On various Ramanujan formulas applied to some sectors of String Theory (open strings) and Particle Physics: Further new possible mathematical connections IV.

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Abstract

In this research thesis, we have analyzed and deepened various Ramanujan expressions applied to some sectors of String Theory (open strings) and Particle Physics. We have therefore described further new possible mathematical connections.

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https://www.sciencephoto.com/media/228058/view/indian-mathematician-srinivasa-ramanujan

From:

Open Strings On The Rindler Horizon
Edward Witten - arXiv:1810.11912v4 [hep-th] 26 Nov 201

We have that:

$$Z^F_{k,N} = (2\sin(\pi k/N))^4 q^{1/3} \prod_{n=1}^{\infty} (1 - q^n \exp(2\pi i k/N))^4 (1 - q^n \exp(-2\pi i k/n))^4. \quad (3.9)$$

We have the following mock theta function:
(https://en.wikipedia.org/wiki/Mock_modular_form#Order_6)

$$\sigma(q) = \sum_{n\geq 0} \frac{q^{(n+1)(n+2)/2}(-q;q)_n}{(q;q^2)_{n+1}}$$

That is:

(A053271 sequence OEIS)

Sum_{n >= 0} q^((n+1)(n+2)/2) (1+q)(1+q^2)...(1+q^n)/((1-q)(1-q^3)...(1-q^(2n+1)))

We have that:

sum q^((n+1)(n+2)/2) (1+q)(1+q^2)(1+q^n)))/((1-q)(1-q^3)(1-q^(2n+1))), n = 0 to k

$$\sum_{n=0}^{k} \frac{q^{1/2\,(n+1)(n+2)}(1+q)(1+q^2)(1+q^n)}{(1-q)(1-q^3)(1-q^{2n+1})}$$

$$\sum_{n=0}^{k} \frac{q^{1/2(n+1)(n+2)}(1+q)(1+q^2)(1+q^n)}{(1-q)(1-q^3)(1-q^{2n+1})}$$

For q = 0.5 and n = 2, we develop the above formula in the following way:

(((0.5^((2+1)(2+2)/2) (1+0.5)(1+0.5^2)(1+0.5^2)))/(((1-0.5)(1-0.5^3)(1-0.5^(2*2+1)))

$$\frac{0.5^{(2+1)\times(2+2)/2}(1+0.5)(1+0.5^2)(1+0.5^2)}{(1-0.5)(1-0.5^3)(1-0.5^{2\times 2+1})}$$

0.086405529953917050691244239631336405529953917050691244239...

0.0864055...

From (3.9), for k = 2, N = 5, q = $e^{2\pi}$ = 535.49165… and n from 1 to 0.0864055, we obtain:

(2sin((4Pi)/5))^4*535.49165^(1/3) * product (1-535.49165^n exp((8Pi*i)/5))^4 (1-535.49165^n exp((-8Pi*i)/5))^4, n=1 to 0.0864055

Input interpretation:

$$\left(2\sin\left(\frac{4\pi}{5}\right)\right)^4 \sqrt[3]{535.49165} \prod_{n=1}^{0.0864055} \left(1-535.49165^n \exp\left(\frac{1}{5}(8\pi i)\right)\right)^4 \left(1-535.49165^n \exp\left(\frac{1}{5}(-8\pi i)\right)\right)^4$$

i is the imaginary unit

Result:

15.5088

15.5088

8*((((((2sin((4Pi)/5))^4*535.49165^(1/3) * product (1-535.49165^n exp((8Pi*i)/5))^4 (1-535.49165^n exp((-8Pi*i)/5))^4, n=1 to 0.0864055)))))+golden ratio where 8 is a Fibonacci number

Input interpretation:

$$8\left(\left(2\sin\left(\frac{4\pi}{5}\right)\right)^4 \sqrt[3]{535.49165} \prod_{n=1}^{0.0864055} \left(1-535.49165^n \exp\left(\frac{1}{5}(8\pi i)\right)\right)^4 \left(1-535.49165^n \exp\left(\frac{1}{5}(-8\pi i)\right)\right)^4\right)+\phi$$

i is the imaginary unit

ϕ is the golden ratio

Result:

125.689

125.689 result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0 and to the Higgs boson mass 125.18 GeV

8*((((((2sin((4Pi)/5))^4*535.49165^(1/3) * product (1-535.49165^n exp((8Pi*i)/5))^4 (1-535.49165^n exp((-8Pi*i)/5))^4, n=1 to 0.0864055)))))+13+golden ratio^2

where 13 is a Fibonacci number

Input interpretation:

$$8\left(\left(2\sin\left(\frac{4\pi}{5}\right)\right)^4 \sqrt[3]{535.49165} \prod_{n=1}^{0.0864055} \left(1-535.49165^n \exp\left(\frac{1}{5}(8\pi i)\right)\right)^4 \left(1-535.49165^n \exp\left(\frac{1}{5}(-8\pi i)\right)\right)^4\right)+13+\phi^2$$

i is the imaginary unit

ϕ is the golden ratio

Result:

139.689

139.689 result practically equal to the rest mass of Pion meson 139.57 MeV

64*((((((2sin((4Pi)/5))^4*535.49165^(1/3) * product (1-535.49165^n exp((8Pi*i)/5))^4 (1-535.49165^n exp((-8Pi*i)/5))^4, n=1 to 0.0864055)))))-55+1/golden ratio

where 55 is a Fibonacci number

Input interpretation:

$$64\left(\left(2\sin\left(\frac{4\pi}{5}\right)\right)^4 \sqrt[3]{535.49165} \prod_{n=1}^{0.0864055} \left(1-535.49165^n \exp\left(\frac{1}{5}(8\pi i)\right)\right)^4 \left(1-535.49165^n \exp\left(\frac{1}{5}(-8\pi i)\right)\right)^4\right) - 55 + \frac{1}{\phi}$$

i is the imaginary unit

ϕ is the golden ratio

Result:

938.183

938.183 result practically equal to the proton mass in MeV

76*((((((2sin((4Pi)/5))^4*535.49165^(1/3) * product (1-535.49165^n exp((8Pi*i)/5))^4 (1-535.49165^n exp((-8Pi*i)/5))^4, n=1 to 0.0864055)))))+11

where 76 and 11 are Lucas numbers

Input interpretation:

$$76\left(\left(2\sin\left(\frac{4\pi}{5}\right)\right)^4 \sqrt[3]{535.49165} \prod_{n=1}^{0.0864055} \left(1-535.49165^n \exp\left(\frac{1}{5}(8\pi i)\right)\right)^4 \left(1-535.49165^n \exp\left(\frac{1}{5}(-8\pi i)\right)\right)^4\right) + 11$$

i is the imaginary unit

Result:

1189.67

1189.67 result practically equal to the rest mass of Sigma baryon 1189.37

89*((((((2sin((4Pi)/5))^4*535.49165^(1/3) * product (1-535.49165^n exp((8Pi*i)/5))^4 (1-535.49165^n exp((-8Pi*i)/5))^4, n=1 to 0.0864055)))))+Pi

where 89 is a Fibonacci number

Input interpretation:

$$89\left(\left(2\sin\left(\frac{4\pi}{5}\right)\right)^4 \sqrt[3]{535.49165} \prod_{n=1}^{0.0864055}\left(1-535.49165^n \exp\left(\frac{1}{5}(8\pi i)\right)\right)^4\left(1-535.49165^n \exp\left(\frac{1}{5}(-8\pi i)\right)\right)^4\right)+\pi$$

i is the imaginary unit

Result:

1383.43

1383.43 result practically qual to the rest mass of Sigma baryon 1383.7

We have also:

76*((((((2sin((4Pi)/5))^4*535.49165^(1/3) * product (1-535.49165^n exp((8Pi*i)/5))^4 (1-535.49165^n exp((-8Pi*i)/5))^4, n=1 to 0.0864055)))))-11-Pi

Where 76 and 11 are Lucas numbers

Input interpretation:

$$76\left(\left(2\sin\left(\frac{4\pi}{5}\right)\right)^4 \sqrt[3]{535.49165} \prod_{n=1}^{0.0864055}\left(1-535.49165^n \exp\left(\frac{1}{5}(8\pi i)\right)\right)^4\left(1-535.49165^n \exp\left(\frac{1}{5}(-8\pi i)\right)\right)^4\right)-11-\pi$$

i is the imaginary unit

Result:

1164.53

1164.53 result very near to the following Ramanujan's class invariant $Q = (G_{505}/G_{101/5})^3 = 1164,2696$

[1/((((((2sin((4Pi)/5))^4*535.49165^(1/3) * product (1-535.49165^n exp((8Pi*i)/5))^4 (1-535.49165^n exp((-8Pi*i)/5))^4, n=1 to 0.0864055)))))]^1/4096

Input interpretation:

$$\left(1\Big/\left(\left(2\sin\left(\frac{4\pi}{5}\right)\right)^4 \sqrt[3]{535.49165} \prod_{n=1}^{0.0864055}\left(1-535.49165^n \exp\left(\frac{1}{5}(8\pi i)\right)\right)^4 \left(1-535.49165^n \exp\left(\frac{1}{5}(-8\pi i)\right)\right)^4\right)\right)\hat{}\,(1/4096)$$

i is the imaginary unit

Result:

0.999331

0.999331 result very near to the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\dots}}}}\approx 0.9991104684$$

Now, we have that:

Consider the function

$$K(z,N)=\sum_{k=1}^{N-1}\frac{\pi\sin\pi z}{\sin(\pi k/N)\sin\pi(z-k/N)}. \tag{2.5}$$

for N = 5, z = 1/2-0.0000864055i = 0.5-0.0000864055i, π = 180, we obtain:

sum (180*sin (180*(0.5-0.0000864055i)))/(((sin((180*k)/5) sin180((0.5-0.0000864055i)-k/5)))), k=1 to 4

Sum:

$$\sum_{k=1}^{4} \frac{180 \sin(180\,(0.5 - 0.0000864055\, i))}{\sin\left(\frac{180\,k}{5}\right) \sin(180) \left((0.5 - 0.0000864055\, i) - \frac{k}{5}\right)} \approx$$

$$-6435.3525630061930480985026363386289640073 - 58.285299328127436938227745518659750643\, i$$

i is the imaginary unit

Decimal approximation:

$-6435.35256300619304809850263633862896400738040845369557 73\ldots - 58.28529932812743693822774551865975064262224048058597 4388\ldots\, i$

Input interpretation:

$-6435.352563006193 + i \times (-58.28529932812743)$

i is the imaginary unit

Result:

$-6435.352563006193\ldots - 58.28529932812743\ldots\, i$

Polar coordinates:

$r = 6435.616503980652$ (radius), $\theta = -179.481083543176318°$ (angle)

6435.616503980652

((((sum (180*sin (180*(0.5-0.0000864055i)))/(((sin((180*k)/5) sin180((0.5-0.0000864055i)-k/5)))), k=1 to 4))))+123+29+7

where 123, 29 and 7 are Lucas numbers

Input interpretation:

$$\sum_{k=1}^{4} \frac{180 \sin(180\,(0.5 + i \times (-0.0000864055)))}{\sin\left(\frac{180\,k}{5}\right) \sin(180) \left((0.5 + i \times (-0.0000864055)) - \frac{k}{5}\right)} + 123 + 29 + 7$$

i is the imaginary unit

Result:

$-6276.35 - 58.2853\, i$

Input interpretation:

$-6276.35 + i \times (-58.2853)$

i is the imaginary unit

Result:

$-6276.35... - 58.2853... i$

Polar coordinates:

$r = 6276.62$ (radius), $\theta = -179.468°$ (angle)

6276.62 result practically equal to the rest mass of charmed B meson 6276

(-6276.35 - 58.2853 i)+golden ratio

Input interpretation:

$(-6276.35 + i \times (-58.2853)) + \phi$

i is the imaginary unit

ϕ is the golden ratio

Result:

$-6274.73... - 58.2853... i$

Polar coordinates:

$r = 6275.$ (radius), $\theta = -179.468°$ (angle)

6275 as above

for N = 5, k = 3, z = 1/2-0.0000864055i = 0.5-0.0000864055i, π = 180, we obtain also:

(180*sin (180*(0.5-0.0000864055i)))/(((sin((180*3)/5) sin180 *((0.5-0.0000864055i)-3/5))))

Input interpretation:

$$\frac{180 \sin(180 (0.5 + i \times (-0.0000864055)))}{\sin\left(\frac{180 \times 3}{5}\right) \sin(180) \left((0.5 + i \times (-0.0000864055)) - \frac{3}{5}\right)}$$

i is the imaginary unit

Result:

2167.47... +
15.0216... i

Polar coordinates:

$r = 2167.52$ (radius), $\theta = 0.39708°$ (angle)

2167.52

Alternative representations:

$$\frac{180\sin(180(0.5 - i\,0.0000864055))}{\sin\left(\frac{180\times3}{5}\right)\sin(180)\left((0.5 - i\,0.0000864055) - \frac{3}{5}\right)} = \frac{180}{\frac{\csc(180(0.5-0.0000864055\,i))\left(0.5-0.0000864055\,i-\frac{3}{5}\right)}{\csc(180)\csc\left(\frac{540}{5}\right)}}$$

$$\frac{180\sin(180(0.5 - i\,0.0000864055))}{\sin\left(\frac{180\times3}{5}\right)\sin(180)\left((0.5 - i\,0.0000864055) - \frac{3}{5}\right)} = \frac{180\cos\left(-180(0.5 - 0.0000864055\,i) + \frac{\pi}{2}\right)}{\cos\left(-180 + \frac{\pi}{2}\right)\cos\left(\frac{\pi}{2} - \frac{540}{5}\right)\left(0.5 - 0.0000864055\,i - \frac{3}{5}\right)}$$

$$\frac{180\sin(180(0.5 - i\,0.0000864055))}{\sin\left(\frac{180\times3}{5}\right)\sin(180)\left((0.5 - i\,0.0000864055) - \frac{3}{5}\right)} = -\frac{180\cos\left(180(0.5 - 0.0000864055\,i) + \frac{\pi}{2}\right)}{\cos\left(180 + \frac{\pi}{2}\right)\cos\left(\frac{\pi}{2} + \frac{540}{5}\right)\left(0.5 - 0.0000864055\,i - \frac{3}{5}\right)}$$

Series representations:

$$\frac{180\sin(180(0.5 - i\,0.0000864055))}{\sin\left(\frac{180\times3}{5}\right)\sin(180)\left((0.5 - i\,0.0000864055) - \frac{3}{5}\right)} = -\frac{4.1664\times10^6\sum_{k=0}^{\infty}(-1)^k J_{1+2k}(180)\,T_{1+2k}(0.5 - 0.0000864055\,i)}{(1157.33 + i)\sin(108)\sin(180)}$$

$$\frac{180\sin(180(0.5 - i\,0.0000864055))}{\sin\left(\frac{180\times3}{5}\right)\sin(180)\left((0.5 - i\,0.0000864055) - \frac{3}{5}\right)} = -\frac{1.0416\times10^6\sum_{k=0}^{\infty}(-1)^k J_{1+2k}(90 - 0.015553\,i)}{(1157.33 + i)\left(\sum_{k=0}^{\infty}(-1)^k J_{1+2k}(108)\right)\sum_{k=0}^{\infty}(-1)^k J_{1+2k}(180)}$$

Integral representations:

$$\frac{180\sin(180\,(0.5 - i\,0.0000864055))}{\sin\left(\frac{180\times 3}{5}\right)\sin(180)\left((0.5 - i\,0.0000864055) - \frac{3}{5}\right)} = \frac{1.66667\left(-5786.67\int_0^1 \cos((90 - 0.015553\,i)\,t)\,dt + i\int_0^1 \cos((90 - 0.015553\,i)\,t)\,dt\right)}{(1157.33 + i)\left(\int_0^1 \cos(108\,t)\,dt\right)\int_0^1 \cos(180\,t)\,dt}$$

$$\frac{180\sin(180\,(0.5 - i\,0.0000864055))}{\sin\left(\frac{180\times 3}{5}\right)\sin(180)\left((0.5 - i\,0.0000864055) - \frac{3}{5}\right)} = \left(6.66667\left(-5786.67\,\pi\,\mathcal{A}\int_{-\mathcal{A}\,\infty+\gamma}^{\mathcal{A}\,\infty+\gamma} \frac{e^{-\left(0.0000604739\,(5786.67-i)^2\right)/s+s}}{s^{3/2}}\,ds + i\,\pi\,\mathcal{A}\int_{-\mathcal{A}\,\infty+\gamma}^{\mathcal{A}\,\infty+\gamma} \frac{e^{-\left(0.0000604739\,(5786.67-i)^2\right)/s+s}}{s^{3/2}}\,ds\right)\right) \Big/ \left((1157.33 + i)\left(\int_{-\mathcal{A}\,\infty+\gamma}^{\mathcal{A}\,\infty+\gamma} \frac{e^{-8100/s+s}}{s^{3/2}}\,ds\right)\left(\int_{-\mathcal{A}\,\infty+\gamma}^{\mathcal{A}\,\infty+\gamma} \frac{e^{-2916/s+s}}{s^{3/2}}\,ds\right)\sqrt{\pi}\right) \text{ for } \gamma > 0$$

Multiple-argument formulas:

$$\frac{180\sin(180\,(0.5 - i\,0.0000864055))}{\sin\left(\frac{180\times 3}{5}\right)\sin(180)\left((0.5 - i\,0.0000864055) - \frac{3}{5}\right)} = -\frac{1.59625\times 10^{60}\prod_{k=0}^{179}\sin(0.5 - 0.0000864055\,i + 0.00555556\,k\,\pi)}{(1157.33 + i)\sin(108)\sin(180)}$$

$$\frac{180\sin(180\,(0.5 - i\,0.0000864055))}{\sin\left(\frac{180\times 3}{5}\right)\sin(180)\left((0.5 - i\,0.0000864055) - \frac{3}{5}\right)} = \frac{2.0832\times 10^{6}\,U_{179}(\sin(0.5 - 0.0000864055\,i))\cos(0.5 - 0.0000864055\,i)}{(1157.33 + i)\sin(108)\sin(180)}$$

$$\frac{180\sin(180\,(0.5 - i\,0.0000864055))}{\sin\left(\frac{180\times 3}{5}\right)\sin(180)\left((0.5 - i\,0.0000864055) - \frac{3}{5}\right)} = -\frac{2.0832\times 10^{6}\,U_{179}(\cos(0.5 - 0.0000864055\,i))\sin(0.5 - 0.0000864055\,i)}{(1157.33 + i)\sin(108)\sin(180)}$$

And we obtain also:

(180*sin (180*(0.5-0.0000864055i)))/(((sin((180*3)/5) sin180 *((0.5-0.0000864055i)-3/5)))) – 55

where 55 is a Fibonacci number

Input interpretation:

$$\frac{180 \sin(180\,(0.5 + i\times(-0.0000864055)))}{\sin\left(\frac{180\times 3}{5}\right)\sin(180)\left((0.5 + i\times(-0.0000864055)) - \frac{3}{5}\right)} - 55$$

i is the imaginary unit

Result:

2112.47... +
15.0216... i

Polar coordinates:

$r = 2112.53$ (radius), $\theta = 0.407418°$ (angle)

2112.53 result practically equal to the rest mass of strange D meson 2112.3

Alternative representations:

$$\frac{180 \sin(180\,(0.5 - i\,0.0000864055))}{\sin\left(\frac{180\times 3}{5}\right)\sin(180)\left((0.5 - i\,0.0000864055) - \frac{3}{5}\right)} - 55 = -55 + \frac{180}{\frac{\csc(180\,(0.5 - 0.0000864055\,i))\left(0.5 - 0.0000864055\,i - \frac{3}{5}\right)}{\csc(180)\csc\left(\frac{540}{5}\right)}}$$

$$\frac{180 \sin(180\,(0.5 - i\,0.0000864055))}{\sin\left(\frac{180\times 3}{5}\right)\sin(180)\left((0.5 - i\,0.0000864055) - \frac{3}{5}\right)} - 55 = -55 + \frac{180 \cos\left(-180\,(0.5 - 0.0000864055\,i) + \frac{\pi}{2}\right)}{\cos\left(-180 + \frac{\pi}{2}\right)\cos\left(\frac{\pi}{2} - \frac{540}{5}\right)\left(0.5 - 0.0000864055\,i - \frac{3}{5}\right)}$$

$$\frac{180 \sin(180\,(0.5 - i\,0.0000864055))}{\sin\left(\frac{180\times 3}{5}\right)\sin(180)\left((0.5 - i\,0.0000864055) - \frac{3}{5}\right)} - 55 = -55 - \frac{180 \cos\left(180\,(0.5 - 0.0000864055\,i) + \frac{\pi}{2}\right)}{\cos\left(180 + \frac{\pi}{2}\right)\cos\left(\frac{\pi}{2} + \frac{540}{5}\right)\left(0.5 - 0.0000864055\,i - \frac{3}{5}\right)}$$

Series representations:

$$\frac{180\sin(180(0.5 - i\,0.0000864055))}{\sin\left(\frac{180\times 3}{5}\right)\sin(180)\left((0.5 - i\,0.0000864055) - \frac{3}{5}\right)} - 55 = -55 - \frac{4.1664\times 10^6 \sum_{k=0}^{\infty}(-1)^k J_{1+2k}(180)\, T_{1+2k}(0.5 - 0.0000864055\,i)}{(1157.33 + i)\sin(108)\sin(180)}$$

$$\frac{180\sin(180(0.5 - i\,0.0000864055))}{\sin\left(\frac{180\times 3}{5}\right)\sin(180)\left((0.5 - i\,0.0000864055) - \frac{3}{5}\right)} - 55 = -\left(\left(55\left(18\,938.2\sum_{k=0}^{\infty}(-1)^k J_{1+2k}(90 - 0.015553\,i) + 1157.33\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}(-1)^{k_1+k_2} J_{1+2k_1}(108)\, J_{1+2k_2}(180) + i\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}(-1)^{k_1+k_2} J_{1+2k_1}(108)\, J_{1+2k_2}(180)\right)\right)\Big/\left((1157.33 + i)\left(\sum_{k=0}^{\infty}(-1)^k J_{1+2k}(108)\right)\sum_{k=0}^{\infty}(-1)^k J_{1+2k}(180)\right)\right)$$

