^6)_\infty}. \tag{9.11}$$

Ramanujan, observing that each factor in the denominator of (9.11) is cancelled by a corresponding factor in the numerator, wrote (9.11) as a single infinite product.

Proof. By (9.3) and (9.2),

$$t_{39} = \frac{G_{13/3}}{G_{39}} = \frac{q_{13/3}^{-1/24}\chi(q_{13/3})}{q_{39}^{-1/24}\chi(q_{39})}, \tag{9.12}$$

from which, by (9.1), (9.11) trivially follows.

From either Weber's text [34, p. 722] or Ramanujan's notebooks [24, vol. 1, p. 305; vol. 2, p. 295],

$$G_{39} = 2^{1/4}\left(\frac{\sqrt{13}+3}{2}\right)^{1/6}\left(\sqrt{\frac{5+\sqrt{13}}{8}}+\sqrt{\frac{\sqrt{13}-3}{8}}\right). \tag{9.13}$$

The class invariant $G_{13/3}$ can be determined from (9.13) and a certain modular equation of degree 3 [9, Lemma 3.3]. Accordingly, we find that

$$G_{13/3} = 2^{1/4}\left(\frac{\sqrt{13}+3}{2}\right)^{1/6}\left(\sqrt{\frac{5+\sqrt{13}}{8}}-\sqrt{\frac{\sqrt{13}-3}{8}}\right). \tag{9.14}$$

Thus, from (9.12)–(9.14),

$$t_{39} = \left(\sqrt{\frac{5+\sqrt{13}}{8}}-\sqrt{\frac{\sqrt{13}-3}{8}}\right)^2.$$

It is now easily checked that t_{39} is a root of the polynomial equation

$$t^4 - t^3 - t^2 - t + 1 = 0. \tag{9.15}$$

Observing that (9.10) and (9.15) are equivalent, we complete the proof.

We have that:

$$t_{39} = e^{-\pi\sqrt{13/3}/12}\frac{(-q_{13/3};q_{13/3}^2)_\infty}{(-q_{13/3}^3;q_{13/3}^6)_\infty}.$$

$$t_{39} = \left(\sqrt{\frac{5+\sqrt{13}}{8}}-\sqrt{\frac{\sqrt{13}-3}{8}}\right)^2.$$

Thence:

(((((([sqrt(((((5+sqrt(13)))/8))))] - [sqrt(((((sqrt(13)-3))/8))))]))))))^2

Input:

$$\left(\sqrt{\frac{1}{8}\left(5+\sqrt{13}\right)}-\sqrt{\frac{1}{8}\left(\sqrt{13}-3\right)}\right)^2$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

$$\left(\frac{1}{2}\sqrt{\frac{1}{2}\left(5+\sqrt{13}\right)}-\frac{1}{2}\sqrt{\frac{1}{2}\left(\sqrt{13}-3\right)}\right)^2$$

Decimal approximation:

- More digits

0.5806918319929524015325414215814165110555317311710727993306...

Alternate forms:

- More forms
- Step-by-step solution

$$\frac{1}{4}\left(-\sqrt{2\left(\sqrt{13}-1\right)}+\sqrt{13}+1\right)$$

Open code

Enlarge Data Customize A Plaintext Interactive

root of $x^4-x^3-x^2-x+1$ near $x=0.580692$

Open code

$$\frac{1}{8}\left(\sqrt{\sqrt{13}-3}-\sqrt{5+\sqrt{13}}\right)^2$$

Open code

Minimal polynomial:

$x^4-x^3-x^2-x+1$

Open code

2 *[(((((((((sqrt(((((5+sqrt(13)))/8)))) - sqrt(((((sqrt(13)-3))/8))))]))))^(1/3)))))))]^2

Input:

$$2\sqrt[3]{\sqrt{\frac{1}{8}\left(5+\sqrt{13}\right)}-\sqrt{\frac{1}{8}\left(\sqrt{13}-3\right)}}^2$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

$$2\left(\frac{1}{2}\sqrt{\frac{1}{2}\left(5+\sqrt{13}\right)}-\frac{1}{2}\sqrt{\frac{1}{2}\left(\sqrt{13}-3\right)}\right)^{2/3}$$

Decimal approximation:

- More digits

1.668573088326763935925970176371420031106524221422059884002...

1.668573088326763935925970176371420031106524221422059884002

Open code

Alternate forms:

- Step-by-step solution

$$\sqrt[3]{2\left(-\sqrt{2\left(\sqrt{13}-1\right)}+\sqrt{13}+1\right)}$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$\left(\sqrt{5+\sqrt{13}}-\sqrt{\sqrt{13}-3}\right)^{2/3}$$

Open code

Minimal polynomial:

$$x^{12}-8x^9-64x^6-512x^3+4096$$

Continued fraction:

- Linear form

$$1+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{57+\cfrac{1}{1+\cfrac{1}{18+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{4+\cfrac{1}{3+\cfrac{1}{6+\cfrac{1}{2+\cfrac{1}{1+\cfrac{1}{5+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{8+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{91+\cfrac{1}{1+\cfrac{1}{\ldots}}}}}}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

- More

$$-\frac{2\left(97-232\pi+20\pi^2\right)}{-161-471\pi+219\pi^2}\approx 1.66857308832676939369792$$

$$\frac{2260260886\pi}{4255623589}\approx 1.66857308832676393591735 5$$

$$\text{root of } 55582x^3-85690x^2+20380x-53641 \text{ near } x=1.66857 \approx 1.66857308832676393592752 24$$

8^2 + 10^3 * 2 *[((((((((((sqrt(((((5+sqrt(13)))/8)))) - sqrt(((((sqrt(13)-3))/8))))])))))^(1/3)))))))]^2

Input:

$$8^2 + 10^3 \times 2 \sqrt[3]{\sqrt{\frac{1}{8}\left(5+\sqrt{13}\right)} - \sqrt{\frac{1}{8}\left(\sqrt{13}-3\right)}}^2$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

$$64 + 2000 \left(\frac{1}{2}\sqrt{\frac{1}{2}\left(5+\sqrt{13}\right)} - \frac{1}{2}\sqrt{\frac{1}{2}\left(\sqrt{13}-3\right)}\right)^{2/3}$$

Decimal approximation:

- More digits

1732.573088326763935925970176371420031106524221422059884002...

Open code

1732.57308... result in the range of the mass of candidate "glueball" $f_0(1710)$ ("glueball" =1760 ± 15 MeV).

Alternate forms:

- More forms
- Step-by-step solution

$$8\left(125\sqrt[3]{2\left(-\sqrt{2\left(\sqrt{13}-1\right)}+\sqrt{13}+1\right)}+8\right)$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$64 + 1000\left(\sqrt{5+\sqrt{13}} - \sqrt{\sqrt{13}-3}\right)^{2/3}$$

Open code

$$8\left(8 + 125\left(\sqrt{5+\sqrt{13}} - \sqrt{\sqrt{13}-3}\right)^{2/3}\right)$$

Open code

Minimal polynomial:

$$x^{12} - 768 x^{11} + 270336 x^{10} - 8057671680 x^9 + 4616304721920 x^8 - 1180498403524608 x^7 - 63823775735203495936 x^6 + 24559085083019163205632 x^5 - 3931077528911294528225280 x^4 - 511664501863451534264086036480 x^3 + 98287895139353488017256051900416 x^2 - 6291043703406667766882770058477568 x + 4096134213330097608806442338741645213696$$

Open code

((((((8^2 + 10^3 * 2 *[(((((((((((sqrt(((((5+sqrt(13)))/8)))) - sqrt(((((sqrt(13)-3))/8))))]))))^(1/3)))))))]^2))))))^1/3

Input:

$$\sqrt[3]{8^2 + 10^3 \times 2\sqrt[3]{\left(\sqrt{\frac{1}{8}\left(5+\sqrt{13}\right)} - \sqrt{\frac{1}{8}\left(\sqrt{13}-3\right)}\right)^2}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

$$\sqrt[3]{64 + 2000\left(\frac{1}{2}\sqrt{\frac{1}{2}\left(5+\sqrt{13}\right)} - \frac{1}{2}\sqrt{\frac{1}{2}\left(\sqrt{13}-3\right)}\right)^{2/3}}$$

Decimal approximation:

- More digits
  12.01057652795757278161381527117800775267925801603437075668...

2*((((((8^2 + 10^3 * 2 *[(((((((((((sqrt(((((5+sqrt(13)))/8)))) - sqrt(((((sqrt(13)-3))/8))))]))))^(1/3)))))))]^2))))))^1/3

Input:

$$2\sqrt[3]{8^2 + 10^3 \times 2\sqrt[3]{\left(\sqrt{\frac{1}{8}\left(5+\sqrt{13}\right)} - \sqrt{\frac{1}{8}\left(\sqrt{13}-3\right)}\right)^2}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

$$2\sqrt[3]{64 + 2000\left(\frac{1}{2}\sqrt{\frac{1}{2}\left(5+\sqrt{13}\right)} - \frac{1}{2}\sqrt{\frac{1}{2}\left(\sqrt{13}-3\right)}\right)^{2/3}}$$

Decimal approximation:

- More digits
  24.02115305591514556322763054235601550535851603206874151337...

Open code

24.02115...

This value is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 24 "modes" corresponding to the physical vibrations of a bosonic string.

((((((8^2 + 10^3 * 2 *[(((((((((((sqrt(((((5+sqrt(13)))/8)))) - sqrt(((((sqrt(13)-3))/8))))]))))^(1/3)))))))]^2))))))^1/15

Input:

$$\sqrt[15]{8^2+10^3\times 2\sqrt[3]{\sqrt{\frac{1}{8}\left(5+\sqrt{13}\right)}-\sqrt{\frac{1}{8}\left(\sqrt{13}-3\right)}}^{\,2}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

$$\sqrt[15]{64+2000\left(\frac{1}{2}\sqrt{\frac{1}{2}\left(5+\sqrt{13}\right)}-\frac{1}{2}\sqrt{\frac{1}{2}\left(\sqrt{13}-3\right)}\right)^{2/3}}$$

Decimal approximation:

- More digits

1.6440414805381511567084788171659161849680731655188698340 01...

Open code

$$1.644041480538... \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 ...$$

Continued fraction:

- Linear form

$$1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{4+\cfrac{1}{4+\cfrac{1}{10+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{8+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{10+\cfrac{1}{3+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{63+\cfrac{1}{1+\cfrac{1}{3+\cfrac{1}{1+\cfrac{1}{\cdots}}}}}}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

- More

$$\frac{1684097\,\pi^2}{10110068} \approx 1.64404148053815123517$$

$$-\csc\left(\cot\left(\frac{33297631}{9795694}\right)\right) \approx 1.6440414805381511537329$$

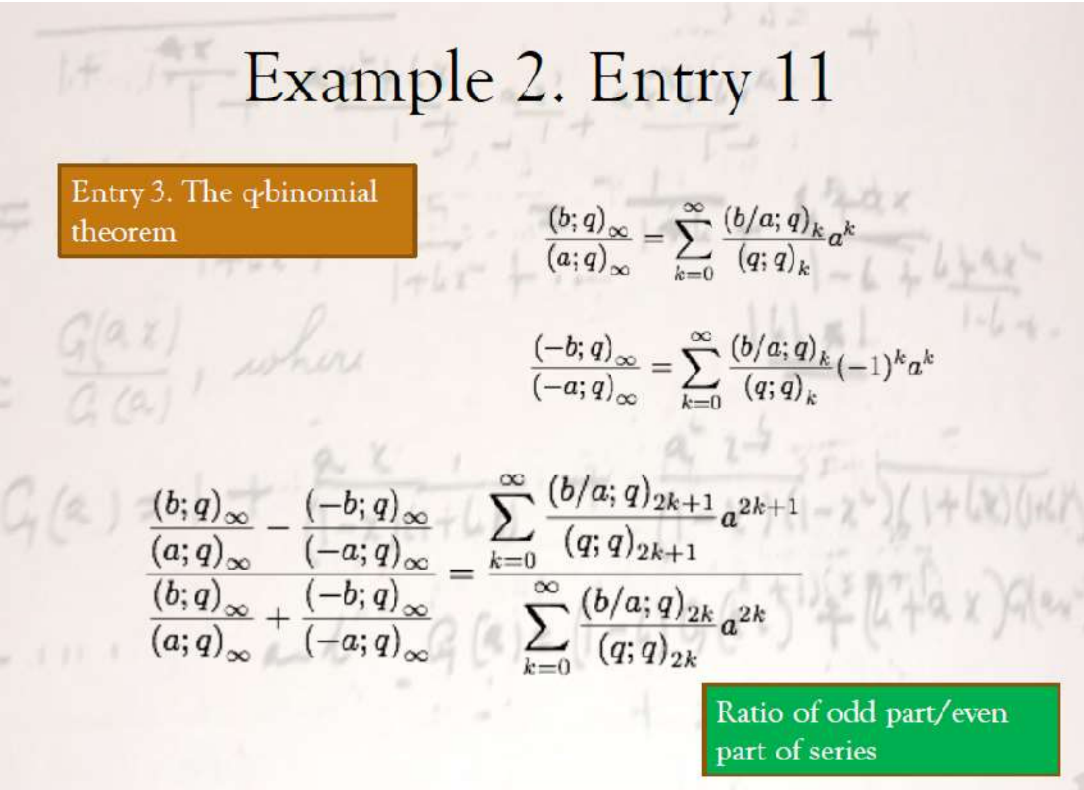
$$\frac{3625911049\,\pi}{6928739724} \approx 1.6440414805381511567033702$$

-

From:

A new proof of a *q*-continued fraction of Ramanujan

Gaurav Bhatnagar (Wien) - SLC 77, Strobl, Sept 13, 2016



Entry 11- Product side

$$\frac{\dfrac{(b;q)_\infty}{(a;q)_\infty}-\dfrac{(-b;q)_\infty}{(-a;q)_\infty}}{\dfrac{(b;q)_\infty}{(a;q)_\infty}+\dfrac{(-b;q)_\infty}{(-a;q)_\infty}}=\frac{\displaystyle\sum_{k=0}^{\infty}\frac{(b/a;q)_{2k+1}}{(q;q)_{2k+1}}a^{2k+1}}{\displaystyle\sum_{k=0}^{\infty}\frac{(b/a;q)_{2k}}{(q;q)_{2k}}a^{2k}}$$

$$\frac{\dfrac{(b;q)_\infty}{(a;q)_\infty}-\dfrac{(-b;q)_\infty}{(-a;q)_\infty}}{\dfrac{(b;q)_\infty}{(a;q)_\infty}+\dfrac{(-b;q)_\infty}{(-a;q)_\infty}}=\frac{(-a;q)_\infty(b;q)_\infty-(a;q)_\infty(-b;q)_\infty}{(-a;q)_\infty(b;q)_\infty+(a;q)_\infty(-b;q)_\infty}.$$

Rewrite the products to get one side of Entry 11

Ratio of sums

$$\frac{\displaystyle\sum_{k=0}^{\infty}\frac{(b/a;q)_{2k+1}}{(q;q)_{2k+1}}a^{2k+1}}{\displaystyle\sum_{k=0}^{\infty}\frac{(b/a;q)_{2k}}{(q;q)_{2k}}a^{2k}}.$$

The ratio can be written as

$$\frac{a-b}{(1-q)\dfrac{\displaystyle\sum_{k=0}^{\infty}\frac{(b/a;q)_{2k}}{(q;q)_{2k}}a^{2k}}{\displaystyle\sum_{k=0}^{\infty}\frac{(bq/a;q)_{2k}}{(q^2;q)_{2k}}a^{2k}}}$$

Apply Euler's approach

$$\frac{N_1}{D_1} \equiv \frac{\displaystyle\sum_{k=0}^{\infty} \frac{(b/a;q)_{2k}}{(q;q)_{2k}} a^{2k}}{\displaystyle\sum_{k=0}^{\infty} \frac{(bq/a;q)_{2k}}{(q^2;q)_{2k}} a^{2k}} = 1 + \frac{1}{D_1}\left(\sum_{k=0}^{\infty} \frac{(b/a;q)_{2k}}{(q;q)_{2k}} a^{2k} - \sum_{k=0}^{\infty} \frac{(bq/a;q)_{2k}}{(q^2;q)_{2k}} a^{2k}\right)$$

$$= 1 + \frac{1}{D_1}\left(\sum_{k=0}^{\infty} \frac{(b/a;q)_{2k}}{(q;q)_{2k}} a^{2k} \left[1 - \frac{1 - bq^{2k}/a}{1 - b/a} \cdot \frac{1-q}{1-q^{2k+1}}\right]\right)$$

$$= 1 + \frac{1}{D_1}\left(\sum_{k=0}^{\infty} \frac{(b/a;q)_{2k}}{(q;q)_{2k}} a^{2k} \left[\frac{(q - b/a)(1-q^{2k})}{(1-b/a)(1-q^{2k+1})}\right]\right).$$

Recall $(q;q)_{2k} = (1-q)(1-q^2)\cdots(1-q^{2k})$

Apply Euler's approach

$$\frac{N_1}{D_1} = 1 + \frac{1}{D_1}\left(\sum_{k=1}^{\infty} \frac{(bq/a;q)_{2k-1}}{(q;q)_{2k-1}} a^{2k} \left[\frac{q - b/a}{1 - q^{2k+1}}\right]\right)$$

$$= 1 + \frac{1}{D_1}\left(\sum_{k=0}^{\infty} \frac{(bq/a;q)_{2k+1}}{(q;q)_{2k+1}} a^{2k+2} \left[\frac{q - b/a}{1 - q^{2k+3}}\right]\right)$$

$$= 1 + \frac{1}{D_1}\left(\frac{a^2(1 - bq/a)(q - b/a)}{(1-q)(1-q^3)} \sum_{k=0}^{\infty} \frac{(bq^2/a;q)_{2k}}{(q^2;q)_{2k}} a^{2k} \left[\frac{1-q^3}{1-q^{2k+3}}\right]\right)$$

So we get

$$\frac{a-b}{1-q+\cfrac{(a-bq)(aq-b)}{(1-q^3)\cfrac{\sum_{k=0}^{\infty}\frac{(bq/a;q)_{2k}}{(q^2;q)_{2k}}a^{2k}}{\sum_{k=0}^{\infty}\frac{(bq^2/a;q)_{2k}}{(q^2;q)_{2k}}a^{2k}\left[\frac{1-q^3}{1-q^{2k+3}}\right]}}}$$

$$\begin{aligned}
\frac{N_2}{D_2} &\equiv \frac{\sum_{k=0}^{\infty}\frac{(bq/a;q)_{2k}}{(q^2;q)_{2k}}a^{2k}}{\sum_{k=0}^{\infty}\frac{(bq^2/a;q)_{2k}}{(q^2;q)_{2k}}a^{2k}\left[\frac{1-q^3}{1-q^{2k+3}}\right]}\\
&= 1+\frac{1}{D_2}\left(\sum_{k=0}^{\infty}\frac{(bq/a;q)_{2k}}{(q^2;q)_{2k}}a^{2k}-\sum_{k=0}^{\infty}\frac{(bq^2/a;q)_{2k}}{(q^2;q)_{2k}}a^{2k}\left[\frac{1-q^3}{1-q^{2k+3}}\right]\right)\\
&= 1+\frac{1}{D_2}\left(\sum_{k=0}^{\infty}\frac{(bq/a;q)_{2k}}{(q^2;q)_{2k}}a^{2k}\left[1-\frac{1-bq^{2k+1}/a}{1-bq/a}\cdot\frac{1-q^3}{1-q^{2k+3}}\right]\right)\\
&= 1+\frac{1}{D_2}\left(\sum_{k=0}^{\infty}\frac{(bq/a;q)_{2k}}{(q^2;q)_{2k}}a^{2k}\left[\frac{(q^3-bq/a)(1-q^{2k})}{(1-bq/a)(1-q^{2k+3})}\right]\right)\\
&= 1+\frac{1}{D_2}\left(\sum_{k=1}^{\infty}\frac{(bq^2/a;q)_{2k-1}}{(q^2;q)_{2k-2}}a^{2k}\left[\frac{q^3-bq/a}{(1-q^{2k+1})(1-q^{2k+3})}\right]\right)\\
&= 1+\frac{1}{D_2}\left(\sum_{k=0}^{\infty}\frac{(bq^2/a;q)_{2k+1}}{(q^2;q)_{2k}}a^{2k+2}\left[\frac{q^3-bq/a}{(1-q^{2k+3})(1-q^{2k+5})}\right]\right)\\
&= 1+\frac{1}{D_2}\left(\frac{a^2(1-bq^2/a)(q^3-bq/a)}{(1-q^3)(1-q^5)}\sum_{k=0}^{\infty}\frac{(bq^3/a;q)_{2k}}{(q^2;q)_{2k}}a^{2k}\left[\frac{1-q^3}{1-q^{2k+3}}\frac{1-q^5}{1-q^{2k+5}}\right]\right)\\
&= 1+\frac{1}{D_2}\left(\frac{q(a-bq^2)(aq^2-b)}{(1-q^3)(1-q^5)}\sum_{k=0}^{\infty}\frac{(bq^3/a;q)_{2k}}{(q^2;q)_{2k}}a^{2k}\left[\frac{1-q^3}{1-q^{2k+3}}\frac{1-q^5}{1-q^{2k+5}}\right]\right).
\end{aligned}$$

We get

$$\frac{a-b}{1-q+}\frac{(a-bq)(aq-b)}{(1-q^3)}+\cfrac{q(a-bq^2)(aq^2-b)}{(1-q^5)\cfrac{\displaystyle\sum_{k=0}^{\infty}\frac{(bq^2/a;q)_{2k}}{(q^2;q)_{2k}}a^{2k}\left[\frac{1-q^3}{1-q^{2k+3}}\right]}{\displaystyle\sum_{k=0}^{\infty}\frac{(bq^3/a;q)_{2k}}{(q^2;q)_{2k}}a^{2k}\left[\frac{1-q^3}{1-q^{2k+3}}\cdot\frac{1-q^5}{1-q^{2k+5}}\right]}}$$

Define, for $s=1,2,3,\ldots$

$$C(s):=\sum_{k=0}^{\infty}\frac{(bq^s/a;q)_{2k}}{(q^2;q)_{2k}}a^{2k}\prod_{i=1}^{s-1}\frac{1-q^{2i+1}}{1-q^{2k+2i+1}}.$$

$$\frac{\displaystyle\sum_{k=0}^{\infty}\frac{(b/a;q)_{2k+1}}{(q;q)_{2k+1}}a^{2k+1}}{\displaystyle\sum_{k=0}^{\infty}\frac{(b/a;q)_{2k}}{(q;q)_{2k}}a^{2k}}=\frac{a-b}{1-q+}\frac{(a-bq)(aq-b)}{(1-q^3)\dfrac{C(1)}{C(2)}}$$

$$(1-q^{2s+1})\frac{C(s)}{C(s+1)}=1-q^{2s+1}+q^s\frac{(a-bq^{s+1})(aq^{s+1}-b)}{(1-q^{2s+3})\dfrac{C(s+1)}{C(s+2)}}$$

Proposition:
A "finite form" of Entry 11

For: $|q| < 1$ *and* $|a| < 1$

$$\frac{(-a;q)_\infty(b;q)_\infty - (a;q)_\infty(-b;q)_\infty}{(-a;q)_\infty(b;q)_\infty + (a;q)_\infty(-b;q)_\infty} =$$

$$\frac{a-b}{1-q+}\ \frac{(a-bq)(aq-b)}{1-q^3}\ +\ \frac{q(a-bq^2)(aq^2-b)}{1-q^5}\ +\cdots$$

$$+\ \frac{q^{s-1}(a-bq^s)(aq^s-b)}{1-q^{2s+1}}\ +\ \frac{q^s(a-bq^{s+1})(aq^{s+1}-b)}{(1-q^{2s+3})\dfrac{C(s+1)}{C(s+2)}}$$

Now, from Ramanujan Notebooks Part V, we have, with regard the entry 11:

Entry 11 (pp. 374, 382). *If* $q > 1$,

$$\frac{1}{1}+\frac{q}{1}+\frac{q^2}{1}+\frac{q^3}{1}+\cdots \tag{11.1}$$

oscillates between

$$1-\frac{q^{-1}}{1}+\frac{q^{-2}}{1}-\frac{q^{-3}}{1}+\cdots \tag{11.2}$$

and

$$\frac{q^{-1}}{1}+\frac{q^{-4}}{1}+\frac{q^{-8}}{1}+\frac{q^{-12}}{1}+\cdots. \tag{11.3}$$

From the general theory of continued fractions, if all the elements of a divergent continued fraction are positive, then the even and odd approximants approach distinct limits. Thus, since (11.1) diverges for $q > 1$, Ramanujan is indicating that its odd approximants tend to (11.2) while its even approximants approach (11.3).

In fact, we shall prove Entry 11 for $|q| > 1$.

and:

To prove that the odd part of (11.1) converges to the value of (11.2) for $|q| > 1$, we can use the same idea, and even the same choices (11.16) for w_n. We then find that the odd part (Jones and Thron [1, p. 43, eq. (2.4.29)], where the first minus sign is misplaced) of (11.1) equals

$$1 - \frac{q}{1+q+q^2} - \frac{q^5}{1+q^3+q^4} - \frac{q^9}{1+q^5+q^6} - \cdots$$
$$= 1 - \frac{q^{-1}}{1+q^{-1}+q^{-2}} - \frac{q^{-1}}{1+q^{-1}+q^{-4}} - \frac{q^{-1}}{1+q^{-1}+q^{-6}} - \cdots$$
$$= 1 - \frac{q^{-1}}{1+q^{-2}} + \frac{q^{-5}}{1+q^{-4}} - \frac{q^{-3}}{1+q^{-3}+q^{-6}} - \frac{q^{-3}}{1+q^{-3}+q^{-8}} - \cdots$$
$$= 1 - \frac{q^{-1}}{1+q^{-2}} + \frac{q^{-5}}{1-q^{-3}+q^{-4}} + \frac{q^{-9}}{1+q^{-6}} - \frac{q^{-5}}{1+q^{-5}+q^{-8}}$$
$$- \frac{q^{-5}}{1+q^{-5}+q^{-10}} - \cdots$$
$$= \cdots$$
$$= 1 - \frac{q^{-1}}{1+q^{-2}} + \frac{q^{-5}}{1-q^{-3}+q^{-4}} + \frac{q^{-9}}{1-q^{-5}+q^{-6}} + \frac{q^{-13}}{1-q^{-7}+q^{-8}} + \cdots$$

The last continued fraction is the even part of (11.2). Since (11.2) converges for $|q| > 1$, the second proof of Entry 11 is complete by the same argument as above.