Integral representations:

$$\frac{180\sin(180(0.5 - i\,0.0000864055))}{\sin\left(\frac{180\times 3}{5}\right)\sin(180)\left((0.5 - i\,0.0000864055) - \frac{3}{5}\right)} - 55 = -\left(\left(55\left(175.354\int_0^1 \cos((90 - 0.015553\,i)\,t)\,dt - 0.030303\,i\int_0^1 \cos((90 - 0.015553\,i)\,t)\,dt + 2\int_0^1\int_0^1 \cos(108\,t_1)\cos(180\,t_2)\,dt_2\,dt_1\right)\right)\Big/\left((1157.33 + i)\left(\int_0^1 \cos(108\,t)\,dt\right)\int_0^1 \cos(180\,t)\,dt\right)\right)$$

$$\frac{180\sin(180(0.5 - i\,0.0000864055))}{\sin\left(\frac{180\times 3}{5}\right)\sin(180)\left((0.5 - i\,0.0000864055) - \frac{3}{5}\right)} - 55 = \left(6.66667\left(-5786.67\,\pi\,\mathcal{A}\int_{-\mathcal{A}\,\infty+\gamma}^{\mathcal{A}\,\infty+\gamma}\frac{e^{-\left(0.0000604739\,(5786.67-i)^2\right)/s+s}}{s^{3/2}}\,ds + i\,\pi\,\mathcal{A}\int_{-\mathcal{A}\,\infty+\gamma}^{\mathcal{A}\,\infty+\gamma}\frac{e^{-\left(0.0000604739\,(5786.67-i)^2\right)/s+s}}{s^{3/2}}\,ds - 9548.\left(\int_{-\mathcal{A}\,\infty+\gamma}^{\mathcal{A}\,\infty+\gamma}\frac{e^{-8100/s+s}}{s^{3/2}}\,ds\right)\left(\int_{-\mathcal{A}\,\infty+\gamma}^{\mathcal{A}\,\infty+\gamma}\frac{e^{-2916/s+s}}{s^{3/2}}\,ds\right)\sqrt{\pi} - 8.25\,i\left(\int_{-\mathcal{A}\,\infty+\gamma}^{\mathcal{A}\,\infty+\gamma}\frac{e^{-8100/s+s}}{s^{3/2}}\,ds\right)\left(\int_{-\mathcal{A}\,\infty+\gamma}^{\mathcal{A}\,\infty+\gamma}\frac{e^{-2916/s+s}}{s^{3/2}}\,ds\right)\sqrt{\pi}\right)\right)\Big/\left((1157.33 + i)\left(\int_{-\mathcal{A}\,\infty+\gamma}^{\mathcal{A}\,\infty+\gamma}\frac{e^{-8100/s+s}}{s^{3/2}}\,ds\right)\left(\int_{-\mathcal{A}\,\infty+\gamma}^{\mathcal{A}\,\infty+\gamma}\frac{e^{-2916/s+s}}{s^{3/2}}\,ds\right)\sqrt{\pi}\right) \quad \text{for } \gamma > 0$$

Multiple-argument formulas:

$$\frac{180\sin(180\,(0.5-i\,0.0000864055))}{\sin\left(\frac{180\times 3}{5}\right)\sin(180)\left((0.5-i\,0.0000864055)-\frac{3}{5}\right)}-55 = -55+\frac{2.0832\times 10^6\,U_{179}(\sin(0.5-0.0000864055\,i))\cos(0.5-0.0000864055\,i)}{(1157.33+i)\sin(108)\sin(180)}$$

$$\frac{180\sin(180\,(0.5-i\,0.0000864055))}{\sin\left(\frac{180\times 3}{5}\right)\sin(180)\left((0.5-i\,0.0000864055)-\frac{3}{5}\right)}-55 = -55-\frac{2.0832\times 10^6\,U_{179}(\cos(0.5-0.0000864055\,i))\sin(0.5-0.0000864055\,i)}{(1157.33+i)\sin(108)\sin(180)}$$

$$\frac{180\sin(180\,(0.5-i\,0.0000864055))}{\sin\left(\frac{180\times 3}{5}\right)\sin(180)\left((0.5-i\,0.0000864055)-\frac{3}{5}\right)}-55 = -55+\left(-4.1664\times 10^6\cos(0.5-0.0000864055\,i)\sin(89.5-0.0154666\,i)+2.0832\times 10^6\sin(89-0.0153802\,i)\right)/((1157.33+i)\sin(108)\sin(180))$$

$U_n(x)$ is the Chebyshev polynomial of the second kind

Now, we have that:

$$K_2(z,N)=\pi N\cot\left(\pi(N(z-1/2)+1/2)\right)-\pi\cot\pi z. \qquad (2.10)$$

For z = 0.5-0.0000864055i , N = 5, π = 180, we obtain:

5*180 cot(180(5(0.5-0.0000864055i-0.5)+0.5))-((180 cot 180*(0.5-0.0000864055i)))

Input interpretation:

$$5\times 180\cot(180\,(5\,(0.5+i\times(-0.0000864055)-0.5)+0.5))-180\cot(180)\,(0.5+i\times(-0.0000864055))$$

cot(x) is the cotangent function

i is the imaginary unit

Result:

$$-514.918\ldots + 87.2733\ldots\, i$$

Polar coordinates:

$r = 522.262$ (radius), $\theta = 170.38°$ (angle)

522.262 result very near to the Lucas number 521

Alternative representations:

$$5\times 180\cot(180(5(0.5-i\,0.0000864055-0.5)+0.5))-180(\cot(180)(0.5-i\,0.0000864055)) = 180(0.5-0.0000864055\,i)\,i\coth(-180\,i)-900\,i\coth(-180\,i(0.5+5(0-0.0000864055\,i)))$$

$$5\times 180\cot(180(5(0.5-i\,0.0000864055-0.5)+0.5))-180(\cot(180)(0.5-i\,0.0000864055)) = -180(0.5-0.0000864055\,i)\,i\coth(180\,i)+900\,i\coth(180(0.5+5(0-0.0000864055\,i))\,i)$$

$$5\times 180\cot(180(5(0.5-i\,0.0000864055-0.5)+0.5))-180(\cot(180)(0.5-i\,0.0000864055)) = -\frac{180(0.5-0.0000864055\,i)}{\tan(180)}+\frac{900}{\tan(180(0.5+5(0-0.0000864055\,i)))}$$

Series representations:

$$5\times 180\cot(180(5(0.5-i\,0.0000864055-0.5)+0.5))-180(\cot(180)(0.5-i\,0.0000864055)) = \sum_{k=-\infty}^{\infty} e^{-0.15553(-1157.33+i)k\,\mathcal{A}}\left(-900+e^{(180.+0.15553\,i)k\,\mathcal{A}}(90-0.015553\,i)\right)\mathcal{A}\,\operatorname{sgn}(k)$$

$$5\times 180\cot(180(5(0.5-i\,0.0000864055-0.5)+0.5))-180(\cot(180)(0.5-i\,0.0000864055)) = \sum_{k=1}^{\infty} e^{-0.15553(-1157.33+i)k\,\mathcal{A}}\left(-900+e^{(180.+0.15553\,i)k\,\mathcal{A}}(90-0.015553\,i)\right)\mathcal{A}+\sum_{k=-\infty}^{-1} e^{-0.15553(-1157.33+i)k\,\mathcal{A}}\left(900+e^{(180.+0.15553\,i)k\,\mathcal{A}}(-90+0.015553\,i)\right)\mathcal{A}$$

$$5\times 180\cot(180(5(0.5-i\,0.0000864055-0.5)+0.5))-180(\cot(180)(0.5-i\,0.0000864055)) = \sum_{k=-\infty}^{\infty}\left(2.49318\times 10^{9}-137.155\,i^2+0.0169299\,i^3-64800\,k^2\pi^2+i\left(-2.01819\times 10^{6}+67.1889\,k^2\pi^2\right)\right)\Big/\left(\left(-32400+k^2\pi^2\right)\left(-8100+13.9977\,i-0.00604739\,i^2+k^2\pi^2\right)\right)$$

Integral representation:

$$5\times 180\cot(180\,(5\,(0.5-i\,0.0000864055-0.5)+0.5))-180\,(\cot(180)\,(0.5-i\,0.0000864055))=\int_{\frac{\pi}{2}}^{90-0.077765\,i}\left(\left((162\,000-139.977\,i-900\,\pi)\csc^2(t)+(-32\,400.+i\,(5.59908-0.015553\,\pi)+90\,\pi)\csc^2\left(\frac{-2314.67\,t+\pi\,(578.667+0.5\,i+6.42963\,t)}{-1157.33+i+6.42963\,\pi}\right)\right)\Big/(-180+0.15553\,i+\pi)\right)dt$$

from which:

5*180 cot(180(5(0.5-0.0000864055i-0.5)+0.5))-((180 cot 180*(0.5-0.0000864055i))) - 24 - golden ratio

Input interpretation:

$$5\times 180\cot(180\,(5\,(0.5+i\times(-0.0000864055))-0.5)+0.5))-180\cot(180)\,(0.5+i\times(-0.0000864055))-24-\phi$$

cot(x) is the cotangent function

i is the imaginary unit

ϕ is the golden ratio

Result:

$-540.536\ldots+87.2733\ldots\,i$

Polar coordinates:

$r=547.536$ (radius), $\theta=170.828°$ (angle)

547.536 result practically equal to the rest mass of Eta meson 547.853

Alternative representations:

$$5\times 180\cot(180\,(5\,(0.5-i\,0.0000864055-0.5)+0.5))-180\,(\cot(180)\,(0.5-i\,0.0000864055))-24-\phi=-24-\phi+180\,(0.5-0.0000864055\,i)\,i\coth(-180\,i)-900\,i\coth(-180\,i\,(0.5+5\,(0-0.0000864055\,i)))$$

$$5\times 180\cot(180(5(0.5-i\,0.0000864055-0.5)+0.5))-180(\cot(180)(0.5-i\,0.0000864055))-24-\phi = -24-\phi-180(0.5-0.0000864055\,i)\,i\coth(180\,i)+900\,i\coth(180(0.5+5(0-0.0000864055\,i))\,i)$$

$$5\times 180\cot(180(5(0.5-i\,0.0000864055-0.5)+0.5))-180(\cot(180)(0.5-i\,0.0000864055))-24-\phi = -24-\phi-\frac{180(0.5-0.0000864055\,i)}{\tan(180)}+\frac{900}{\tan(180(0.5+5(0-0.0000864055\,i)))}$$