Now, from:

$$1 - \frac{q^{-1}}{1+q^{-2}} + \frac{q^{-5}}{1-q^{-3}+q^{-4}} + \frac{q^{-9}}{1-q^{-5}+q^{-6}} + \frac{q^{-13}}{1-q^{-7}+q^{-8}} + \cdots$$

we obtain, for q = 2, remembering that a continued fraction

$$x = a_0 + \cfrac{1}{a_1 + \cfrac{1}{a_2 + \cfrac{1}{a_3 + \cdots}}}$$

is also equal to

$$x = a_0 + \frac{1}{a_1+}\frac{1}{a_2+}\frac{1}{a_3+}$$

1-(1/2)/((1+(1/4)+(1/36)/((1-1/8+1/16+(1/512)/((1-1/32+1/64+(1/8192)/((1-1/128+1/256

Input:

$$1-\cfrac{\frac{1}{2}}{1+\frac{1}{4}+\cfrac{\frac{1}{36}}{1-\frac{1}{8}+\frac{1}{16}+\cfrac{\frac{1}{512}}{1-\frac{1}{32}+\frac{1}{64}+\cfrac{\frac{1}{8192}}{1-\frac{1}{128}+\frac{1}{256}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Exact result:

- Step-by-step solution

$$\frac{6\,777\,977}{11\,125\,247}$$

Decimal approximation:

- More digits

0.6092428329905843888230077049075854225978083902316955299 95...

Open code

1 / (((((1-(1/2)/((1+(1/4)+(1/36)/((1-1/8+1/16+(1/512)/((1-1/32+1/64+(1/8192)/((1-1/128+1/256

Input:

$$\cfrac{1}{1-\cfrac{\frac{1}{2}}{1+\frac{1}{4}+\cfrac{\frac{1}{36}}{1-\frac{1}{8}+\frac{1}{16}+\cfrac{\frac{1}{512}}{1-\frac{1}{32}+\frac{1}{64}+\cfrac{\frac{1}{8192}}{1-\frac{1}{128}+\frac{1}{256}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Exact result:

- Step-by-step solution

$$\frac{11\,125\,247}{6\,777\,977}$$

Decimal approximation:

- More digits

1.6413816393888618978789689017829361179596802998888901511 46...

Open code

$$1.64138163938... \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 ...$$

Continued fraction:

- Linear form

$$1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{3+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{20+\cfrac{1}{17+\cfrac{1}{1+\cfrac{1}{7+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{7+\cfrac{1}{\dots}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

More

- $\frac{222563621\pi}{425985170} \approx 1.64138163938886189881584$

π root of $902x^5 + 759x^4 - 145x^3 + 90x^2 - 470x + 150$ near $x = 0.522468$ $\approx$ 1.64138163938886189786 2707

$\frac{527 - 108\pi + 202\pi^2}{2(-68 - 81\pi + 100\pi^2)} \approx 1.64138163938886189883459$

This result is very important for the our researches!

From:

A new proof of a *q*-continued fraction of Ramanujan

Gaurav Bhatnagar (Wien) - SLC 77, Strobl, Sept 13, 2016

Now, we have:

Example 3: Entry 12

We begin with

$$\frac{\displaystyle\sum_{k=0}^{\infty}\frac{((bq/a)^2;q^4)_k}{(q^4;q^4)_k}(a^2q)^k}{\displaystyle\sum_{k=0}^{\infty}\frac{((b/aq)^2;q^4)_k}{(q^4;q^4)_k}(a^2q^3)^k}=\frac{(b^2q^3;q^4)_\infty/(a^2q;q^4)_\infty}{(b^2q;q^4)_\infty/(a^2q^3;q^4)_\infty}$$

$$=\frac{(a^2q^3,b^2q^3;q^4)_\infty}{(a^2q,b^2q;q^4)_\infty}$$

Entry 12: Euler's approach

We begin with

$$\frac{\displaystyle\sum_{k=0}^{\infty}\frac{((bq/a)^2;q^4)_k}{(q^4;q^4)_k}(a^2q)^k}{\displaystyle\sum_{k=0}^{\infty}\frac{((b/aq)^2;q^4)_k}{(q^4;q^4)_k}(a^2q^3)^k}=\frac{\displaystyle\sum_{k=0}^{\infty}\frac{(bq/a,-bq/a;q^2)_k}{(q^2,-q^2;q^2)_k}(a^2q)^k}{\displaystyle\sum_{k=0}^{\infty}\frac{(b/aq,-b/aq;q^2)_k}{(q^2,-q^2;q^2)_k}(a^2q^3)^k}$$

$$=\frac{1}{\dfrac{\displaystyle\sum_{k=0}^{\infty}\frac{(b/aq,-b/aq;q^2)_k}{(q^2,-q^2;q^2)_k}(a^2q^3)^k}{\displaystyle\sum_{k=0}^{\infty}\frac{(bq/a,-bq/a;q^2)_k}{(q^2,-q^2;q^2)_k}(a^2q)^k}}$$

We use

$$(a;q^2)_k=(\sqrt{a},-\sqrt{a};q^2)_k$$

$$(a,b;q)_k=(a;q)_k(b;q)_k$$

$$
\begin{aligned}
\frac{N}{D} &= \frac{\displaystyle\sum_{k=0}^{\infty} \frac{\left(b/aq, -b/aq; q^2\right)_k}{(q^2, -q^2; q^2)_k} (a^2q^3)^k}{\displaystyle\sum_{k=0}^{\infty} \frac{\left(bq/a, -bq/a; q^2\right)_k}{(q^2, -q^2; q^2)_k} (a^2q)^k} \\
&= 1 + \frac{1}{D}\left(\sum_{k=0}^{\infty} \frac{\left(b/aq, -b/aq; q^2\right)_k}{(q^2, -q^2; q^2)_k} (a^2q^3)^k - \sum_{k=0}^{\infty} \frac{\left(bq/a, -bq/a; q^2\right)_k}{(q^2, -q^2; q^2)_k} (a^2q)^k \right) \\
&= 1 + \frac{1}{D}\left(\sum_{k=0}^{\infty} \frac{\left(b/aq, -b/aq; q^2\right)_k}{(q^2, -q^2; q^2)_k} (a^2q)^k \left(q^{2k} - \frac{\left(1 - bq^{2k}/aq\right)\left(1 + bq^{2k}/aq\right)}{(1 - b/aq)(1 + b/aq)} \right) \right) \\
&= 1 + \frac{1}{D}\left(\sum_{k=0}^{\infty} \frac{\left(b/aq, -b/aq; q^2\right)_k}{(q^2, -q^2; q^2)_k} (a^2q)^k \left((-1)\frac{\left(1 - q^{2k}\right)\left(1 + b^2q^{2k}/a^2q^2\right)}{(1 - b/aq)(1 + b/aq)} \right) \right) \\
&= 1 + \frac{(-1)}{D}\left(\sum_{k=1}^{\infty} \frac{\left(bq/a, -bq/a; q^2\right)_{k-1}}{(q^2; q^2)_{k-1}(-q^2; q^2)_k} (a^2q)^k \left(1 + b^2q^{2k}/a^2q^2\right) \right) \\
&= 1 + \frac{(-1)}{D}\left(\sum_{k=0}^{\infty} \frac{\left(bq/a, -bq/a; q^2\right)_k}{(q^2, -q^2; q^2)_k} (a^2q)^k \left[\frac{a^2q\left(1 + b^2q^{2k}/a^2\right)}{1 + q^{2k+2}} \right] \right).
\end{aligned}
$$

The factor $\left(1 + q^{2k+2}\right)$ is not a problem, we can use

$$
\left(-q^2; q^2\right)_k \left(1 + q^{2k+2}\right) = \left(1 + q^2\right)\left(-q^4; q^2\right)_k
$$

But we cannot absorb the factor $\left(1 + b^2q^{2k}/a^2\right)$ in the sum.

However, if we just had $1 - bq^{2k+1}/a$, we could proceed by using

$$
\left(bq/a; q^2\right)_k \left(1 - bq^{2k+1}/a\right) = (1 - bq/a)\left(bq^3/a; q^2\right)_k.
$$

$$
\begin{aligned}
\frac{a^2q\left(1+b^2q^{2k}/a^2\right)}{1+q^{2k+2}} &= \frac{\left(a^2q+b^2q^{2k+1}\right)}{1+q^{2k+2}} \\
&= \frac{\left(a^2q-abq^{2k+2}+b^2q^{2k+1}-ab+abq^{2k+2}+ab\right)}{1+q^{2k+2}} \\
&= \frac{\left(a^2q\left(1-bq^{2k+1}/a\right)-ab\left(1-bq^{2k+1}/a\right)+ab\left(1+q^{2k+2}\right)\right)}{1+q^{2k+2}} \\
&= \frac{\left(a^2q-ab\right)\left(1-bq^{2k+1}/a\right)+ab\left(1+q^{2k+2}\right)}{1+q^{2k+2}} \\
&= ab+\frac{a\left(aq-b\right)\left(1-bq^{2k+1}/a\right)}{1+q^{2k+2}}.
\end{aligned}
$$

$$
\begin{aligned}
\frac{N}{D} &= 1-ab-\frac{a(aq-b)(1-bq/a)}{(1+q^2)\,D}\left(\sum_{k=0}^{\infty}\frac{\left(bq^3/a,-bq/a;q^2\right)_k}{\left(q^2,-q^4;q^2\right)_k}(a^2q)^k\right) \\
&= 1-ab+\cfrac{(b-aq)(a-bq)}{\cfrac{(1+q^2)\left(\displaystyle\sum_{k=0}^{\infty}\frac{\left(bq/a,-bq/a;q^2\right)_k}{\left(q^2,-q^4;q^2\right)_k}(a^2q)^k\right)}{\left(\displaystyle\sum_{k=0}^{\infty}\frac{\left(bq^3/a,-bq/a;q^2\right)_k}{\left(q^2,-q^2;q^2\right)_k}(a^2q)^k\right)}}.
\end{aligned}
$$

$$
\begin{aligned}
\frac{N_1}{D_1} &= \frac{\displaystyle\sum_{k=0}^{\infty}\frac{\left(bq/a,-bq/a;q^2\right)_k}{\left(q^2,-q^2;q^2\right)_k}(a^2q)^k}{\displaystyle\sum_{k=0}^{\infty}\frac{\left(bq^3/a,-bq/a;q^2\right)_k}{\left(q^2,-q^4;q^2\right)_k}(a^2q)^k} \\
&= 1+\frac{1}{D_1}\left(\sum_{k=0}^{\infty}\frac{\left(bq/a,-bq/a;q^2\right)_k}{\left(q^2,-q^2;q^2\right)_k}(a^2q)^k\left(1-\frac{\left(1-bq^{2k+1}/a\right)\left(1+q^2\right)}{\left(1-bq/a\right)\left(1+q^{2k+2}\right)}\right)\right) \\
&= 1+\frac{1}{D_1}\left(\sum_{k=0}^{\infty}\frac{\left(bq/a,-bq/a;q^2\right)_k}{\left(q^2,-q^2;q^2\right)_k}(a^2q)^k\left((-1)\frac{\left(1-q^{2k}\right)\left(q^2+bq/a\right)}{\left(1-bq/a\right)\left(1+q^{2k+2}\right)}\right)\right) \\
&= 1+\frac{(-1)}{D_1}\left(\sum_{k=1}^{\infty}\frac{\left(bq^3/a;q^2\right)_{k-1}\left(-bq/a;q^2\right)_k}{\left(q^2;q^2\right)_{k-1}\left(-q^2;q^2\right)_k}(a^2q)^k\left(\frac{q^2+bq/a}{1+q^{2k+2}}\right)\right) \\
&= 1+\frac{(-1)}{D_1}\left(\sum_{k=0}^{\infty}\frac{\left(bq^3/a;q^2\right)_k\left(-bq/a;q^2\right)_{k+1}}{\left(q^2;q^2\right)_k\left(-q^2;q^2\right)_{k+1}}(a^2q)^k\left[\frac{a^2q\left(q^2+bq/a\right)}{1+q^{2k+4}}\right]\right) \\
&= 1+\frac{(-1)}{D_1}\left(\sum_{k=0}^{\infty}\frac{\left(bq^3/a,-bq/a;q^2\right)_k}{\left(q^2,-q^4;q^2\right)_k}(a^2q)^k\left[\frac{\left(1+bq^{2k+1}/a\right)\left(a^2q^3+abq^2\right)}{\left(1+q^2\right)\left(1+q^{2k+4}\right)}\right]\right).
\end{aligned}
$$

We now have an extra factor

$$\left[\frac{\left(1+bq^{2k+1}/a\right)\left(a^2q^3+abq^2\right)}{\left(1+q^2\right)\left(1+q^{2k+4}\right)}\right].$$

But given our experience, let us try to obtain the factor

$$\left(1-bq^{2k+3}/a\right)$$

$$\begin{aligned}
&\frac{\left(1+bq^{2k+1}/a\right)\left(a^2q^3+abq^2\right)}{\left(1+q^2\right)\left(1+q^{2k+4}\right)}\\
&=\frac{a^2q^3+abq^{2k+4}+abq^2+b^2q^{2k+3}}{\left(1+q^2\right)\left(1+q^{2k+4}\right)}\\
&=\frac{\left(a^2q^3-abq^{2k+6}\right)+abq^{2k+4}+abq^2+\left(b^2q^{2k+3}-ab\right)+ab+abq^{2k+6}}{\left(1+q^2\right)\left(1+q^{2k+4}\right)}\\
&=\frac{\left(a^2q^3-ab\right)\left(1-bq^{2k+3}/a\right)+ab\left(1+q^2+q^{2k+4}+q^{2k+6}\right)}{\left(1+q^2\right)\left(1+q^{2k+4}\right)}\\
&=\frac{a\left(aq^3-b\right)\left(1-bq^{2k+3}/a\right)+ab\left(1+q^2\right)\left(1+q^{2k+4}\right)}{\left(1+q^2\right)\left(1+q^{2k+4}\right)}\\
&=ab+\frac{a\left(aq^3-b\right)\left(1-bq^{2k+3}/a\right)}{\left(1+q^2\right)\left(1+q^{2k+4}\right)}
\end{aligned}$$

$$\begin{aligned}
\left(1+q^2\right)\frac{N_1}{D_1}&=\left(1-ab\right)\left(1+q^2\right)-\frac{a(aq^3-b)(1-bq^3/a)}{\left(1+q^4\right)D_1}\left(\sum_{k=0}^{\infty}\frac{\left(bq^5/a,-bq/a;q^2\right)_k}{\left(q^2,-q^6;q^2\right)_k}\left(a^2q\right)^k\right)\\
&=\left(1-ab\right)\left(1+q^2\right)+\frac{(b-aq^3)(a-bq^3)}{\dfrac{\left(1+q^4\right)\left(\displaystyle\sum_{k=0}^{\infty}\frac{\left(bq^3/a,-bq/a;q^2\right)_k}{\left(q^2,-q^4;q^2\right)_k}\left(a^2q\right)^k\right)}{\left(\displaystyle\sum_{k=0}^{\infty}\frac{\left(bq^5/a,-bq/a;q^2\right)_k}{\left(q^2,-q^6;q^2\right)_k}\left(a^2q\right)^k\right)}}.
\end{aligned}$$

$$D(s) := \sum_{k=0}^{\infty} \frac{(aq^{2s-1}/b, -aq/b; q^2)_k}{(q^2, -q^{2s}; q^2)_k} (a^2q)^k$$

$$\frac{1}{N_1/D_1} = \frac{\displaystyle\sum_{k=0}^{\infty} \frac{(aq/b, -aq/b; q^2)_k}{(q^2, -q^2; q^2)_k} (a^2q)^k}{\displaystyle\sum_{k=0}^{\infty} \frac{(a/bq, -a/bq; q^2)_k}{(q^2, -q^2; q^2)_k} (a^2q^3)^k} = \frac{1}{1-ab+\cfrac{(a-bq)(b-aq)}{(1+q^2)\cfrac{D(1)}{D(2)}}}$$

Further, for $s = 1, 2, \ldots$, we have

$$(1+q^{2s})\frac{D(s)}{D(s+1)} = (1-ab)(1+q^{2s}) + \frac{(a-bq^{2s+1})(b-aq^{2s+1})}{(1+q^{2s+2})\cfrac{D(s+1)}{D(s+2)}}$$

Proposition:
A "finite form" of Entry 12

$$\frac{(a^2q^3, b^2q^3; q^4)_\infty}{(a^2q, b^2q; q^4)_\infty} =$$

$$\frac{1}{1-ab+} \frac{(a-bq)(b-aq)}{(1-ab)(1+q^2)+} \frac{(a-bq^3)(b-aq^3)}{(1-ab)(1+q^4)} + \cdots$$
$$+ \frac{(a-bq^{2s-1})(b-aq^{2s-1})}{(1-ab)(1+q^{2s})} + \frac{(a-bq^{2s+1})(b-aq^{2s+1})}{(1+q^{2s+2})\cfrac{D(s+1)}{D(s+2)}}$$

As s goes to infinity, we get "Modified Covnergence" of the infinite continued fraction of Entry 12

For: $|q| < 1$ *and* $|a| < 1$

Entry 12 (p. 383). *If*

$$u := \frac{q^{1/5}}{1} \; \frac{q}{+\,1} \; \frac{q^2}{+\,1} \; \frac{q^3}{+\,1} + \cdots,$$

then $u^2 + u - 1 = 0$ *when* $q^n = 1$, *where n is any positive integer except multiples of 5 in which case u is not definite.*

we obtain, for q = 2, remembering that a continued fraction

$$x = a_0 + \cfrac{1}{a_1 + \cfrac{1}{a_2 + \cfrac{1}{a_3 + \cdots}}}$$

is also equal to

$$x = a_0 + \frac{1}{a_1+}\frac{1}{a_2+}\frac{1}{a_3+}$$

the following expression:

(2^(1/5))/((1+2/((1+2^2/((1+2^3/((1+2^4/((1+2^5/((1+2^6

Input:

$$\frac{\sqrt[5]{2}}{1+\frac{2}{1+\frac{2^2}{1+\frac{2^3}{1+\frac{2^4}{1+\frac{2^5}{1+2^6}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- Approximate form
- Step-by-step solution

$$\frac{6461\sqrt[5]{2}}{10\,287}$$

Decimal approximation:

- More digits

0.721467879035272011171957684760590080236873781905401932839...

1/
(((((((((((((((((2^(1/5))/((1+2/((1+2^2/((1+2^3/((1+2^4/((1+2^5/((1+2^6)))))))))))))))))
^3

Input:

$$\frac{1}{\left(\frac{\sqrt[5]{2}}{1+\frac{2}{1+\frac{2^2}{1+\frac{2^3}{1+\frac{2^4}{1+\frac{2^5}{1+2^6}}}}}}\right)^3}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

$$\frac{1088594709903}{269711350181 \times 2^{3/5}}$$

Decimal approximation:

- More digits

2.662864077426803949426734700928237337951542661197926683228...

1/(((((((((((((((2^(1/5))/((1+2/((1+2^2/((1+2^3/((1+2^4/((1+2^5/((1+2^6)))))))))))))))^(3/2)

Input:

$$\frac{1}{\left(\frac{\sqrt[5]{2}}{1+\frac{2}{1+\frac{2^2}{1+\frac{2^3}{1+\frac{2^4}{1+\frac{2^5}{1+2^6}}}}}}\right)^{3/2}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

$$\frac{92583\sqrt{\frac{127}{6461}}}{6461 \times 2^{3/10}}$$

Decimal approximation:

- More digits

1.631828446077222894979724886294569386034807068017675001906...

1.631828446077222894979724886294569386034807068017675001906

Alternate form:

- Step-by-step solution

$$\frac{92583\sqrt{820547}\;2^{7/10}}{83489042}$$

Continued fraction:

- Linear form

$$1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{10+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{10+\cfrac{1}{13+\cfrac{1}{1+\cfrac{1}{9+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{4+\cfrac{1}{15+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{\cdots}}}}}}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

- More

$$\frac{-280\pi\,\pi!+5070+65\pi+634\pi^2}{1016\pi}\approx 1.63182844607722289497911697$$

$$\frac{2123983027\pi}{4089087606}\approx 1.63182844607722289 50220$$

$$\text{root of } 27169x^3+3575x^2-74883x-5382 \text{ near } x=1.63183 \approx$$

$$1.63182844607722289497 60894$$

Or, we have the following alternate our expression:

1+(2^(1/5))/((1+2/((1+2^2/((1+2^3/((1+2^4/((1+2^5/((1+2^6

Input:

$$1+\cfrac{\sqrt[5]{2}}{1+\cfrac{2}{1+\cfrac{2^2}{1+\cfrac{2^3}{1+\cfrac{2^4}{1+\cfrac{2^5}{1+2^6}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

$$1+\frac{6461\sqrt[5]{2}}{10\,287}$$

Decimal approximation:

- More digits

1.7214678790352720111719576847605900802368737819054019328 39...

Alternate forms:

- Step-by-step solution

$$\frac{10\,287+6461\sqrt[5]{2}}{10\,287}$$

Open code

Enlarge Data Customize A Plaintext Interactive

root of $115\,197\,671\,082\,803\,220\,207\,x^5 - 575\,988\,355\,414\,016\,101\,035\,x^4 + 1\,151\,976\,710\,828\,032\,202\,070\,x^3 - 1\,151\,976\,710\,828\,032\,202\,070\,x^2 + 575\,988\,355\,414\,016\,101\,035\,x - 137\,715\,613\,325\,941\,436\,809$ near $x = 1.72147$

Open code

Minimal polynomial:

$$115\,197\,671\,082\,803\,220\,207\,x^5 - 575\,988\,355\,414\,016\,101\,035\,x^4 + 1\,151\,976\,710\,828\,032\,202\,070\,x^3 - 1\,151\,976\,710\,828\,032\,202\,070\,x^2 + 575\,988\,355\,414\,016\,101\,035\,x - 137\,715\,613\,325\,941\,436\,809$$

Open code

10^3 (((1+(2^(1/5))/((1+2/((1+2^2/((1+2^3/((1+2^4/((1+2^5/((1+2^6)))

Input:

$$10^3\left(1+\frac{\sqrt[5]{2}}{1+\frac{2}{1+\frac{2^2}{1+\frac{2^3}{1+\frac{2^4}{1+\frac{2^5}{1+2^6}}}}}}\right)$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

$$1000\left(1+\frac{6461\sqrt[5]{2}}{10\,287}\right)$$

Decimal approximation:

- More digits

1721.4678790352720111719576847605900802368737819054019328 39...

1721.4678... result in the range of the mass of candidate "glueball" $f_0(1710)$ ("glueball" =1760 ± 15 MeV).

((((((((((((((((((((10^3 (((1+(2^(1/5))/((1+2/((1+2^2/((1+2^3/((1+2^4/((1+2^5/((1+2^6)))))))))))))))))))))))^1/3

Input:

$$\sqrt[3]{10^3\left(1+\frac{\sqrt[5]{2}}{1+\frac{2}{1+\frac{2^2}{1+\frac{2^3}{1+\frac{2^4}{1+\frac{2^5}{1+2^6}}}}}}\right)}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Exact result:

$$10\sqrt[3]{1+\frac{6461\sqrt[5]{2}}{10\,287}}$$

Decimal approximation:

- More digits

11.98486025666588944626969084009075186794684385396305174276...

Open code

2*((((((((((((((((((((10^3 (((1+(2^(1/5))/((1+2/((1+2^2/((1+2^3/((1+2^4/((1+2^5/((1+2^6)))))))))))))))))))))))^1/3

Input:

$$2\sqrt[3]{10^3\left(1+\frac{\sqrt[5]{2}}{1+\frac{2}{1+\frac{2^2}{1+\frac{2^3}{1+\frac{2^4}{1+\frac{2^5}{1+2^6}}}}}}\right)}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Exact result:

$$20\sqrt[3]{1+\frac{6461\sqrt[5]{2}}{10287}}$$

Decimal approximation:

- More digits

23.96972051333177889253938168018150373589368770792610348552...

23.9697...

This result is very near to the value of black hole entropy 23,9078

Alternate forms:

$$\frac{20}{3}\sqrt[3]{\frac{1}{381}\left(10287+6461\sqrt[5]{2}\right)}$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$\sqrt[3]{\text{root of } 115197671082803220207x^5-4607906843312128808280000x^4+73726509492994060932480000000x^3-589812075943952487459840000000000x^2+2359248303775809949839360000000000000x-4512665217464449001357312000000000000000 \text{ near } x=13771.7}$$

Open code

Minimal polynomial:

$$115197671082803220207x^{15}-4607906843312128808280000x^{12}+73726509492994060932480000000x^9-589812075943952487459840000000000x^6+2359248303775809949839360000000000000x^3-4512665217464449001357312000000000000000$$

((((((((((((((((((10^3 (((1+(2^(1/5))/((1+2/((1+2^2/((1+2^3/((1+2^4/((1+2^5/((1+2^6))))))))))))))))))))))^1/15

Input:

$$\sqrt[15]{10^3\left(1+\frac{\sqrt[5]{2}}{1+\frac{2}{1+\frac{2^2}{1+\frac{2^3}{1+\frac{2^4}{1+\frac{2^5}{1+2^6}}}}}}\right)}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Exact result:

$$\sqrt[5]{10}\ \sqrt[15]{1+\frac{6461\sqrt[5]{2}}{10\,287}}$$

Decimal approximation:

- More digits

1.6433368536967045772493749871944625313448041133549802651 12...

$$1.6433368536967... \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ ...$$

Open code

Alternate forms:

$$\frac{\sqrt[5]{10}\ \sqrt[15]{\frac{1}{127}\left(10\,287+6461\sqrt[5]{2}\right)}}{3^{4/15}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$\sqrt[15]{\text{root of } 115\,197\,671\,082\,803\,220\,207\,x^5 - 575\,988\,355\,414\,016\,101\,035\,000\,x^4 + 1\,151\,976\,710\,828\,032\,202\,070\,000\,000\,x^3 - 1\,151\,976\,710\,828\,032\,202\,070\,000\,000\,000\,x^2 + 575\,988\,355\,414\,016\,101\,035\,000\,000\,000\,000\,x - 137\,715\,613\,325\,941\,436\,809\,000\,000\,000\,000\,000 \text{ near } x = 1721.47}$$

Open code

Minimal polynomial:

$$115\,197\,671\,082\,803\,220\,207\,x^{75} - 575\,988\,355\,414\,016\,101\,035\,000\,x^{60} + 1\,151\,976\,710\,828\,032\,202\,070\,000\,000\,x^{45} - 1\,151\,976\,710\,828\,032\,202\,070\,000\,000\,000\,x^{30} + 575\,988\,355\,414\,016\,101\,035\,000\,000\,000\,000\,x^{15} - 137\,715\,613\,325\,941\,436\,809\,000\,000\,000\,000\,000$$

Continued fraction:

- Linear form

$$1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{4+\cfrac{1}{10+\cfrac{1}{2+\cfrac{1}{2+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{8+\cfrac{1}{3+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{4+\cfrac{1}{98+\cfrac{1}{7+\cfrac{1}{1+\cfrac{1}{99+\cfrac{1}{\cdots}}}}}}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

- More

$$\frac{100\sqrt{\frac{11422961}{4457861}}}{\pi^4} \approx 1.6433368536967046006$$

$$\frac{390-389\,e+70\,e^2}{4\left(-223-65\,e+51\,e^2\right)} \approx 1.6433368536967045754415$$

$$\frac{4196822489\,\pi}{8023130906} \approx 1.6433368536967045772442693$$

Note that from the closed form, we obtain:

$$\pi = (1.6433368536967045772 4 * 8023130906)/4196822489$$

3.1415926535897932384544816471126186819287223849033277751873

Continued fraction:

- Linear form

$$3+\cfrac{1}{7+\cfrac{1}{15+\cfrac{1}{1+\cfrac{1}{292+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{1+\cfrac{1}{3+\cfrac{1}{1+\cfrac{1}{14+\cfrac{1}{2+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{2+\cfrac{1}{2+\cfrac{1}{3+\cfrac{1}{2+\cfrac{1}{\ldots}}}}}}}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

- More

$\pi \approx 3.14159265358979323846264 3$

$\log(\mathcal{G}_{Ge}) \approx 3.141592653589793238462643$

$\sqrt{6\,\zeta(2)} \approx 3.141592653589793238462643$

- $\log(x)$ is the natural logarithm
- $\mathcal{G}_{Ge}$ is Gelfond's constant
- $\zeta(2)$ is zeta of 2

and from:

ln ((((4196822489*Pi)/1.6433368536967045772 4)))

Input interpretation:

$$\log\left(\frac{4\,196\,822\,489\,\pi}{1.6433368536967045772 4}\right)$$

Open code

- $\log(x)$ is the natural logarithm

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

22.80559456992534106005...