Series representations:

$$5\times 180\cot(180(5(0.5-i\,0.0000864055-0.5)+0.5))-180(\cot(180)(0.5-i\,0.0000864055))-24-\phi = -24-\phi+\sum_{k=-\infty}^{\infty} e^{-0.15553(-1157.33+i)k\mathcal{A}}\left(-900+e^{(180.+0.15553\,i)k\mathcal{A}}(90-0.015553\,i)\right)\mathcal{A}\,\operatorname{sgn}(k)$$

$$5\times 180\cot(180(5(0.5-i\,0.0000864055-0.5)+0.5))-180(\cot(180)(0.5-i\,0.0000864055))-24-\phi = -24-\phi+\sum_{k=1}^{\infty} e^{-0.15553(-1157.33+i)k\mathcal{A}}\left(-900+e^{(180.+0.15553\,i)k\mathcal{A}}(90-0.015553\,i)\right)\mathcal{A}+\sum_{k=-\infty}^{-1} e^{-0.15553(-1157.33+i)k\mathcal{A}}\left(900+e^{(180.+0.15553\,i)k\mathcal{A}}(-90+0.015553\,i)\right)\mathcal{A}$$

$$5\times 180\cot(180(5(0.5-i\,0.0000864055-0.5)+0.5))-180(\cot(180)(0.5-i\,0.0000864055))-24-\phi = -24-\phi+\sum_{k=-\infty}^{\infty}\left(2.49318\times10^{9}-137.155\,i^2+0.0169299\,i^3-64800\,k^2\pi^2+i\left(-2.01819\times10^{6}+67.1889\,k^2\pi^2\right)\right)/\left(\left(-32400+k^2\pi^2\right)\left(-8100+13.9977\,i-0.00604739\,i^2+k^2\pi^2\right)\right)$$

Integral representation:

$$5\times 180\cot(180(5(0.5-i\,0.0000864055-0.5)+0.5))-180(\cot(180)(0.5-i\,0.0000864055))-24-\phi = -24-\phi+\int_{\frac{\pi}{2}}^{90-0.077765\,i}\left(\left((162000-139.977\,i-900\,\pi)\csc^2(t)+(-32400.+i(5.59908-0.015553\,\pi)+90\,\pi)\csc^2\left(\frac{-2314.67\,t+\pi(578.667+0.5\,i+6.42963\,t)}{-1157.33+i+6.42963\,\pi}\right)\right)/(-180+0.15553\,i+\pi)\right)dt$$

From the formula of coefficients of the '5th order' mock theta function $\psi_1(q)$: (A053261 OEIS Sequence)

sqrt(phi) * exp(Pi*sqrt(n/15)) / (2*5^(1/4)*sqrt(n))

sqrt(golden ratio) * exp(Pi*sqrt(140/15)) / (2*5^(1/4)*sqrt(140))-7

where 7 is a Lucas number

Input:

$$\sqrt{\phi} \times \frac{\exp\left(\pi \sqrt{\frac{140}{15}}\right)}{2 \sqrt[4]{5} \sqrt{140}} - 7$$

ϕ is the golden ratio

Exact result:

$$\frac{e^{2\sqrt{7/3}\,\pi} \sqrt{\frac{\phi}{7}}}{4 \times 5^{3/4}} - 7$$

Decimal approximation:

522.5365205444131848886041148576074384081260329366703540246...

522.53652054…

Property:

$$-7 + \frac{e^{2\sqrt{7/3}\,\pi} \sqrt{\frac{\phi}{7}}}{4 \times 5^{3/4}}$$ is a transcendental number

Alternate forms:

$$\frac{1}{20} \sqrt{\frac{1}{14}\left(5 + \sqrt{5}\right)}\, e^{2\sqrt{7/3}\,\pi} - 7$$

$$\frac{\sqrt{\frac{1}{14}\left(1 + \sqrt{5}\right)}\, e^{2\sqrt{7/3}\,\pi}}{4 \times 5^{3/4}} - 7$$

$$\frac{1}{280}\left(\sqrt[4]{5}\,\sqrt{14\left(1+\sqrt{5}\right)}\,e^{2\sqrt{7/3}\,\pi}-1960\right)$$

Series representations:

$$\frac{\sqrt{\phi}\,\exp\left(\pi\sqrt{\frac{140}{15}}\right)}{2\sqrt[4]{5}\,\sqrt{140}}-7=\left(-70\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(140-z_0)^k z_0^{-k}}{k!}+5^{3/4}\exp\left(\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{28}{3}-z_0\right)^k z_0^{-k}}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(\phi-z_0)^k z_0^{-k}}{k!}\right)\Bigg/\left(10\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(140-z_0)^k z_0^{-k}}{k!}\right)\quad\text{for not }((z_0\in\mathbb{R}\text{ and }-\infty<z_0\leq 0))$$

$$\frac{\sqrt{\phi}\,\exp\left(\pi\sqrt{\frac{140}{15}}\right)}{2\sqrt[4]{5}\,\sqrt{140}}-7=\left(-70\exp\left(i\pi\left\lfloor\frac{\arg(140-x)}{2\pi}\right\rfloor\right)\sum_{k=0}^{\infty}\frac{(-1)^k(140-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}+5^{3/4}\exp\left(i\pi\left\lfloor\frac{\arg(\phi-x)}{2\pi}\right\rfloor\right)\exp\left(\pi\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{28}{3}-x\right)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{28}{3}-x\right)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k(\phi-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\Bigg/\left(10\exp\left(i\pi\left\lfloor\frac{\arg(140-x)}{2\pi}\right\rfloor\right)\sum_{k=0}^{\infty}\frac{(-1)^k(140-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)$$

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

$$\frac{\sqrt{\phi}\exp\left(\pi\sqrt{\frac{140}{15}}\right)}{2\sqrt[4]{5}\sqrt{140}} - 7 = \left(\left(\frac{1}{z_0}\right)^{-1/2\lfloor \arg(140-z_0)/(2\pi)\rfloor} z_0^{-1/2\lfloor \arg(140-z_0)/(2\pi)\rfloor}\right.$$

$$\left(-70\left(\frac{1}{z_0}\right)^{1/2\lfloor \arg(140-z_0)/(2\pi)\rfloor} z_0^{1/2\lfloor \arg(140-z_0)/(2\pi)\rfloor} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (140-z_0)^k z_0^{-k}}{k!} + \right.$$

$$5^{3/4} \exp\left(\pi\left(\frac{1}{z_0}\right)^{1/2\left\lfloor \arg\left(\frac{28}{3}-z_0\right)/(2\pi)\right\rfloor} z_0^{1/2\left(1+\left\lfloor \arg\left(\frac{28}{3}-z_0\right)/(2\pi)\right\rfloor\right)}\right.$$

$$\left.\sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k \left(\frac{28}{3}-z_0\right)^k z_0^{-k}}{k!}\right)\left(\frac{1}{z_0}\right)^{1/2\lfloor \arg(\phi-z_0)/(2\pi)\rfloor}$$

$$\left.\left. z_0^{1/2\lfloor \arg(\phi-z_0)/(2\pi)\rfloor} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (\phi-z_0)^k z_0^{-k}}{k!}\right)\right) \Bigg/$$

$$\left(10 \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (140-z_0)^k z_0^{-k}}{k!}\right)$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

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

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

We have also:

Pi*(((5*180 cot(180(5(0.5-0.0000864055i-0.5)+0.5))-((180 cot 180*(0.5-0.0000864055i)))))) - 89 - 1/golden ratio

where 89 is a Fibonacci number

Input interpretation:

$$\pi\,(5\times 180\cot(180\,(5\,(0.5 + i\times(-0.0000864055) - 0.5) + 0.5)) - 180\cot(180)\,(0.5 + i\times(-0.0000864055))) - 89 - \frac{1}{\phi}$$

cot(x) is the cotangent function

i is the imaginary unit

ϕ is the golden ratio

Result:

$-1707.28... + 274.177... i$

Polar coordinates:

$r = 1729.16$ (radius), $\theta = 170.877°$ (angle)

1729.16

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

Alternative representations:

$$\pi (5 \times 180 \cot(180 (5 (0.5 - i\, 0.0000864055 - 0.5) + 0.5)) - 180 (\cot(180) (0.5 - i\, 0.0000864055))) - 89 - \frac{1}{\phi} = -89 + \pi (180 (0.5 - 0.0000864055\, i)\, i \coth(-180\, i) - 900\, i \coth(-180\, i (0.5 + 5 (0 - 0.0000864055\, i)))) - \frac{1}{\phi}$$

$$\pi (5 \times 180 \cot(180 (5 (0.5 - i\, 0.0000864055 - 0.5) + 0.5)) - 180 (\cot(180) (0.5 - i\, 0.0000864055))) - 89 - \frac{1}{\phi} = -89 + \pi (-180 (0.5 - 0.0000864055\, i)\, i \coth(180\, i) + 900\, i \coth(180 (0.5 + 5 (0 - 0.0000864055\, i))\, i)) - \frac{1}{\phi}$$

$$\pi (5 \times 180 \cot(180 (5 (0.5 - i\, 0.0000864055 - 0.5) + 0.5)) - 180 (\cot(180) (0.5 - i\, 0.0000864055))) - 89 - \frac{1}{\phi} = -89 - \frac{1}{\phi} + \pi \left(-\frac{180 (0.5 - 0.0000864055\, i)}{\tan(180)} + \frac{900}{\tan(180 (0.5 + 5 (0 - 0.0000864055\, i)))}\right)$$

Series representations:

$$\pi(5\times 180\cot(180(5(0.5-i\,0.0000864055-0.5)+0.5))-180(\cot(180)(0.5-i\,0.0000864055)))-89-\frac{1}{\phi}=-89-\frac{1}{\phi}+\sum_{k=-\infty}^{\infty} e^{-0.15553(-1157.33+i)k\mathcal{A}}\left(-900+e^{(180.+0.15553 i)k\mathcal{A}}(90-0.015553 i)\right)\pi\mathcal{A}\operatorname{sgn}(k)$$

$$\pi(5\times 180\cot(180(5(0.5-i\,0.0000864055-0.5)+0.5))-180(\cot(180)(0.5-i\,0.0000864055)))-89-\frac{1}{\phi}=$$
$$-89-\frac{1}{\phi}+\sum_{k=-\infty}^{\infty}\left(\pi\left(2.49318\times 10^{9}-137.155 i^2+0.0169299 i^3-64800 k^2\pi^2+i\left(-2.01819\times 10^{6}+67.1889 k^2\pi^2\right)\right)\right)\Big/\left(\left(-32400+k^2\pi^2\right)\left(-8100+13.9977 i-0.00604739 i^2+k^2\pi^2\right)\right)$$

$$\pi(5\times 180\cot(180(5(0.5-i\,0.0000864055-0.5)+0.5))-180(\cot(180)(0.5-i\,0.0000864055)))-89-\frac{1}{\phi}=\frac{1}{\phi}\left(-1-89\phi+\phi\sum_{k=1}^{\infty} e^{-0.15553(-1157.33+i)k\mathcal{A}}\left(-900+e^{(180.+0.15553 i)k\mathcal{A}}(90-0.015553 i)\right)\pi\mathcal{A}+\phi\sum_{k=-\infty}^{-1} e^{-0.15553(-1157.33+i)k\mathcal{A}}\left(900+e^{(180.+0.15553 i)k\mathcal{A}}(-90+0.015553 i)\right)\pi\mathcal{A}\right)$$

Integral representation:

$$\pi(5\times 180\cot(180(5(0.5-i\,0.0000864055-0.5)+0.5))-180(\cot(180)(0.5-i\,0.0000864055)))-89-\frac{1}{\phi}=$$
$$-89-\frac{1}{\phi}+\int_{\frac{\pi}{2}}^{90-0.077765 i}\left(\left(\pi\left((162000-139.977 i-900\pi)\csc^2(t)+(-32400.+i(5.59908-0.015553\pi)+90\pi)\csc^2\left(\frac{-2314.67 t+\pi(578.667+0.5 i+6.42963 t)}{-1157.33+i+6.42963\pi}\right)\right)\right)\Big/(-180+0.15553 i+\pi)\right)dt$$