This value 22.8055 is very near to the black hole entropy 22.6589

Series representations:

- More

$$\log\left(\frac{4196822489\pi}{1.6433368536967045772400000}\right) = \log(-1.0000000000000000000000000 + 2.55384188552651333305579 2\times 10^9 \pi) - \sum_{k=1}^{\infty} \frac{1}{k}(-1)^k (-1.0000000000000000000000000 + 2.553841885526513333055792\times 10^9 \pi)^{-k}$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$\log\left(\frac{4196822489\pi}{1.6433368536967045772400000}\right) = 2 i \pi \left\lfloor \frac{1}{2\pi} \arg(2.553841885526513333055792\times 10^9 \pi - 1.0000000000000000000000000\, x) \right\rfloor + \log(x) - \sum_{k=1}^{\infty} \frac{1}{k}(-1)^k (2.553841885526513333055792\times 10^9 \pi - 1.0000000000000000000000000\, x)^k x^{-k} \quad \text{for } x < 0$$

Open code

$$\log\left(\frac{4196822489\pi}{1.6433368536967045772400000}\right) = \left\lfloor \frac{1}{2\pi} \arg(2.553841885526513333055792\times 10^9 \pi - 1.0000000000000000000000000\, z_0) \right\rfloor \log\left(\frac{1}{z_0}\right) + \log(z_0) + \left\lfloor \frac{1}{2\pi} \arg(2.553841885526513333055792\times 10^9 \pi - 1.0000000000000000000000000\, z_0) \right\rfloor \log(z_0) - \sum_{k=1}^{\infty} \frac{1}{k}(-1)^k (2.553841885526513333055792\times 10^9 \pi - 1.0000000000000000000000000\, z_0)^k z_0^{-k}$$

Integral representations:

$$\log\left(\frac{4196822489\pi}{1.6433368536967045772400000}\right) = \int_1^{2.553841885526513333055792\times 10^9 \pi} \frac{1}{t}\, dt$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$\log\left(\frac{4196822489\pi}{1.6433368536967045772400000}\right) = \frac{1}{2 i \pi} \int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{1}{\Gamma(1-s)} (-1.0000000000000000000000000 + 2.553841885526513333055792\times 10^9 \pi)^{-s} \Gamma(-s)^2 \Gamma(1+s)\, ds \quad \text{for } -1 < \gamma < 0$$

Open code

- $\Gamma(x)$ is the gamma function
-

And:

(0.538*4+2.5819)/2 * ln ((((4196822489*Pi)/1.643336853696704577240000))) * 1/(10^45)

Input interpretation:

$$\left(\frac{1}{2}(0.538\times 4+2.5819)\right)\log\left(\frac{4196822489\,\pi}{1.643336853696704577240000}\right)\times\frac{1}{10^{45}}$$

Open code

- $\log(x)$ is the natural logarithm

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

$5.39797...\times 10^{-44}$

Series representations:

- More

$$\frac{\log\left(\frac{4196822489\,\pi}{1.643336853696704577240000}\right)(0.538\times 4+2.5819)}{10^{45}\times 2}=2.36695\times 10^{-45}\log(-1.000000000000000000000000+2.553841885526513333055792\times 10^{9}\,\pi)-2.36695\times 10^{-45}\sum_{k=1}^{\infty}\frac{1}{k}(-1)^k\,(-1.000000000000000000000000+2.553841885526513333055792\times 10^{9}\,\pi)^{-k}$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$\frac{\log\left(\frac{4196822489\,\pi}{1.643336853696704577240000}\right)(0.538\times 4+2.5819)}{10^{45}\times 2}=4.7339\times 10^{-45}\,i\,\pi\left\lfloor\frac{1}{2\pi}\arg(2.553841885526513333055792\times 10^{9}\,\pi-1.000000000000000000000000\,x)\right\rfloor+2.36695\times 10^{-45}\log(x)-2.36695\times 10^{-45}\sum_{k=1}^{\infty}\frac{1}{k}(-1)^k\,(2.553841885526513333055792\times 10^{9}\,\pi-1.000000000000000000000000\,x)^k\,x^{-k}\quad\text{for } x<0$$

Open code

$$\frac{\log\left(\frac{4196822489\,\pi}{1.6433368536967045772400000}\right)(0.538\times 4+2.5819)}{10^{45}\times 2} =$$

$$2.36695\times 10^{-45}\left\lfloor\frac{1}{2\pi}\arg(2.5538418855265133330557792\times 10^{9}\,\pi - 1.0000000000000000000000000\,z_0)\right\rfloor \log\left(\frac{1}{z_0}\right) + 2.36695\times 10^{-45}\log(z_0) + 2.36695\times 10^{-45}\left\lfloor\frac{1}{2\pi}\arg(2.5538418855265133330557792\times 10^{9}\,\pi - 1.0000000000000000000000000\,z_0)\right\rfloor \log(z_0) - 2.36695\times 10^{-45}\sum_{k=1}^{\infty}\frac{1}{k}(-1)^k\,(2.5538418855265133330557792\times 10^{9}\,\pi - 1.0000000000000000000000000\,z_0)^k\,z_0^{-k}$$

Integral representations:

$$\frac{\log\left(\frac{4196822489\,\pi}{1.6433368536967045772400000}\right)(0.538\times 4+2.5819)}{10^{45}\times 2} = 2.36695\times 10^{-45}\int_1^{2.5538418855265133330557792\times 10^{9}\,\pi}\frac{1}{t}\,dt$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$\frac{\log\left(\frac{4196822489\,\pi}{1.6433368536967045772400000}\right)(0.538\times 4+2.5819)}{10^{45}\times 2} =$$

$$\frac{1.18348\times 10^{-45}}{i\,\pi}\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{1}{\Gamma(1-s)}\,(-1.0000000000000000000000000 + 2.5538418855265133330557792\times 10^{9}\,\pi)^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)\,ds \quad \text{for } -1<\gamma<0$$

This result 5.39797×10^{-44} is a very good approximation to the value of Planck time $1\ t_P \approx 5.391\,245(60)\times 10^{-44}$ s, that is equal to the formula

$$t_P \equiv \sqrt{\frac{\hbar G}{c^5}}$$

where:

$\hbar = {}^{h}/_{2\pi}$ is the reduced Planck constant (sometimes h is used instead of $\hbar$ in the definition[1])

G = gravitational constant

c = speed of light in vacuum

Now, we have:

Entry 16 (p. 373). *For* $|q| < 1$,

$$\frac{\chi(-q^2)f(-q^5)}{f(-q,-q^4)} = \frac{f(q,q^9)}{f(-q^4,-q^{16})} = \sum_{n=0}^{\infty} \frac{q^{n^2}}{(q^4;q^4)_n} \tag{16.1}$$

and

$$\frac{q\chi(-q^2)f(-q^5)}{f(-q^2,-q^3)} = \frac{qf(q^3,q^7)}{f(-q^8,-q^{12})} = \sum_{n=0}^{\infty} \frac{q^{(n+1)^2}}{(q^4;q^4)_n}, \tag{16.2}$$

where, as before, $\chi(q) = (-q;q^2)_\infty$. *Moreover,*

$$\frac{qf(q^3,q^7)}{f(-q^8,-q^{12})} \Big/ \frac{f(q,q^9)}{f(-q^4,-q^{16})} = \frac{q}{1} + \frac{q^2}{1} + \frac{q^3}{1} + \cdots \tag{16.3}$$

We have that:

$$\begin{aligned}
\frac{f(q,q^9)}{f(-q^4,-q^{16})} &= \frac{(-q;q^{10})_\infty(-q^9;q^{10})_\infty(q^{10};q^{10})_\infty}{(q^4;q^{20})_\infty(q^{16};q^{20})_\infty(q^{20};q^{20})_\infty} \\
&= \frac{(-q;q^{10})_\infty(-q^9;q^{10})_\infty}{(-q^2;q^{10})_\infty(q^2;q^{10})_\infty(-q^8;q^{10})_\infty(q^8;q^{10})_\infty(-q^{10};q^{10})_\infty} \\
&= \frac{(-q^4;q^{10})_\infty(-q^6;q^{10})_\infty(-q;q^{10})_\infty(-q^9;q^{10})_\infty}{(-q^2;q^2)_\infty(q;q^5)_\infty(-q;q^5)_\infty(q^4;q^5)_\infty(-q^4;q^5)_\infty} \\
&= \frac{1}{(-q^2;q^2)_\infty(q;q^5)_\infty(q^4;q^5)_\infty} \qquad (16.4) \\
&= \frac{(q^2;q^4)_\infty(q^5;q^5)_\infty}{(q;q^5)_\infty(q^4;q^5)_\infty(q^5;q^5)_\infty} \\
&= \frac{\chi(-q^2)f(-q^5)}{f(-q,-q^4)},
\end{aligned}$$

And

By (16.4) and its analogue, in order to prove the second equalities of (16.1) and (16.2), it suffices to show that, respectively,

$$\sum_{n=0}^{\infty} \frac{q^{n^2}}{(q^4;q^4)_n} = \frac{1}{(-q^2;q^2)_\infty (q;q^5)_\infty (q^4;q^5)_\infty}$$

and

$$\sum_{n=0}^{\infty} \frac{q^{(n+1)^2}}{(q^4;q^4)_n} = \frac{q}{(-q^2;q^2)_\infty (q^2;q^5)_\infty (q^3;q^5)_\infty}.$$

From the:

$$\frac{qf(q^3,q^7)}{f(-q^8,-q^{12})} \Big/ \frac{f(q,q^9)}{f(-q^4,-q^{16})} = \frac{q}{1} + \frac{q^2}{1} + \frac{q^3}{1} + \cdots \qquad (16.3)$$

we obtain, for q = 0.5, remembering that a continued fraction

$$x = a_0 + \cfrac{1}{a_1 + \cfrac{1}{a_2 + \cfrac{1}{a_3 + \cdots}}}$$

is also equal to

$$x = a_0 + \frac{1}{a_1+}\,\frac{1}{a_2+}\,\frac{1}{a_3+}$$

((0.5))/((1+0.5^2/((1+0.5^3/((1+0.5^4/((1+0.5^5/((1+0.5^6

Input:

$$\cfrac{0.5}{1+\cfrac{0.5^2}{1+\cfrac{0.5^3}{1+\cfrac{0.5^4}{1+\cfrac{0.5^5}{1+0.5^6}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

0.408615978138562932004500884102234367465037775277286609869...

Open code

2^2 * ((0.5))/((1+0.5^2/((1+0.5^3/((1+0.5^4/((1+0.5^5/((1+0.5^6

Input:

$$2^2 \times \frac{0.5}{1+\frac{0.5^2}{1+\frac{0.5^3}{1+\frac{0.5^4}{1+\frac{0.5^5}{1+0.5^6}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

1.634463912554251728018003536408937469860151101109146439479...

Open code

(24*4) + 10^3 * ((((((((2^2 * (0.5))/((1+0.5^2/((1+0.5^3/((1+0.5^4/((1+0.5^5/((1+0.5^6))))))))

Input:

$$24 \times 4 + 10^3 \times \frac{2^2 \times 0.5}{1+\frac{0.5^2}{1+\frac{0.5^3}{1+\frac{0.5^4}{1+\frac{0.5^5}{1+0.5^6}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

1730.463912554251728018003536408937469860151101109146439479...

1730.4639… result in the range of the mass of candidate "glueball" $f_0(1710)$ ("glueball" =1760 ± 15 MeV).

((((((((((((((((((96 + 10^3 * ((((((((2^2 * (0.5))/((1+0.5^2/((1+0.5^3/((1+0.5^4/((1+0.5^5/((1+0.5^6))))))))))))))))))))^1/3

Input:

$$\sqrt[3]{96 + 10^3 \times \frac{2^2 \times 0.5}{1+\frac{0.5^2}{1+\frac{0.5^3}{1+\frac{0.5^4}{1+\frac{0.5^5}{1+0.5^6}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

12.0057...

Or, we have also:

((((((((((((((((((27*4) + 10^3 * ((((((((2^2 * (0.5))/((1+0.5^2/((1+0.5^3/((1+0.5^4/((1+0.5^5/((1+0.5^6))))))))))))))))))

Input:

$$27 \times 4 + 10^3 \times \frac{2^2 \times 0.5}{1 + \frac{0.5^2}{1+\frac{0.5^3}{1+\frac{0.5^4}{1+\frac{0.5^5}{1+0.5^6}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits
1742.46391255425172801800353640893746986015110110914643947 9...

1742.4639... result in the range of the mass of candidate "glueball" $f_0(1710)$ ("glueball" =1760 ± 15 MeV).

((((((((((((((((((27*4) + 10^3 * ((((((((2^2 * (0.5))/((1+0.5^2/((1+0.5^3/((1+0.5^4/((1+0.5^5/((1+0.5^6))))))))))))))))))^1/3

Input:

$$\sqrt[3]{27 \times 4 + 10^3 \times \frac{2^2 \times 0.5}{1 + \frac{0.5^2}{1+\frac{0.5^3}{1+\frac{0.5^4}{1+\frac{0.5^5}{1+0.5^6}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits
12.0334...

2*((((((((((((((((((27*4) + 10^3 * ((((((((2^2 * (0.5))/((1+0.5^2/((1+0.5^3/((1+0.5^4/((1+0.5^5/((1+0.5^6))))))))))))))))))^1/3

Input:

$$2\sqrt[3]{27\times 4+10^3\times \frac{2^2\times 0.5}{1+\frac{0.5^2}{1+\frac{0.5^3}{1+\frac{0.5^4}{1+\frac{0.5^5}{1+0.5^6}}}}}}$$

Open code

Result:

- More digits

24.0668...

24.0668…

This value is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 24 "modes" corresponding to the physical vibrations of a bosonic string.

((((((((((((((((((27*4) + 10^3 * ((((((((2^2 * (0.5))/((1+0.5^2/((1+0.5^3/((1+0.5^4/((1+0.5^5/((1+0.5^6))))))))))))))))))))))^1/15

Input:

$$\sqrt[15]{27\times 4+10^3\times \frac{2^2\times 0.5}{1+\frac{0.5^2}{1+\frac{0.5^3}{1+\frac{0.5^4}{1+\frac{0.5^5}{1+0.5^6}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- Fewer digits
- More digits

1.644665514378409167676165872630301357167677816086223440741...

$1.64466551437... \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 ...$

Continued fraction:

- Linear form

$$1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{4+\cfrac{1}{2+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{5+\cfrac{1}{15+\cfrac{1}{5+\cfrac{1}{1+\cfrac{1}{4+\cfrac{1}{2+\cfrac{1}{2+\cfrac{1}{26+\cfrac{1}{1+\cfrac{1}{8+\cfrac{1}{2+\cfrac{1}{1+\cfrac{1}{\cdots}}}}}}}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

- More

π root of $1889x^4 - 8510x^3 + 870x^2 + 2410x - 421$ near $x = 0.523513$ $\approx$ 1.64466551437840916766835

$\frac{2\,774\,351\,968\,\pi}{5\,299\,487\,151} \approx 1.64466551437840916761349$

π root of $1235x^5 + 71x^4 - 216x^3 - 866x^2 + 295x + 60$ near $x = 0.523513$ $\approx$ 1.64466551437840916777649

Now, we have:

Entry 18 (p. 373). *For* $|q| < 1$,

$$\frac{f(-q,-q^5)}{f(-q^3,-q^3)} = \frac{1}{1} + \frac{q+q^2}{1} + \frac{q^2+q^4}{1} + \cdots.$$

Beneath this continued fraction, Ramanujan writes

$$\text{Num?} = \frac{\varphi(-q^3)}{f(-q)} \quad \text{and Den?} = \frac{\psi(q^3)}{f(-q^2)}.$$

In fact, he has incorrectly inverted the identifications of the "numerator" and "denominator" on the left side of Entry 18.

By Entry 22 and Example (v), Section 31 of Chapter 16 (Part III [3, pp. 36, 51]),

$$\frac{f(-q,-q^5)}{f(-q^3,-q^3)} = \frac{\chi(-q)\psi(q^3)}{\varphi(-q^3)} = \frac{(q;q^2)_\infty(q^6;q^6)_\infty}{(q^3;q^6)^2_\infty(q^3;q^3)_\infty} = \frac{(q;q^2)_\infty}{(q^3;q^6)^3_\infty},$$

where $\chi(q) = (-q;q^2)_\infty$. On the other hand, by Entry 22 of Chapter 16 (Part III [3, p. 36]),

$$\frac{\psi(q^3)/f(-q^2)}{\varphi(-q^3)/f(-q)} = \frac{(q^6;q^6)_\infty(q;q)_\infty}{(q^3;q^6)^2_\infty(q^2;q^2)_\infty(q^3;q^3)_\infty} = \frac{(q;q^2)_\infty}{(q^3;q^6)^3_\infty}.$$

Hence, we have shown that Ramanujan has mistakenly confused the roles of the "numerator" and "denominator." Moreover, we now see that Entry 18 can be written in the more transparent form

$$G(q) := \frac{(q;q^2)_\infty}{(q^3;q^6)^3_\infty} = \frac{1}{1} + \frac{q+q^2}{1} + \frac{q^2+q^4}{1} + \cdots. \qquad (18.1)$$

From the:

$$G(q) := \frac{(q;q^2)_\infty}{(q^3;q^6)^3_\infty} = \frac{1}{1} + \frac{q+q^2}{1} + \frac{q^2+q^4}{1} + \cdots. \qquad (18.1)$$

we obtain, for q = 0.5, remembering that a continued fraction

$$x = a_0 + \cfrac{1}{a_1 + \cfrac{1}{a_2 + \cfrac{1}{a_3 + \cdots}}}$$

is also equal to

$$x = a_0 + \frac{1}{a_1+} \frac{1}{a_2+} \frac{1}{a_3+}$$

1/((1+(0.5+0.5^2)/((1+(0.5^2+0.5^4)/((1+(0.5^3+0.5^6)/((1+(0.5^4+0.5^8)

Input:

$$\frac{1}{1+\frac{0.5+0.5^2}{1+\frac{0.5^2+0.5^4}{1+\frac{0.5^3+0.5^6}{1+(0.5^4+0.5^8)}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

0.629829290206648697214734950584007187780772686433063791554...

-(7/2) * ln((((((((1/((1+(0.5+0.5^2)/((1+(0.5^2+0.5^4)/((1+(0.5^3+0.5^6)/((1+(0.5^4+0.5^8))))))))

Input:

$$-\frac{7}{2} \log\left(\frac{1}{1+\frac{0.5+0.5^2}{1+\frac{0.5^2+0.5^4}{1+\frac{0.5^3+0.5^6}{1+(0.5^4+0.5^8)}}}}\right)$$

Open code

- $\log(x)$ is the natural logarithm

Enlarge Data Customize A Plaintext Interactive

Result:

- Fewer digits
- More digits

1.618072624843341590506515433783669210810568416303596585874...

$1.61807262484334159050651543378366921081056841630359 65 \approx \phi$

Series representations:

- More

$$\frac{1}{2}\left(-\log\left(\frac{1}{1+\frac{0.5+0.5^2}{1+\frac{0.5^2+0.5^4}{1+\frac{0.5^3+0.5^6}{1+(0.5^4+0.5^8)}}}}\right)\right)7 = \frac{7}{2}\sum_{k=1}^{\infty}\frac{(-1)^k(-0.370171)^k}{k}$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$\frac{1}{2}\left(-\log\left(\frac{1}{1+\frac{0.5+0.5^2}{1+\frac{0.5^2+0.5^4}{1+\frac{0.5^3+0.5^6}{1+(0.5^4+0.5^8)}}}}\right)\right)7 =$$

$$-7 i \pi \left\lfloor \frac{\arg(0.629829 - x)}{2\pi} \right\rfloor - \frac{7\log(x)}{2} + \frac{7}{2}\sum_{k=1}^{\infty} \frac{(-1)^k (0.629829 - x)^k x^{-k}}{k} \quad \text{for } x < 0$$

Open code

$$\frac{1}{2}\left(-\log\left(\frac{1}{1+\frac{0.5+0.5^2}{1+\frac{0.5^2+0.5^4}{1+\frac{0.5^3+0.5^6}{1+(0.5^4+0.5^8)}}}}\right)\right)7 = -\frac{7}{2}\left\lfloor \frac{\arg(0.629829 - z_0)}{2\pi} \right\rfloor \log\left(\frac{1}{z_0}\right) - \frac{7\log(z_0)}{2} -$$

$$\frac{7}{2}\left\lfloor \frac{\arg(0.629829 - z_0)}{2\pi} \right\rfloor \log(z_0) + \frac{7}{2}\sum_{k=1}^{\infty} \frac{(-1)^k (0.629829 - z_0)^k z_0^{-k}}{k}$$

Integral representation:

$$\frac{1}{2}\left(-\log\left(\frac{1}{1+\frac{0.5+0.5^2}{1+\frac{0.5^2+0.5^4}{1+\frac{0.5^3+0.5^6}{1+(0.5^4+0.5^8)}}}}\right)\right)7 = -\frac{7}{2}\int_1^{0.629829} \frac{1}{t}\, dt$$

Continued fraction:

- Linear form

$$1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{2+\cfrac{1}{2+\cfrac{1}{3+\cfrac{1}{1+\cfrac{1}{10+\cfrac{1}{4+\cfrac{1}{3+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{3+\cfrac{1}{1+\cfrac{1}{\ldots}}}}}}}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

More

- $\frac{11}{8}\pi\cos^2\left(\frac{692079}{758716}\right) \approx 1.61807262484334152864 6$
- $\frac{2(-97-82\pi+206\pi^2)}{3(-138+63\pi+64\pi^2)} \approx 1.61807262484334159008578$
- $\frac{1619757871\pi}{3144864668} \approx 1.61807262484334159057 7609$

Now, we have:

Entry 19 (Formula (3), p. 290). *For* $|q| < 1$,

$$\frac{(q^2;q^3)_\infty}{(q;q^3)_\infty} = \frac{1}{1} - \frac{q}{1+q} - \frac{q^3}{1+q^2} - \frac{q^5}{1+q^3} - \frac{q^7}{1+q^4} - \cdots.$$

For q = 0.5, we obtain:

1/((1-(0.5)/((1+(0.5)-0.5^3/((1+(0.5^2)-0.5^5/((1+(0.5^3)-0.5^7/((1+(0.5^4)

Input:

$$\cfrac{1}{1-\cfrac{0.5}{1+0.5-\cfrac{0.5^3}{1+0.5^2-\cfrac{0.5^5}{1+0.5^3-\cfrac{0.5^7}{1+0.5^4}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive
Result:
- More digits
1.556971514242878560719640179910044977511244377811094452773...
Open code

1/ ((((((((1/((1-(0.5)/((1+(0.5)-0.5^3/((1+(0.5^2)-0.5^5/((1+(0.5^3)-0.5^7/((1+(0.5^4))))))))))

Input:

$$\frac{1}{\frac{1}{1-\frac{0.5}{1+0.5-\frac{0.5^3}{1+0.5^2-\frac{0.5^5}{1+0.5^3-\frac{0.5^7}{1+0.5^4}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive
Result:
- More digits
0.642272508425613866153105440539239287433798748194511314395...
Open code

And

1 + 1/ ((((((((1/((1-(0.5)/((1+(0.5)-0.5^3/((1+(0.5^2)-0.5^5/((1+(0.5^3)-0.5^7/((1+(0.5^4))))))))))

Input:

$$1+\frac{1}{\frac{1}{1-\frac{0.5}{1+0.5-\frac{0.5^3}{1+0.5^2-\frac{0.5^5}{1+0.5^3-\frac{0.5^7}{1+0.5^4}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive
Result:
- More digits
1.642272508425613866153105440539239287433798748194511314395...

$1.642272... \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 ...$

We have also that:

-(1.8272*2) * ln ((((((((((((1/ ((((((((1/((1-(0.5)/((1+(0.5)-0.5^3/((1+(0.5^2)-0.5^5/((1+(0.5^3)-0.5^7/((1+(0.5^4))))))))))))))))

Where 1,8272 is a Hausdorff dimension

Input interpretation:

$$-(1.8272\times 2)\log\left(\frac{1}{\frac{1}{1-\frac{0.5}{1+0.5-\frac{0.5^3}{1+0.5^2-\frac{0.5^5}{1+0.5^3-\frac{0.5^7}{1+0.5^4}}}}}}\right)$$

Open code

- $\log(x)$ is the natural logarithm

Enlarge Data Customize A Plaintext Interactive

Result:

- Fewer digits
- More digits

1.6179585479405453558247692828318676928099661228840884483394...