1/Pi*(((5*180 cot(180(5(0.5-0.0000864055i-0.5)+0.5))-((180 cot 180*(0.5-0.0000864055i))))))+29-golden ratio

where 29 is a Lucas number

Input interpretation:

$$\frac{1}{\pi}(5\times 180\cot(180(5(0.5+i\times(-0.0000864055)-0.5)+0.5))-180\cot(180)(0.5+i\times(-0.0000864055)))+29-\phi$$

cot(x) is the cotangent function

i is the imaginary unit

ϕ is the golden ratio

Result:

$-136.522\ldots+27.7800\ldots i$

Polar coordinates:

$r=139.319$ (radius), $\theta=168.498°$ (angle)

139.319 result practically equal to the rest mass of Pion meson 139.57 MeV

Alternative representations:

$$\frac{1}{\pi}(5\times 180\cot(180(5(0.5-i\,0.0000864055-0.5)+0.5))-180\cot(180)(0.5-i\,0.0000864055))+29-\phi=29-\phi+\frac{1}{\pi}(180(0.5-0.0000864055\,i)\,i\coth(-180\,i)-900\,i\coth(-180\,i(0.5+5(0-0.0000864055\,i))))$$

$$\frac{1}{\pi}(5\times 180\cot(180(5(0.5-i\,0.0000864055-0.5)+0.5))-180\cot(180)(0.5-i\,0.0000864055))+29-\phi=29-\phi+\frac{1}{\pi}(-180(0.5-0.0000864055\,i)\,i\coth(180\,i)+900\,i\coth(180(0.5+5(0-0.0000864055\,i))\,i))$$

$$\frac{1}{\pi}(5\times 180\cot(180(5(0.5-i\,0.0000864055-0.5)+0.5))-180\cot(180)(0.5-i\,0.0000864055))+29-\phi=29-\phi+\frac{-\frac{180(0.5-0.0000864055\,i)}{\tan(180)}+\frac{900}{\tan(180(0.5+5(0-0.0000864055\,i)))}}{\pi}$$

Series representations:

$$\frac{1}{\pi}(5\times 180\cot(180(5(0.5-i\,0.0000864055-0.5)+0.5))-180\cot(180)(0.5-i\,0.0000864055))+29-\phi=29-\phi+\sum_{k=-\infty}^{\infty}\frac{e^{-0.15553(-1157.33+i)k\mathcal{A}}\left(-900+e^{(180.+0.15553\,i)k\mathcal{A}}(90-0.015553\,i)\right)\mathcal{A}\,\mathrm{sgn}(k)}{\pi}$$

$$\frac{1}{\pi}(5\times 180\cot(180(5(0.5-i\,0.0000864055-0.5)+0.5))-180\cot(180)(0.5-i\,0.0000864055))+29-\phi=29-\phi+\sum_{k=-\infty}^{\infty}\left(2.49318\times 10^{9}-137.155\,i^2+0.0169299\,i^3-64800\,k^2\pi^2+i\left(-2.01819\times 10^{6}+67.1889\,k^2\pi^2\right)\right)/\left(\pi\left(-32400+k^2\pi^2\right)\left(-8100+13.9977\,i-0.00604739\,i^2+k^2\pi^2\right)\right)$$

$$\frac{1}{\pi}(5\times 180\cot(180(5(0.5-i\,0.0000864055-0.5)+0.5))-180\cot(180)(0.5-i\,0.0000864055))+29-\phi=-\left(-29+\phi-\sum_{k=1}^{\infty}\frac{e^{-0.15553(-1157.33+i)k\mathcal{A}}\left(-900+e^{(180.+0.15553\,i)k\mathcal{A}}(90-0.015553\,i)\right)\mathcal{A}}{\pi}-\sum_{k=-\infty}^{-1}\frac{e^{-0.15553(-1157.33+i)k\mathcal{A}}\left(900+e^{(180.+0.15553\,i)k\mathcal{A}}(-90+0.015553\,i)\right)\mathcal{A}}{\pi}\right)$$

Integral representation:

$$\frac{1}{\pi}(5\times 180\cot(180(5(0.5-i\,0.0000864055-0.5)+0.5))-180\cot(180)(0.5-i\,0.0000864055))+29-\phi=29-\phi+\int_{\frac{\pi}{2}}^{90-0.077765\,i}\left(\left((162000-139.977\,i-900\,\pi)\csc^2(t)+(-32400.+i(5.59908-0.015553\,\pi)+90\,\pi)\csc^2\left(\frac{-2314.67\,t+\pi(578.667+0.5\,i+6.42963\,t)}{-1157.33+i+6.42963\,\pi}\right)\right)/(\pi(-180+0.15553\,i+\pi))\right)dt$$

1/Pi*(((5*180 cot(180(5(0.5-0.0000864055i-0.5)+0.5))-((180 cot 180*(0.5-0.0000864055i))))))+47-4-golden ratio

where 47 and 4 are Lucas numbers

Input interpretation:

$$\frac{1}{\pi}\left(5\times 180\cot(180\,(5\,(0.5+i\times(-0.0000864055)-0.5)+0.5))-180\cot(180)\,(0.5+i\times(-0.0000864055))\right)+47-4-\phi$$

cot(x) is the cotangent function

i is the imaginary unit

ϕ is the golden ratio

Result:

$$-122.522\ldots+27.7800\ldots\,i$$

Polar coordinates:

$r = 125.631$ (radius), $\theta = 167.225°$ (angle)

125.631 result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0 and to the Higgs boson mass 125.18 GeV

Alternative representations:

$$\frac{1}{\pi}\left(5\times 180\cot(180\,(5\,(0.5-i\,0.0000864055-0.5)+0.5))-180\cot(180)\,(0.5-i\,0.0000864055)\right)+47-4-\phi = 43-\phi+\frac{1}{\pi}\left(180\,(0.5-0.0000864055\,i)\,i\coth(-180\,i)-900\,i\coth(-180\,i\,(0.5+5\,(0-0.0000864055\,i)))\right)$$

$$\frac{1}{\pi}\left(5\times 180\cot(180\,(5\,(0.5-i\,0.0000864055-0.5)+0.5))-180\cot(180)\,(0.5-i\,0.0000864055)\right)+47-4-\phi = 43-\phi+\frac{1}{\pi}\left(-180\,(0.5-0.0000864055\,i)\,i\coth(180\,i)+900\,i\coth(180\,(0.5+5\,(0-0.0000864055\,i))\,i)\right)$$

$$\frac{1}{\pi}(5\times 180\cot(180(5(0.5-i\,0.0000864055-0.5)+0.5))-180\cot(180)(0.5-i\,0.0000864055))+47-4-\phi = 43-\phi+\frac{-\frac{180(0.5-0.0000864055\,i)}{\tan(180)}+\frac{900}{\tan(180(0.5+5(0-0.0000864055\,i)))}}{\pi}$$

Series representations:

$$\frac{1}{\pi}(5\times 180\cot(180(5(0.5-i\,0.0000864055-0.5)+0.5))-180\cot(180)(0.5-i\,0.0000864055))+47-4-\phi = 43-\phi+\sum_{k=-\infty}^{\infty}\frac{e^{-0.15553(-1157.33+i)k\mathcal{A}}\left(-900+e^{(180.+0.15553\,i)k\mathcal{A}}(90-0.015553\,i)\right)\mathcal{A}\,\mathrm{sgn}(k)}{\pi}$$

$$\frac{1}{\pi}(5\times 180\cot(180(5(0.5-i\,0.0000864055-0.5)+0.5))-180\cot(180)(0.5-i\,0.0000864055))+47-4-\phi = 43-\phi+\sum_{k=-\infty}^{\infty}\left(2.49318\times10^{9}-137.155\,i^2+0.0169299\,i^3-64\,800\,k^2\pi^2+i\left(-2.01819\times10^{6}+67.1889\,k^2\pi^2\right)\right)\Big/\left(\pi\left(-32\,400+k^2\pi^2\right)\left(-8100+13.9977\,i-0.00604739\,i^2+k^2\pi^2\right)\right)$$

$$\frac{1}{\pi}(5\times 180\cot(180(5(0.5-i\,0.0000864055-0.5)+0.5))-180\cot(180)(0.5-i\,0.0000864055))+47-4-\phi = -\left(-43+\phi-\sum_{k=1}^{\infty}\frac{e^{-0.15553(-1157.33+i)k\mathcal{A}}\left(-900+e^{(180.+0.15553\,i)k\mathcal{A}}(90-0.015553\,i)\right)\mathcal{A}}{\pi}-\sum_{k=-\infty}^{-1}\frac{e^{-0.15553(-1157.33+i)k\mathcal{A}}\left(900+e^{(180.+0.15553\,i)k\mathcal{A}}(-90+0.015553\,i)\right)\mathcal{A}}{\pi}\right)$$

Integral representation:

$$\frac{1}{\pi}(5\times 180\cot(180(5(0.5-i\,0.0000864055-0.5)+0.5))-180\cot(180)(0.5-i\,0.0000864055))+47-4-\phi = 43-\phi+\int_{\frac{\pi}{2}}^{90-0.077765\,i}\left(\left((162\,000-139.977\,i-900\,\pi)\csc^2(t)+(-32\,400.+i(5.59908-0.015553\,\pi)+90\,\pi)\csc^2\left(\frac{-2314.67\,t+\pi(578.667+0.5\,i+6.42963\,t)}{-1157.33+i+6.42963\,\pi}\right)\right)\Big/\left(\pi(-180+0.15553\,i+\pi)\right)\right)dt$$

Now, we have that:

$$\frac{16\eta^8(4\mathrm{i}\tilde{T})}{\eta^{16}(2\mathrm{i}\tilde{T})} = \frac{16\prod_{n=1}^{\infty}(1+\exp(-4\pi n\tilde{T}))^8}{1-\exp(-4\pi n\tilde{T})^8} \tag{4.10}$$

16 product (1+exp(-4*Pi*n*1729))^8, n=1 to infinity

Input interpretation:

$$16\prod_{n=1}^{\infty}(1+\exp(-4\,\pi\,n\times 1729))^8$$

Result:

$$\frac{1}{16}\left(\left(-1;\,e^{-6916\,\pi}\right)_{\infty}\right)^8 \approx 16$$

16

1-exp(-4Pi*n*1729)^8

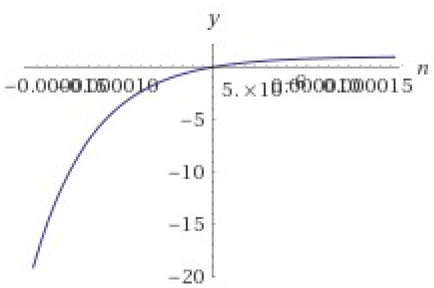
Input:

$$1-\exp^8(-4\,\pi\,n\times 1729)$$

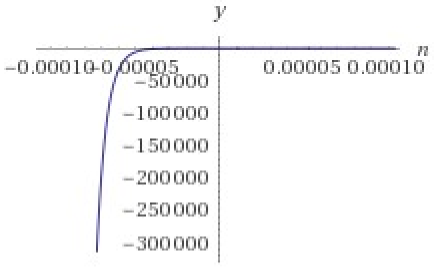
Exact result:

$$1-e^{-55328\,\pi\,n}$$

Plots:



(n from -1.7×10^{-5} to 1.7×10^{-5})



(n from -1×10^{-4} to 1×10^{-4})

Roots:

$$n = -\frac{i\,m}{27\,664}\,,\quad m \in \mathbb{Z}$$

$\mathbb{Z}$ is the set of integers

Periodicity:

periodic in n with period $\frac{i}{27\,664}$

Series expansion at n = 0:

$$55\,328\,\pi\,n - 1\,530\,593\,792\,\pi^2\,n^2 + \frac{84\,684\,693\,323\,776\,\pi^3\,n^3}{3} - \frac{1\,171\,358\,678\,054\,469\,632\,\pi^4\,n^4}{3} + \frac{64\,808\,932\,939\,397\,695\,799\,296\,\pi^5\,n^5}{15} + O\left(n^6\right)$$

(Taylor series)

Derivative:

$$\frac{d}{dn}\left(1 - \exp^8(-4\,\pi\,n \times 1729)\right) = 55\,328\,\pi\,e^{-55\,328\,\pi\,n}$$

Indefinite integral:

$$\int \left(1 - e^{-55\,328\,n\,\pi}\right)dn = n + \frac{e^{-55\,328\,\pi\,n}}{55\,328\,\pi} + \text{constant}$$

Limit:

$$\lim_{n\to\infty}\left(1 - e^{-55\,328\,n\,\pi}\right) = 1$$

Series representations:

$$1 - \exp^8(-4\,\pi\,n\,1729) = 1 - \sum_{k=0}^{\infty} \frac{(-n)^k\,(55\,328\,\pi)^k}{k!}$$

$$1 - \exp^8(-4\,\pi\,n\,1729) = 1 - \sum_{k=-\infty}^{\infty} I_k(-55\,328\,n\,\pi)$$

$$1 - \exp^8(-4\,\pi\,n\,1729) = 1 - e^{z_0} \sum_{k=0}^{\infty} \frac{(-55\,328\,n\,\pi - z_0)^k}{k!}$$

Definite integral over a half-period:

$$\int_0^{-\frac{i}{55328}} \left(1 - e^{-55328\, n \pi}\right) dn = -\frac{2 + i\pi}{55328\,\pi} \approx -0.0000115063 - 0.000018074\, i$$

Definite integral over a period:

$$\int_0^{-\frac{i}{27664}} \left(1 - e^{-55328\, n \pi}\right) dn = -\frac{i}{27664} \approx -0.0000361481\, i$$

Definite integral mean square:

$$\int_0^{-\frac{i}{27664}} 27664\, i \left(1 - e^{-55328\, n \pi}\right)^2 dn = 1$$

In conclusion, we obtain:

1/(((1 - e^(-55328 * π))))   16 product (1+exp(-4*Pi*n*1729))^8, n=1 to infinity

Input interpretation:

$$\frac{1}{1 - e^{-55328\,\pi}} \times 16 \prod_{n=1}^{\infty} (1 + \exp(-4\,\pi\, n \times 1729))^8$$

Result:

$$\frac{\left((-1;\, e^{-6916\pi})_\infty\right)^8}{16\left(1 - e^{-55328\,\pi}\right)} \approx 16$$

16

$(a;\, q)_n$ gives the q-Pochhammer symbol

Alternate form:

$$-\frac{\left((-1;\, e^{-6916\pi})_\infty\right)^8}{16\left(e^{-55328\,\pi} - 1\right)}$$

8 * ((((1/(((1 - e^(-55328 * π))))   16 product (1+exp(-4*Pi*n*1729))^8, n=1 to infinity))))-3+1/golden ratio

where 8 and 3 are Fibonacci numbers

Input interpretation:

$$8\left(\frac{1}{1 - e^{-55328\,\pi}} \times 16 \prod_{n=1}^{\infty} (1 + \exp(-4\,\pi\, n \times 1729))^8\right) - 3 + \frac{1}{\phi}$$

ϕ is the golden ratio

Result:

$$\frac{\left((-1;\ e^{-6916\pi})_\infty\right)^8}{2\left(1-e^{-55328\pi}\right)}+\frac{1}{\phi}-3\approx 125.618$$

125.618 result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0 and to the Higgs boson mass 125.18 GeV

$(a; q)_n$ gives the q-Pochhammer symbol

Alternate forms:

$$-\frac{\left((-1;\ e^{-6916\pi})_\infty\right)^8}{2\left(e^{-55328\pi}-1\right)}+\frac{1}{\phi}-3$$

$$\frac{\left((-1;\ e^{-6916\pi})_\infty\right)^8}{2\left(1-e^{-55328\pi}\right)}+\frac{1}{2}\left(\sqrt{5}-7\right)$$

$$\frac{-\left(\left((-1;\ e^{-6916\pi})_\infty\right)^8-6\right)\phi+2\,e^{-55328\pi}(1-3\phi)-2}{2\left(e^{-55328\pi}-1\right)\phi}$$

8 * ((((1/(((1 - e^(-55328 * π)))) 16 product (1+exp(-4*Pi*n*1729))^8, n=1 to infinity))))+11+1/golden ratio

where 11 is a Lucas number

Input interpretation:

$$8\left(\frac{1}{1-e^{-55328\pi}}\times 16\prod_{n=1}^{\infty}(1+\exp(-4\pi n\times 1729))^8\right)+11+\frac{1}{\phi}$$

ϕ is the golden ratio

Result:

$$\frac{\left((-1;\ e^{-6916\pi})_\infty\right)^8}{2\left(1-e^{-55328\pi}\right)}+\frac{1}{\phi}+11\approx 139.618$$

139.618 result practically equal to the rest mass of Pion meson 139.57 MeV

$(a; q)_n$ gives the q-Pochhammer symbol

Alternate forms:

$$-\frac{\left((-1;\, e^{-6916\pi})_\infty\right)^8}{2\left(e^{-55328\pi}-1\right)}+\frac{1}{\phi}+11$$

$$\frac{\left((-1;\, e^{-6916\pi})_\infty\right)^8}{2\left(1-e^{-55328\pi}\right)}+11+\frac{2}{1+\sqrt{5}}$$

$$\frac{-\left(\left(\left((-1;\, e^{-6916\pi})_\infty\right)^8+22\right)\phi+2\,e^{-55328\pi}\,(11\,\phi+1)-2\right)}{2\left(e^{-55328\pi}-1\right)\phi}$$

Now, we have that:

$$\frac{\eta^8(2i\widetilde{T})}{\eta^8(i\widetilde{T})\eta^8(4i\widetilde{T})}=\exp(2\pi\widetilde{T})\frac{\prod_{n=1}^{\infty}(1+\exp(-2\pi(2n-1)\widetilde{T}))^8}{(1-\exp(4\pi n\widetilde{T}))^8}=\exp(2\pi\widetilde{T})+8+\mathcal{O}(\exp(-2\pi\widetilde{T}))$$

$$\frac{\eta^8(i\widetilde{T})}{\eta^{16}(2i\widetilde{T})}=\exp(2\pi\widetilde{T})\frac{\prod_{n=1}^{\infty}(1-\exp(-2\pi(2n-1)\widetilde{T}))^8}{(1-\exp(4\pi n\widetilde{T}))^8}=\exp(2\pi\widetilde{T})-8+\mathcal{O}(\exp(-2\pi\widetilde{T})) \qquad (4.19)$$

exp(2*Pi*(0.0864055))-8+(exp(-2*Pi*(0.0864055)))

Input interpretation:

$\exp(2\,\pi\times 0.0864055)-8+\exp(-2\,\pi\times 0.0864055)$

Result:

-5.697947...

-5.697947...

exp(2*Pi*(0.0864055))+8+(exp(-2*Pi*(0.0864055)))

Input interpretation:

$\exp(2\,\pi\times 0.0864055)+8+\exp(-2\,\pi\times 0.0864055)$

Result:

10.30205...

10.30205...

From the difference between the two functions and squaring, we get:

[((exp(2*Pi*(0.0864055))-8+(exp(-2*Pi*(0.0864055))))) - ((exp(2*Pi*(0.0864055))+8+(exp(-2*Pi*(0.0864055)))))]^2

Input interpretation:

$((\exp(2\pi\times 0.0864055) - 8 + \exp(-2\pi\times 0.0864055)) - (\exp(2\pi\times 0.0864055) + 8 + \exp(-2\pi\times 0.0864055)))^2$

Result:

256

256 = 64 × 4

From the formula of coefficients of the '5th order' mock theta function $\psi_1(q)$: (A053261 OEIS Sequence)

sqrt(golden ratio) * exp(Pi*sqrt(n/15)) / (2*5^(1/4)*sqrt(n))

for n = 117, we obtain:

sqrt(golden ratio) * exp(Pi*sqrt(117/15)) / (2*5^(1/4)*sqrt(117))+(2*0.9568666373)

where 0.9568666373 is the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{5}}}{\sqrt{(\varphi-1)\sqrt{5}}-\varphi+1}=1-\cfrac{e^{-\pi}}{1+\cfrac{e^{-2\pi}}{1+\cfrac{e^{-3\pi}}{1+\cfrac{e^{-4\pi}}{1+\dots}}}}\approx 0.9568666373$$

Input interpretation:

$$\sqrt{\phi} \times \frac{\exp\left(\pi \sqrt{\frac{117}{15}}\right)}{2 \sqrt[4]{5} \sqrt{117}} + 2 \times 0.9568666373$$

ϕ is the golden ratio

Result:

256.083666904...

256.083666904…

Series representations:

$$\frac{\sqrt{\phi} \exp\left(\pi \sqrt{\frac{117}{15}}\right)}{2 \sqrt[4]{5} \sqrt{117}} + 2 \times 0.956867 = \left(0.1 \left(19.1373 \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (117 - z_0)^k z_0^{-k}}{k!} + 3.3437 \exp\left(\pi \sqrt{z_0} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k \left(\frac{39}{5} - z_0\right)^k z_0^{-k}}{k!}\right) \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (\phi - z_0)^k z_0^{-k}}{k!}\right)\right) \Big/ \left(\sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (117 - z_0)^k z_0^{-k}}{k!}\right) \quad \text{for not } ((z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \leq 0))$$

$$\frac{\sqrt{\phi} \exp\left(\pi \sqrt{\frac{117}{15}}\right)}{2 \sqrt[4]{5} \sqrt{117}} + 2 \times 0.956867 = \left(0.1 \left(19.1373 \exp\left(i \pi \left\lfloor \frac{\arg(117 - x)}{2 \pi} \right\rfloor\right) \sum_{k=0}^{\infty} \frac{(-1)^k (117 - x)^k x^{-k} \left(-\frac{1}{2}\right)_k}{k!} + 3.3437 \exp\left(i \pi \left\lfloor \frac{\arg(\phi - x)}{2 \pi} \right\rfloor\right) \exp\left(\pi \exp\left(i \pi \left\lfloor \frac{\arg\left(\frac{39}{5} - x\right)}{2 \pi} \right\rfloor\right) \sqrt{x} \sum_{k=0}^{\infty} \frac{(-1)^k \left(\frac{39}{5} - x\right)^k x^{-k} \left(-\frac{1}{2}\right)_k}{k!}\right) \sum_{k=0}^{\infty} \frac{(-1)^k (\phi - x)^k x^{-k} \left(-\frac{1}{2}\right)_k}{k!}\right)\right) \Big/ \left(\exp\left(i \pi \left\lfloor \frac{\arg(117 - x)}{2 \pi} \right\rfloor\right) \sum_{k=0}^{\infty} \frac{(-1)^k (117 - x)^k x^{-k} \left(-\frac{1}{2}\right)_k}{k!}\right) \quad \text{for } (x \in \mathbb{R} \text{ and } x < 0)$$

$$\frac{\sqrt{\phi}\exp\left(\pi\sqrt{\frac{117}{15}}\right)}{2\sqrt[4]{5}\sqrt{117}} + 2\times 0.956867 =$$

$$\left(0.1\left(\frac{1}{z_0}\right)^{-1/2\lfloor\arg(117-z_0)/(2\pi)\rfloor} z_0^{-1/2\lfloor\arg(117-z_0)/(2\pi)\rfloor}\left(19.1373\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(117-z_0)/(2\pi)\rfloor} z_0^{1/2\lfloor\arg(117-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(117-z_0)^k z_0^{-k}}{k!} + 3.3437\exp\left(\pi\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(\frac{39}{5}-z_0\right)/(2\pi)\right\rfloor} z_0^{1/2\left(1+\left\lfloor\arg\left(\frac{39}{5}-z_0\right)/(2\pi)\right\rfloor\right)}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{39}{5}-z_0\right)^k z_0^{-k}}{k!}\right)\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(\phi-z_0)/(2\pi)\rfloor} z_0^{1/2\lfloor\arg(\phi-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(\phi-z_0)^k z_0^{-k}}{k!}\right)\right)\Bigg/\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(117-z_0)^k z_0^{-k}}{k!}\right)$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

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

$\arg(z)$ is the complex argument

$\lfloor x\rfloor$ is the floor function

i is the imaginary unit

Multiplying the two results, we obtain:

(((exp(2*Pi*(0.0864055))-8+(exp(-2*Pi*(0.0864055)))))) * (((exp(2*Pi*(0.0864055))+8+(exp(-2*Pi*(0.0864055))))))

Input interpretation:

$$(\exp(2\pi\times 0.0864055) - 8 + \exp(-2\pi\times 0.0864055))\,(\exp(2\pi\times 0.0864055) + 8 + \exp(-2\pi\times 0.0864055))$$

Result:

-58.7006...

-58.7006...

From which:

-2(((exp(2*Pi*(0.0864055))-8+(exp(-2*Pi*(0.0864055)))))) * (((exp(2*Pi*(0.0864055))+8+(exp(-2*Pi*(0.0864055))))))+29-7

where 29 and 7 are Lucas numbers

Input interpretation:

$$-2\,(\exp(2\,\pi\times 0.0864055)-8+\exp(-2\,\pi\times 0.0864055))\,(\exp(2\,\pi\times 0.0864055)+8+\exp(-2\,\pi\times 0.0864055))+29-7$$

Result:

139.4011...

139.4011... result practically equal to the rest mass of Pion meson 139.57 MeV

-2(((exp(2*Pi*(0.0864055))-8+(exp(-2*Pi*(0.0864055)))))) * (((exp(2*Pi*(0.0864055))+8+(exp(-2*Pi*(0.0864055))))))+7+3-golden ratio

where 7 and 3 are Lucas numbers

Input interpretation:

$$-2\,(\exp(2\,\pi\times 0.0864055)-8+\exp(-2\,\pi\times 0.0864055))\,(\exp(2\,\pi\times 0.0864055)+8+\exp(-2\,\pi\times 0.0864055))+7+3-\phi$$

ϕ is the golden ratio

Result:

125.783...

125.783… result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0 and to the Higgs boson mass 125.18 GeV

-27*(((exp(2*Pi*(0.0864055))-8+(exp(-2*Pi*(0.0864055)))))) * (((exp(2*Pi*(0.0864055))+8+(exp(-2*Pi*(0.0864055))))))+123+18+golden ratio^2

where 123 and 18 are Lucas numbers

Input interpretation:

$$-27\,(\exp(2\,\pi\times 0.0864055)-8+\exp(-2\,\pi\times 0.0864055))\,(\exp(2\,\pi\times 0.0864055)+8+\exp(-2\,\pi\times 0.0864055))+123+18+\phi^2$$

ϕ is the golden ratio

Result:

1728.533...

1728.533...

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

We first consider the residue at $z = \tau/2$ modulo the lattice. This corresponds to $w = q^{1/2}$, where $w = \exp(2\pi i z)$. From the product formula for $G(z, \tau)$, one finds that

$$\eta(\tau) = q^{1/24} \prod_{n=1}^{\infty} (1 - q^n).$$

$$G(z,\tau) \overset{z\to\tau/2}{\sim} -\frac{1}{1-qw^{-2}} \cdot \frac{q^{-1/6}\prod_{n=1}^{\infty}(1-q^{n-1/2})^8}{\eta^8(\tau)}. \qquad (3.32)$$

for $q = e^{2\pi} = 535.49165\ldots$, we obtain:

535.49165^(1/24) product (1-535.49165^n), n=1 to 0.0864055

Input interpretation:

$$\sqrt[24]{535.49165} \prod_{n=1}^{0.0864055} (1 - 535.49165^n)$$

Result:

1.29927

1.29927

And:

(((535.49165^(1/24) product (1-535.49165^n), n=1 to 0.0864055)))^8

Input interpretation:

$$\left(\sqrt[24]{535.49165} \prod_{n=1}^{0.0864055} (1 - 535.49165^n)\right)^8$$

Result:

8.12053

8.12053

From:

$$G(z,\tau) \overset{z\to\tau/2}{\sim} -\frac{1}{1-qw^{-2}} \cdot \frac{q^{-1/6}\prod_{n=1}^{\infty}(1-q^{n-1/2})^8}{\eta^8(\tau)}. \qquad (3.32)$$

-(((1/(1-535.49165*(535.49165^(1/2))^-2)))) * 1/8.12053 * 535.49165^(-1/6) product ((1-535.49165^(n-0.5)))^8, n=1 to 0.0864055

Input interpretation:

$$-\frac{1}{1 + -\frac{535.49165}{\sqrt{535.49165}^2}} \left(\frac{1}{8.12053} \times 535.49165^{-1/6}\right) \prod_{n=1}^{0.0864055} (1 - 535.49165^{n-0.5})^8$$

Result:

1.94618×10^{14}

$1.94618*10^{14}$

From which, we have:

(((-(((1/(1-535.49165*(535.49165^(1/2))^-2)))) * 1/8.12053 * 535.49165^(-1/6) product ((1-535.49165^(n-0.5)))^8, n=1 to 0.0864055)))^1/3

Input interpretation:

$$\sqrt[3]{-\frac{1}{1+-\frac{535.49165}{\sqrt{535.49165}^2}}\left(\frac{1}{8.12053}\times 535.49165^{-1/6}\right)\prod_{n=1}^{0.0864055}\left(1-535.49165^{n-0.5}\right)^8}$$

Result:

57951.

57951

From the formula of coefficients of the '5th order' mock theta function $\psi_1(q)$: (A053261 OEIS Sequence)

sqrt(golden ratio) * exp(Pi*sqrt(n/15)) / (2*5^(1/4)*sqrt(n))

for n = 329, we obtain:

sqrt(golden ratio) * exp(Pi*sqrt(329/15)) / (2*5^(1/4)*sqrt(329)) + 377 + 34 + 8

where 377, 34 and 8 are Fibonacci numbers

Input:

$$\sqrt{\phi}\times\frac{\exp\left(\pi\sqrt{\frac{329}{15}}\right)}{2\sqrt[4]{5}\sqrt{329}}+377+34+8$$

ϕ is the golden ratio

Exact result:

$$\frac{e^{\sqrt{329/15}\,\pi}\sqrt{\frac{\phi}{329}}}{2\sqrt[4]{5}}+419$$

Decimal approximation:

57951.35737436966704999608902807251901007379198071732333042...

57951.357…

Property:

$419 + \frac{e^{\sqrt{329/15}\,\pi} \sqrt{\frac{\phi}{329}}}{2 \sqrt[4]{5}}$ is a transcendental number

Alternate forms:

$$419 + \frac{1}{2} \sqrt{\frac{5 + \sqrt{5}}{3290}}\, e^{\sqrt{329/15}\,\pi}$$

$$419 + \frac{\sqrt{\frac{1}{658} \left(1 + \sqrt{5}\right)}\, e^{\sqrt{329/15}\,\pi}}{2 \sqrt[4]{5}}$$

$$\frac{2757020 + 5^{3/4} \sqrt{658 \left(1 + \sqrt{5}\right)}\, e^{\sqrt{329/15}\,\pi}}{6580}$$

Series representations:

$$\frac{\sqrt{\phi}\, \exp\left(\pi \sqrt{\frac{329}{15}}\right)}{2 \sqrt[4]{5} \sqrt{329}} + 377 + 34 + 8 = \left(4190 \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (329 - z_0)^k z_0^{-k}}{k!} + 5^{3/4} \exp\left(\pi \sqrt{z_0} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k \left(\frac{329}{15} - z_0\right)^k z_0^{-k}}{k!}\right) \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (\phi - z_0)^k z_0^{-k}}{k!}\right) \Big/ \left(10 \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (329 - z_0)^k z_0^{-k}}{k!}\right) \quad \text{for not } ((z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$$

$$\frac{\sqrt{\phi}\,\exp\left(\pi\sqrt{\frac{329}{15}}\right)}{2\sqrt[4]{5}\,\sqrt{329}}+377+34+8=$$

$$\left(4190\exp\left(i\pi\left\lfloor\frac{\arg(329-x)}{2\pi}\right\rfloor\right)\sum_{k=0}^{\infty}\frac{(-1)^k(329-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}+5^{3/4}\exp\left(i\pi\left\lfloor\frac{\arg(\phi-x)}{2\pi}\right\rfloor\right)\exp\left(\pi\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{329}{15}-x\right)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{329}{15}-x\right)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k(\phi-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\Bigg/\left(10\exp\left(i\pi\left\lfloor\frac{\arg(329-x)}{2\pi}\right\rfloor\right)\sum_{k=0}^{\infty}\frac{(-1)^k(329-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\quad\text{for }(x\in\mathbb{R}\text{ and }x<0)$$

$$\frac{\sqrt{\phi}\,\exp\left(\pi\sqrt{\frac{329}{15}}\right)}{2\sqrt[4]{5}\,\sqrt{329}}+377+34+8=$$

$$\left(\left(\frac{1}{z_0}\right)^{-1/2\lfloor\arg(329-z_0)/(2\pi)\rfloor}z_0^{-1/2\lfloor\arg(329-z_0)/(2\pi)\rfloor}\left(4190\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(329-z_0)/(2\pi)\rfloor}z_0^{1/2\lfloor\arg(329-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(329-z_0)^k z_0^{-k}}{k!}+5^{3/4}\exp\left(\pi\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(\frac{329}{15}-z_0\right)/(2\pi)\right\rfloor}z_0^{1/2\left(1+\left\lfloor\arg\left(\frac{329}{15}-z_0\right)/(2\pi)\right\rfloor\right)}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{329}{15}-z_0\right)^k z_0^{-k}}{k!}\right)\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(\phi-z_0)/(2\pi)\rfloor}z_0^{1/2\lfloor\arg(\phi-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(\phi-z_0)^k z_0^{-k}}{k!}\right)\right)\Bigg/\left(10\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(329-z_0)^k z_0^{-k}}{k!}\right)$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