1.6179585479405453558247692828318676928099661228840884 ≈ ϕ

Series representations:

- More

$$-\log\left(\frac{1}{\frac{1}{1-\frac{0.5}{1+0.5-\frac{0.5^3}{1+0.5^2-\frac{0.5^5}{1+0.5^3-\frac{0.5^7}{1+0.5^4}}}}}}\right)1.8272\times 2 = 3.6544\sum_{k=1}^{\infty}\frac{(-1)^k\,(-0.357727)^k}{k}$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$-\log\left(\frac{1}{\frac{1}{1-\frac{0.5}{1+0.5-\frac{0.5^3}{1+0.5^2-\frac{0.5^5}{1+0.5^3-\frac{0.5^7}{1+0.5^4}}}}}}\right)1.8272\times 2 = -7.3088\, i\, \pi \left\lfloor \frac{\arg(0.642273-x)}{2\pi} \right\rfloor - 3.6544\log(x) + 3.6544 \sum_{k=1}^{\infty} \frac{(-1)^k (0.642273-x)^k x^{-k}}{k} \quad \text{for } x < 0$$

Open code

$$-\log\left(\frac{1}{\frac{1}{1-\frac{0.5}{1+0.5-\frac{0.5^3}{1+0.5^2-\frac{0.5^5}{1+0.5^3-\frac{0.5^7}{1+0.5^4}}}}}}\right)1.8272\times 2 = -3.6544 \left\lfloor \frac{\arg(0.642273-z_0)}{2\pi} \right\rfloor \log\left(\frac{1}{z_0}\right) - 3.6544\log(z_0) - 3.6544 \left\lfloor \frac{\arg(0.642273-z_0)}{2\pi} \right\rfloor \log(z_0) + 3.6544 \sum_{k=1}^{\infty} \frac{(-1)^k (0.642273-z_0)^k z_0^{-k}}{k}$$

Integral representation:

$$-\log\left(\frac{1}{\frac{1}{1-\frac{0.5}{1+0.5-\frac{0.5^3}{1+0.5^2-\frac{0.5^5}{1+0.5^3-\frac{0.5^7}{1+0.5^4}}}}}}\right)1.8272\times 2 = -3.6544 \int_1^{0.642273} \frac{1}{t}\, dt$$

Continued fraction:

- Linear form

$$1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{6+\cfrac{1}{3+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{2+\cfrac{1}{5+\cfrac{1}{3+\cfrac{1}{2+\cfrac{1}{1+\cfrac{1}{34+\cfrac{1}{1+\cfrac{1}{3+\cfrac{1}{\cdots}}}}}}}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

More

- $\dfrac{-17016\,\mathcal{B}-25}{10\,(57\,\mathcal{B}-74)} \approx 1.6179585479405453515569$
- $\dfrac{11}{9}\,\pi\cosh^{-1}\left(\dfrac{9065441}{7441732}\right)^2 \approx 1.6179585479405453580035$
- $\dfrac{3940294157\,\pi}{7650875353} \approx 1.6179585479405453558837071$

Now, we have:

Entry 20 (Formula (4), p. 290). *For* $|q|<1$,

$$\frac{(q^3;q^4)_\infty}{(q;q^4)_\infty}=\frac{1}{1}\,-\,\frac{q}{1+q^2}\,-\,\frac{q^3}{1+q^4}\,-\,\frac{q^5}{1+q^6}\,-\cdots.$$

It is interesting to note that the continued fraction in Entry 20 also converges for $|q| > 1$. In fact, set $q = 1/a$, so that $|a| < 1$. Then

$$\begin{aligned}
&\frac{1}{1} - \frac{q}{1+q^2} - \frac{q^3}{1+q^4} - \frac{q^5}{1+q^6} - \cdots \\
&= \frac{1}{1} - \frac{1/a}{1+1/a^2} - \frac{1/a^3}{1+1/a^4} - \frac{1/a^5}{1+1/a^6} - \cdots \\
&= \frac{1}{1} - \frac{a}{a^2+1} - \frac{a^3}{a^4+1} - \frac{a^5}{a^6+1} - \cdots \\
&= \frac{(a^3;a^4)_\infty}{(a;a^4)_\infty} = \frac{(1/q^3;1/q^4)_\infty}{(1/q;1/q^4)_\infty}. \qquad (20.1)
\end{aligned}$$

This is, indeed, a beautiful example of symmetry.

Although the continued fraction above is symmetric in q and $1/q$, the product $(bq^3;q^4)_\infty/(bq;q^4)_\infty$ does not share this invariance. However, if $b = -1$, then

$$\frac{(-q^3;q^4)_\infty}{(-q;q^4)_\infty} = \frac{(q;q^8)_\infty(q^5;q^8)_\infty(q^6;q^8)_\infty}{(q^2;q^8)_\infty(q^3;q^8)_\infty(q^7;q^8)_\infty},$$

and the latter quotient is invariant when q is replaced by $1/q$. These observations are due to K. Alladi and B. Gordon [1, p. 298].

The convergence of (20.1) when q is a primitive root of unity has been examined by Zhang [1].

We obtain:

1/((1-(0.5^1)/((1+(0.5^2)-((0.5^3/((1+(0.5^4)-((0.5^5/((1+(0.5^6)

Input:

$$\frac{1}{1 - \frac{0.5^1}{1+0.5^2 - \frac{0.5^3}{1+0.5^4 - \frac{0.5^5}{1+0.5^6}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

1.795109299740644683216005928121526491293071507965913301222...

((((((((((((((ln5/ln3) * 1/((1-(0.5^1)/((1+(0.5^2)-((0.5^3/((1+(0.5^4)-((0.5^5/((1+(0.5^6)))))))))))))))^1/2

Input:

$$\sqrt{\frac{\log(5)}{\log(3)} \times \frac{1}{1 - \frac{0.5^1}{1+0.5^2 - \frac{0.5^3}{1+0.5^4 - \frac{0.5^5}{1+0.5^6}}}}}$$

Open code

- $\log(x)$ is the natural logarithm

Enlarge Data Customize A Plaintext Interactive

Result:

- Fewer digits
- More digits

1.621661984173812055947502076515304484747705164664459626074...

1.6216619841738120559475020765153044847477051646644596

Continued fraction:

- Linear form

$$1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{4+\cfrac{1}{17+\cfrac{1}{1+\cfrac{1}{7+\cfrac{1}{2+\cfrac{1}{2+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{5+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{1+\cfrac{1}{4+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{\cdots}}}}}}}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

- More

$$\frac{2318500457\,\pi}{4491555006} \approx 1.62166198417381205529021$$

$$\text{root of } 643\,x^3 - 26649\,x^2 + 32825\,x + 14108 \text{ near } x = 1.62166 \approx$$

1.62166198417381205570127

$$\log\left(\frac{1}{74}\left(197 - 17\sqrt{2} - 399\,e + 180\,e^2 - 259\,\pi + 78\,\pi^2\right)\right) \approx$$

1.62166198417381205661320

27*4 + 10^3 * ((((((((((((((ln5/ln3) * 1/((1-(0.5^1)/((1+(0.5^2)-((0.5^3/((1+(0.5^4)-((0.5^5/((1+(0.5^6)))))))))))))))^1/2

Input:

$$27\times 4+10^3\sqrt{\frac{\log(5)}{\log(3)}\times\frac{1}{1-\frac{0.5^1}{1+0.5^2-\frac{0.5^3}{1+0.5^4-\frac{0.5^5}{1+0.5^6}}}}}$$

Open code

- $\log(x)$ is the natural logarithm

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

1729.66…

1729.66…

This result is very near to the mass of candidate glueball $f_0(1710)$ meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. As a consequence, it is sometimes called a Zagier as a pun on the Gross–Zagier theorem. The number 1728 is one less than the Hardy–Ramanujan number 1729

Series representations:

- More

$$27\times 4+10^3\sqrt{\frac{\log(5)}{\left(1-\frac{0.5^1}{1+0.5^2-\frac{0.5^3}{1+0.5^4-\frac{0.5^5}{1+0.5^6}}}\right)\log(3)}}=$$

$$1339.82\left(0.080608+\sqrt{\frac{\log(4)-\sum_{k=1}^{\infty}\frac{\left(-\frac{1}{4}\right)^k}{k}}{\log(2)-\sum_{k=1}^{\infty}\frac{\left(-\frac{1}{2}\right)^k}{k}}}\right)$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$27\times 4+10^3\sqrt{\frac{\log(5)}{\left(1-\frac{0.5^1}{1+0.5^2-\frac{0.5^3}{1+0.5^4-\frac{0.5^5}{1+0.5^6}}}\right)\log(3)}} =$$

$$1339.82\left(0.080608+\sqrt{\frac{2 i \pi \left\lfloor\frac{\arg(5-x)}{2\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k (5-x)^k x^{-k}}{k}}{2 i \pi \left\lfloor\frac{\arg(3-x)}{2\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k (3-x)^k x^{-k}}{k}}}\right) \quad \text{for } x<0$$

Open code

$$27\times 4+10^3\sqrt{\frac{\log(5)}{\left(1-\frac{0.5^1}{1+0.5^2-\frac{0.5^3}{1+0.5^4-\frac{0.5^5}{1+0.5^6}}}\right)\log(3)}} =$$

$$1339.82\left(0.080608+\sqrt{\frac{2 i \pi \left\lfloor-\frac{-\pi+\arg\left(\frac{5}{z_0}\right)+\arg(z_0)}{2\pi}\right\rfloor+\log(z_0)-\sum_{k=1}^{\infty}\frac{(-1)^k (5-z_0)^k z_0^{-k}}{k}}{2 i \pi \left\lfloor-\frac{-\pi+\arg\left(\frac{3}{z_0}\right)+\arg(z_0)}{2\pi}\right\rfloor+\log(z_0)-\sum_{k=1}^{\infty}\frac{(-1)^k (3-z_0)^k z_0^{-k}}{k}}}\right)$$

Integral representations:

$$27\times 4+10^3\sqrt{\frac{\log(5)}{\left(1-\frac{0.5^1}{1+0.5^2-\frac{0.5^3}{1+0.5^4-\frac{0.5^5}{1+0.5^6}}}\right)\log(3)}} = 1339.82\left(0.080608+\sqrt{\frac{\int_1^5 \frac{1}{t}\,dt}{\int_1^3 \frac{1}{t}\,dt}}\right)$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$27\times 4+10^3\sqrt{\frac{\log(5)}{\left(1-\frac{0.5^1}{1+0.5^2-\frac{0.5^3}{1+0.5^4-\frac{0.5^5}{1+0.5^6}}}\right)\log(3)}} =$$

$$1339.82\left(0.080608+\sqrt{\frac{\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{4^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds}{\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{2^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds}}\right) \quad \text{for } -1<\gamma<0$$

((((((((((((108 + 10^3 ((((((((((((1.4649 * 1/((1-(0.5^1)/((1+(0.5^2)-((0.5^3/((1+(0.5^4)-((0.5^5/((1+(0.5^6)))))))))))))))^0.5)))))))))))))^1/3

Where 1,4649 is equal to (ln5/ln3)

Input interpretation:

$$\sqrt[3]{108+10^3\sqrt{1.4649\times\frac{1}{1-\frac{0.5^1}{1+0.5^2-\frac{0.5^3}{1+0.5^4-\frac{0.5^5}{1+0.5^6}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

12.0038...

2((((((((((((108 + 10^3 ((((((((((((1.4649 * 1/((1-(0.5^1)/((1+(0.5^2)-((0.5^3/((1+(0.5^4)-((0.5^5/((1+(0.5^6)))))))))))))))^0.5)))))))))))))^1/3

Input interpretation:

$$2\sqrt[3]{108+10^3\sqrt{1.4649\times\frac{1}{1-\frac{0.5^1}{1+0.5^2-\frac{0.5^3}{1+0.5^4-\frac{0.5^5}{1+0.5^6}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits

24.0075...

24.0075…

This value is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 24 "modes" corresponding to the physical vibrations of a bosonic string.

((((((((((((108 + 10^3 ((((((((((((1.4649 * 1/((1-(0.5^1)/((1+(0.5^2)-((0.5^3/((1+(0.5^4)-((0.5^5/((1+(0.5^6)))))))))))))))^0.5)))))))))))))^1/15

Input interpretation:

$$\sqrt[15]{108 + 10^3 \sqrt{1.4649 \times \frac{1}{1 - \frac{0.5^1}{1+0.5^2 - \frac{0.5^3}{1+0.5^4 - \frac{0.5^5}{1+0.5^6}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- Fewer digits
- More digits

1.643854600920769848955885632597652438485577701391212504667...

$$1.6438546... \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 ...$$

Continued fraction:

- Linear form

$$1 + \cfrac{1}{1 + \cfrac{1}{1 + \cfrac{1}{1 + \cfrac{1}{4 + \cfrac{1}{4 + \cfrac{1}{1 + \cfrac{1}{9 + \cfrac{1}{13 + \cfrac{1}{9 + \cfrac{1}{2 + \cfrac{1}{2 + \cfrac{1}{3 + \cfrac{1}{1 + \cfrac{1}{5 + \cfrac{1}{2 + \cfrac{1}{1 + \cfrac{1}{6 + \cfrac{1}{1 + \cfrac{1}{2 + \cfrac{1}{6 + \cfrac{1}{5 + \cfrac{1}{\ldots}}}}}}}}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

- More

$$\frac{6\,764\,712\,\pi^2}{40\,614\,925} \approx 1.64385460092076982343 6$$

$$\frac{868\,185\,315\,\pi}{1\,659\,200\,641} \approx 1.643854600920769848906754$$

π root of $70\,763\,x^3 + 65\,835\,x^2 - 39\,528\,x - 7480$ near $x = 0.523255$ $\approx$

1.643854600920769848957256 6

Simmetrically, we obtain the following interesting results:

-1/((1+(0.5^1)/((1-(0.5^2)+((0.5^3/((1-(0.5^4)+((0.5^5/((1-(0.5^6)

Input:

$$-\frac{1}{1+\frac{0.5^1}{1-0.5^2+\frac{0.5^3}{1-0.5^4+\frac{0.5^5}{1-0.5^6}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits
  $-0.637409537947671182037483763221376878827240675449990 72184\ldots$

3*1.328*((((((((((((-1/((1+(0.5^1)/((1-(0.5^2)+((0.5^3/((1-(0.5^4)+((0.5^5/((1-(0.5^6)))))))))))))^2

Where 1,328 is a Hausdorff dimension

Input:

$$\frac{3\times 1.328\times(-1)}{\left(1+\frac{0.5^1}{1-0.5^2+\frac{0.5^3}{1-0.5^4+\frac{0.5^5}{1-0.5^6}}}\right)^2}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

- More digits
  $-1.61866302156158805586013115587958275038521835835222509334\ldots$

-1.61866302156158805586013115587958275038521835835222509334 ≈ $-\phi$

Continued fraction:

- Linear form

$$-1+\cfrac{1}{-1+\cfrac{1}{-1+\cfrac{1}{-1+\cfrac{1}{-1+\cfrac{1}{-1+\cfrac{1}{-1+\cfrac{1}{-1+\cfrac{1}{-5+\cfrac{1}{-3+\cfrac{1}{-1+\cfrac{1}{-1+\cfrac{1}{-1+\cfrac{1}{-1+\cfrac{1}{-2+\cfrac{1}{-1+\cfrac{1}{\ldots}}}}}}}}}}}}}}}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Possible closed forms:

- More

$-\frac{4788067486\pi}{9292951923} \approx -1.6186630215615880558050057$

root of $33777x^3 + 29667x^2 - 2250x + 61877$ near $x = -1.61866$ $\approx$

$-1.6186630215615880558054397$

root of $6x^5 + 921x^4 - 95x^3 - 2177x^2 + 192x - 644$ near $x = -1.61866$ $\approx$

$-1.6186630215615880558647106$

This result -1,618663..., obtained applying the symmetrical formula of Entry 20, is a very good approximation to golden ratio 1,6180339887... with minus sign

Now, we have:

Entry 50 (Formula (4), p. 292). *Let x, p, and n be complex numbers such that either $\operatorname{Re} x > 0$, or $\operatorname{Re} x = 0$ and $0 < |\operatorname{Im} x| < 1$, or p is a nonpositive integer. Furthermore, let $y = \{(1+x^2)^{1/2} - 1\}/x$ and let $m = n(1+x^2)^{-1/2}$. Then*

$$\frac{x}{p+n} + \frac{1 \cdot px^2}{p+n+2} + \frac{2(p+1)x^2}{p+n+4} + \frac{3(p+2)x^2}{p+n+6} + \cdots$$
$$= (1+1/x^2)^{(p-1)/2}(2y)^p \sum_{k=0}^{\infty} \frac{(-1)^k (p)_k y^{2k}}{k!(m+p+2k)}.$$

$$\frac{a}{p+n} + \frac{pa^2}{p+n+2} + \frac{2(p+1)a^2}{p+n+4} + \cdots$$
$$= 2^p a(1+a^2)^{(p-1)/2} \int_0^1 \frac{t^{p-1+n(1+a^2)^{-1/2}}\,dt}{(\{(1+a^2)^{1/2}+1\} + t^2\{(1+a^2)^{1/2}-1\})^p}.$$

For a, n , p > 0. (a = 1, n = 2, p = 3)

We obtain, from the right hand side, the following integral

16 * integrate ((((t^2.5 / (((2^0.5+1)+ t^2(2^0.5-1)))^3)))) [0, 1]

Input:

$$16 \int_0^1 \frac{t^{2.5}}{((\sqrt{2}+1)+t^2(\sqrt{2}-1))^3}\,dt$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

0.240266

Computation result:

$$16 \int_0^1 \frac{t^{2.5}}{\left(\left(\sqrt{2}+1\right)+t^2\left(\sqrt{2}-1\right)\right)^3}\,dt = 0.240266$$

((((((1 / (((((16 * integrate ((((t^2.5 / (((2^0.5+1)+ t^2(2^0.5-1)))^3)))) [0, 1]))))))^1/3

Input:

$$\sqrt[3]{\frac{1}{16 \int_0^1 \frac{t^{2.5}}{\left(\left(\sqrt{2}+1\right)+t^2\left(\sqrt{2}-1\right)\right)^3}\,dt}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

1.60855

Computation result:

$$\sqrt[3]{\frac{1}{16 \int_0^1 \frac{t^{2.5}}{\left(\left(\sqrt{2}+1\right)+t^2\left(\sqrt{2}-1\right)\right)^3}\,dt}} = 1.60855$$

((((((1 / (((((16 * integrate ((((t^2.5 / (((2^0.5+1)+ t^2(2^0.5-1)))^3)))) [0, 1]))))))^1/(((2)^(0.5)))^3))

Input:

$$\sqrt{2}\,\sqrt[3]{\frac{1}{16 \int_0^1 \frac{t^{2.5}}{\left(\left(\sqrt{2}+1\right)+t^2\left(\sqrt{2}-1\right)\right)^3}\,dt}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

1.65561

1.65561 is very near to the 14th root of the following Ramanujan's class invariant $Q = \left(G_{505}/G_{101/5}\right)^3 = 1164{,}2696$ i.e. 1,65578...

Rational form:

$$\frac{165561}{100000} = 1 + \frac{65561}{100000}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Continued fraction:

- Linear form

$$1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{9+\cfrac{1}{2+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{3+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{\dots}}}}}}}}}}}}}}$$

Open code

Possible closed forms:

- More

$\sqrt{\frac{5}{3}}\, A \approx 1.655606304$

$7\,\mathcal{D}_{DHA} - 4 \approx 1.6556185461$

$\frac{244\pi}{463} \approx 1.6556125431$

Pi * ((((((1 / (((((16 * integrate ((((t^2.5 / (((2^0.5+1)+ t^2(2^0.5-1)))^3)))) [0, 1]))))))^1/(((2)^(0.5)))^3))

Input:

$$\pi\, \sqrt[\sqrt{2}^3]{\frac{1}{16 \int_0^1 \frac{t^{2.5}}{\left(\left(\sqrt{2}+1\right)+t^2\left(\sqrt{2}-1\right)\right)^3}\, dt}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

5.20126

Or:

3 * ((((((1 / (((((16 * integrate ((((t^2.5 / (((2^0.5+1)+ t^2(2^0.5-1)))^3)))) [0, 1]))))))^1/(((2)^(0.5)))^3))

Input:

$$3 \sqrt{2}^{3} \sqrt{\frac{1}{16 \int_0^1 \frac{t^{2.5}}{\left(\left(\sqrt{2}+1\right)+t^2\left(\sqrt{2}-1\right)\right)^3} dt}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

4.96683

e/Pi * ((((((1 / (((((16 * integrate ((((t^2.5 / (((2^0.5+1)+ t^2(2^0.5-1)))^3)))) [0, 1]))))))^1/(((2)^(0.5)))^3))

Input:

$$\frac{e}{\pi} \sqrt{2}^{3} \sqrt{\frac{1}{16 \int_0^1 \frac{t^{2.5}}{\left(\left(\sqrt{2}+1\right)+t^2\left(\sqrt{2}-1\right)\right)^3} dt}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

1.43253

2/3 * ((((((1 / (((((16 * integrate ((((t^2.5 / (((2^0.5+1)+ t^2(2^0.5-1)))^3)))) [0, 1]))))))^1/(((2)^(0.5)))^3))

Input:

$$\frac{2}{3} \sqrt{2}^{3} \sqrt{\frac{1}{16 \int_0^1 \frac{t^{2.5}}{\left(\left(\sqrt{2}+1\right)+t^2\left(\sqrt{2}-1\right)\right)^3} dt}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

1.10374

This value 1,10374 is a multiple very near to the value of Cosmological Constant. Indeed:

Input:

$$\frac{1}{10^{52}} \times \frac{2}{3} \sqrt{2}^{3} \sqrt{\frac{1}{16 \int_0^1 \frac{t^{2.5}}{\left(\left(\sqrt{2}+1\right)+t^2\left(\sqrt{2}-1\right)\right)^3} dt}}$$

Open code

Enlarge Data Customize A Plaintext Interactive

Result:

1.10374×10^{-52}

Given the Planck (2018) values of $\Omega_\Lambda = 0.6889 \pm 0.0056$ and $H_0 = 67.66 \pm 0.42$ (km/s)/Mpc = $(2.1927664 \pm 0.0136) \times 10^{-18}$ s^{-1}, Λ has the value of

$$\Lambda = 1.1056 \times 10^{-52}\ \mathrm{m}^{-2},$$

TABLES

From:

Electroweak Dark Matter at Future Hadron Colliders

Tao Han, Satyanarayan Mukhopadhyay and Xing Wang

arXiv:1805.00015v2 [hep-ph] 12 Apr 2019

100 TeV colliders respectively. For the Higgsino-like scenario, these numbers are reduced to 300, 600 and 1550 GeV, primarily due to the smaller length of the disappearing track and the reduced production rate. For the higher value of the background estimate, the mass reach for the wino-like states are modified to 500, 1500 and 4500 GeV, respectively, at the three collider energies. Similarly, for the Higgsino-like scenario, the reach is modified to 200, 450 and 1070 GeV. We note that the signal significance in the disappearing track

95% C.L.	Wino Monojet	Wino Disappearing Track	Higgsino Monojet	Higgsino Disappearing Track
14 TeV	280 GeV	900 GeV	200 GeV	300 GeV
27 TeV	700 GeV	2.1 TeV	490 GeV	600 GeV
100 TeV	2 TeV	6.5 TeV	1.4 TeV	1.5 TeV

Table 5: Summary of DM mass reach at 95% C.L. for an electroweak triplet (wino-like) and a doublet (Higgsino-like) representation, at the HL-LHC, HE-LHC and the FCC-hh/SppC colliders, in optimistic scenarios for the background systematics. See text for details.

search is rather sensitive to the wino and Higgsino mass values (thus making the 2σ and 5σ reach very close in mass). This is because, as the chargino lifetime in the lab frame becomes shorter for heavier masses, the signal event rate decreases exponentially.

From:

Three-dimensional AdS gravity and extremal CFTs at c = 8m
Spyros D. Avramis, Alex Kehagias and Constantina Mattheopoulou

Published by Institute of Physics Publishing for SISSA - Received: September 7, 2007 - Accepted: October 28, 2007 - Published: November 9, 2007

Table

m	L_0	d	S	S_{BH}	m	L_0	d	S	S_{BH}
3	1	196883	12.1904	12.5664	6	1	42987519	17.5764	17.7715
	2	21296876	16.8741	17.7715		2	40448921875	24.4233	25.1327
	3	842609326	20.5520	21.7656		3	8463511703277	29.7668	30.7812
4	2/3	139503	11.8458	11.8477	7	2/3	7402775	15.8174	15.6730
	5/3	69193488	18.0524	18.7328		5/3	33934039137	24.2477	24.7812
	8/3	6928824200	22.6589	23.6954		8/3	16953652012291	30.4615	31.3460
5	1/3	20619	9.9340	9.3664	8	1/3	278511	12.5372	11.8477
	4/3	86645620	18.2773	18.7328		4/3	13996384631	23.3621	23.6954
	7/3	24157197490	23.9078	24.7812		7/3	19400406113385	30.5963	31.3460

Table 1: Degeneracies, microscopic entropies and semiclassical entropies for the first few values of m and L_0.

Bound of DM particle mass

From:

Phenomenological consequences of superfluid dark matter with baryon-phonon coupling

Lasha Berezhiani -Max-Planck-Institut fur Physik, Fohringer Ring 6, 80805 Munchen, Germany
Benoit Famaey - Universite de Strasbourg, CNRS UMR 7550, Observatoire astronomique de Strasbourg, 11 rue de l'Universite, F-67000 Strasbourg, France - *Justin Khoury* - Center for Particle Cosmology, Department of Physics and Astronomy, University of Pennsylvania, Philadelphia PA 19104, USA (Dated: November 17, 2017)

Using (22) this translates to an upper bound on the mass of the DM particle:

$$m \lesssim 4.2 \left(\frac{\sigma/m}{\text{cm}^2/\text{g}} \right)^{1/4} \text{eV} . \qquad (24)$$

Smaller and less massive galaxies result in a somewhat weaker bound.

The bound (24) on the DM particle mass is the main result of this Section. It shows that for values of σ/m satisfying the merging-cluster bound $\sim 1\,\text{cm}^2/\text{g}$ [85–88], m must be somewhat below 4 eV. The dependence on the cross section is rather weak, however, scaling as the 1/4 power. It should be mentioned that the upper bound (24) would be somewhat tighter had we assumed a $\rho \propto r^{-2}$ transition density profile outside the superfluid core, instead of $\rho \propto r^{-3}$.

References

Wikipedia

Ramanujan's Notebooks, Part I, by Bruce C. Berndt (Springer, 1985, ISBN 0-387-96110-0)

Ramanujan's Notebooks, Part II, by Bruce C. Berndt (Springer, 1999, ISBN 0-387-96794-X)

Ramanujan's Notebooks, Part III, by Bruce C. Berndt (Springer, 2004, ISBN 0-387-97503-9)

Ramanujan's Notebooks, Part IV, by Bruce C. Berndt (Springer, 1993, ISBN 0-387-94109-6)

Ramanujan's Notebooks, Part V, by Bruce C. Berndt (Springer, 2005, ISBN 0-387-94941-0)

George E. Andrews and Bruce C. Berndt, Ramanujan's Lost Notebook: Part I (Springer, 2005, ISBN 0-387-25529-X)

George E. Andrews and Bruce C. Berndt, Ramanujan's Lost Notebook: Part II, (Springer, 2008, ISBN 978-0-387-77765-8)

George E. Andrews and Bruce C. Berndt, Ramanujan's Lost Notebook: Part III, (Springer, 2012, ISBN 978-1-4614-3809-0)

George E. Andrews and Bruce C. Berndt, Ramanujan's Lost Notebook: Part IV, (Springer, 2013, ISBN 978-1-4614-4080-2)

George E. Andrews and Bruce C. Berndt, Ramanujan's Lost Notebook: Part V, (Springer, 2018, ISBN 978-3-319-77832-7)