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

$\arg(z)$ is the complex argument

$\lfloor x\rfloor$ is the floor function

i is the imaginary unit

55+(((-(((1/(1-535.49165*(535.49165^(1/2))^-2)))) * 1/8.12053 * 535.49165^(-1/6) product ((1-535.49165^(n-0.5)))^8, n=1 to 0.0864055)))^1/5

where 55 is a Fibonacci number

Input interpretation:

$$55+\sqrt[5]{-\frac{1}{1+-\frac{535.49165}{\sqrt{535.49165}^2}}\left(\frac{1}{8.12053}\times 535.49165^{-1/6}\right)\prod_{n=1}^{0.0864055}\left(1-535.49165^{n-0.5}\right)^8}$$

Result:

775.836

775.836 result practically equal to the rest mass of Neutral rho meson 775.49

8+10^3+(((-(((1/(1-535.49165*(535.49165^(1/2))^-2)))) * 1/8.12053 * 535.49165^(-1/6) product ((1-535.49165^(n-0.5)))^8, n=1 to 0.0864055)))^1/5

where 8 is a Fibonacci number

Input interpretation:

$$8+10^3+\sqrt[5]{-\frac{1}{1+-\frac{535.49165}{\sqrt{535.49165}^2}}\left(\frac{1}{8.12053}\times 535.49165^{-1/6}\right)\prod_{n=1}^{0.0864055}\left(1-535.49165^{n-0.5}\right)^8}$$

Result:

1728.84

1728.84

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

55+8+10^3+(((-(((1/(1-535.49165*(535.49165^(1/2))^-2))))*1/8.12053* 535.49165^(-1/6) product ((1-535.49165^(n-0.5)))^8, n=1 to 0.0864055)))^1/5

where 55 and 8 are Fibonacci numbers

Input interpretation:

$$55+8+10^3+\sqrt[5]{-\frac{1}{1+-\frac{535.49165}{\sqrt{535.49165}^2}}\left(\frac{1}{8.12053}\times 535.49165^{-1/6}\right)\prod_{n=1}^{0.0864055}\left(1-535.49165^{n-0.5}\right)^8}$$

Result:

1783.84

1783.84 result in the range of the hypothetical mass of Gluino (gluino = 1785.16 GeV).

(((-(((1/(1-535.49165*(535.49165^(1/2))^-2)))) * 1/8.12053 * 535.49165^(-1/6) product ((1-535.49165^(n-0.5)))^8, n=1 to 0.0864055)))^1/4 - 123 + 11 - golden ratio

where 123 and 11 are Lucas numbers

Input interpretation:

$$\sqrt[4]{-\frac{1}{1+-\frac{535.49165}{\sqrt{535.49165}^2}}\left(\frac{1}{8.12053}\times 535.49165^{-1/6}\right)\prod_{n=1}^{0.0864055}\left(1-535.49165^{n-0.5}\right)^8}-123+11-\phi$$

ϕ is the golden ratio

Result:

3621.43

3621.43 result practically equal to the rest mass of double charmed Xi baryon 3621.40

1/2[(((-(((1/(1-535.49165*(535.49165^(1/2))^-2)))) * 1/8.12053 * 535.49165^(-1/6) product ((1-535.49165^(n-0.5)))^8, n=1 to 0.0864055)))^1/4]+golden ratio

Input interpretation:

$$\frac{1}{2}\sqrt[4]{-\frac{1}{1+-\frac{535.49165}{\sqrt{535.49165}^2}}\left(\frac{1}{8.12053}\times 535.49165^{-1/6}\right)\prod_{n=1}^{0.0864055}\left(1-535.49165^{n-0.5}\right)^8}+\phi$$

ϕ is the golden ratio

Result:

1869.14

1869.14 result practically equal to the rest mass of D meson 1869.62

And:

$$G(z,\tau)\overset{z\to(1+\tau)/2}{\sim}\frac{1}{1-qw^{-2}}\cdot\frac{q^{-1/6}\prod_{n=1}^{\infty}(1+q^{n-1/2})^8}{\eta(\tau)^8}, \quad (3.34)$$

(((1/(1-535.49165*(-535.49165^(1/2))^-2)))) * 1/8.12053 * 535.49165^(-1/6) product ((1+535.49165^(n-0.5)))^8, n=1 to 0.0864055

Input interpretation:

$$\frac{1}{1+-\frac{535.49165}{\left(-\sqrt{535.49165}\right)^2}}\times\frac{1}{8.12053}\times 535.49165^{-1/6}\prod_{n=1}^{0.0864055}\left(1+535.49165^{n-0.5}\right)^8$$

Result:

-1.94618×10^{14}

$-1.94618*10^{14}$

We have that:

$$G(z,\tau)\overset{z\to 1/2}{\sim}-\frac{1}{w-w^{-1}}\cdot\frac{16q^{1/3}\prod_{n=1}^{\infty}(1+q^n)^8}{\eta^8(\tau)}, \quad (3.36)$$

-1/(sqrt535.49165- 1/(535.49165^(1/2))) * 1/8.12053 *(((16 * 535.49165^(1/3) product ((1+535.49165^n))^8, n=1 to 0.0864055)))

Input interpretation:

$$-\frac{\frac{1}{8.12053}\left(16\sqrt[3]{535.49165}\prod_{n=1}^{0.0864055}(1+535.49165^n)^8\right)}{\sqrt{535.49165}-\frac{1}{\sqrt{535.49165}}}$$

Result:

-0.692716

-0.692716

Multiplying the two results, we obtain:

-0.692716*(((((((1/(1-535.49165*(-535.49165^(1/2))^-2)))) * 1/8.12053 * 535.49165^(-1/6) product ((1+535.49165^(n-0.5)))^8, n=1 to 0.0864055))))

Input interpretation:

$$-0.692716\left(\frac{1}{1+-\frac{535.49165}{\left(-\sqrt{535.49165}\right)^2}}\times\frac{1}{8.12053}\times 535.49165^{-1/6}\prod_{n=1}^{0.0864055}\left(1+535.49165^{n-0.5}\right)^8\right)$$

Result:

1.34815×10^{14}

$1.34815*10^{14}$

From which:

4ln[-0.692716*(((((((1/(1-535.49165*(-535.49165^(1/2))^-2)))) * 1/8.12053 * 535.49165^(-1/6) product ((1+535.49165^(n-0.5)))^8, n=1 to 0.0864055))))]-5

where 5 is a Fibonacci number

Input interpretation:

$$4\log\left(-0.692716\left(\frac{1}{1+-\frac{535.49165}{\left(-\sqrt{535.49165}\right)^2}}\times\frac{1}{8.12053}\times 535.49165^{-1/6}\prod_{n=1}^{0.0864055}\left(1+535.49165^{n-0.5}\right)^8\right)\right)-5$$

log(x) is the natural logarithm

Result:

125.14

125.14 result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0 and to the Higgs boson mass 125.18 GeV

4ln[-0.692716*(((((((1/(1-535.49165*(-535.49165^(1/2))^-2)))) * 1/8.12053 * 535.49165^(-1/6) product ((1+535.49165^(n-0.5)))^8, n=1 to 0.0864055))))]+11-2+1/golden ratio

where 11 and 2 are Lucas numbers

Input interpretation:

$$4\log\left(-0.692716\left(\frac{1}{1+-\frac{535.49165}{\left(-\sqrt{535.49165}\right)^2}}\times\frac{1}{8.12053}\times 535.49165^{-1/6}\prod_{n=1}^{0.0864055}\left(1+535.49165^{n-0.5}\right)^8\right)\right)+11-2+\frac{1}{\phi}$$

log(x) is the natural logarithm

ϕ is the golden ratio

Result:

139.758

139.758 result practically equal to the rest mass of Pion meson 139.57 MeV

We have also:

27*2ln[-0.692716*(((((((1/(1-535.49165*(-535.49165^(1/2))^-2)))) * 1/8.12053 * 535.49165^(-1/6) product ((1+535.49165^(n-0.5)))^8, n=1 to 0.0864055))))]-29+1/golden ratio

where 29 is a Lucas number

From Wikipedia:

*"The fundamental group of the complex form, compact real form, or any algebraic version of E_6 is the cyclic group **Z**/3**Z**, and its outer automorphism group is the cyclic group **Z**/2**Z**. Its fundamental representation is 27-dimensional (complex), and a basis is given by the 27 lines on a cubic surface. The dual representation, which is inequivalent, is also 27-dimensional. In particle physics, E_6 plays a role in some grand unified theories".*

Input interpretation:

$$27\times 2\log\left(-0.692716\left(\frac{1}{1+-\frac{535.49165}{\left(-\sqrt{535.49165}\right)^2}}\times\frac{1}{8.12053}\times 535.49165^{-1/6}\prod_{n=1}^{0.0864055}\left(1+535.49165^{n-0.5}\right)^8\right)\right)-29+\frac{1}{\phi}$$

log(x) is the natural logarithm

ϕ is the golden ratio

Result:

1728.5

1728.5

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

And:

((((27*2ln[-0.692716*(((((((1/(1-535.49165*(-535.49165^(1/2))^-2)))) * 1/8.12053 * 535.49165^(-1/6) product ((1+535.49165^(n-0.5)))^8, n=1 to 0.0864055))))]-29+1/golden ratio))))^1/15

where 29 is a Lucas number

Input interpretation:

$$\left(27\times 2\log\left(-0.692716\left(\frac{1}{1+-\frac{535.49165}{\left(-\sqrt{535.49165}\right)^2}}\times\frac{1}{8.12053}\times 535.49165^{-1/6}\prod_{n=1}^{0.0864055}\left(1+535.49165^{n-0.5}\right)^8\right)\right)-29+\frac{1}{\phi}\right)\text{^}(1/15)$$

log(x) is the natural logarithm

ϕ is the golden ratio

Result:

1.64378

$1.64378 \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 \ldots$

Now, we have that:

$$\frac{1}{q^{1/12}\prod_{n=1}^{\infty}\left((1-q^n\exp(4\pi ik/N))(1-q^n\exp(-4\pi ik/N)\right)\eta^6(\tau)}. \quad (3.14)$$

(((535.49165^(1/24) product (1-535.49165^n), n=1 to 0.0864055)))^6

Input interpretation:

$$\left(\sqrt[24]{535.49165}\prod_{n=1}^{0.0864055}(1-535.49165^n)\right)^6$$

Result:

4.81048

4.81048 = $\eta^6(\tau)$

1/((((535.49165^1/12 product ((1-535.49165^n exp((2*4Pi*i)/5))) ((1-535.49165^n exp((-2*4Pi*i)/5))) 4.81048 , n=1 to 0.0864055))))

Input interpretation:

$$1\Big/\left(\sqrt[12]{535.49165}\prod_{n=1}^{0.0864055}\left(1-535.49165^n\exp\left(\frac{1}{5}(2\times4(\pi i))\right)\right)\left(1-535.49165^n\exp\left(\frac{1}{5}(-2\times4(\pi i))\right)\right)\times4.81048\right)$$

i is the imaginary unit

Result:

0.592385

0.592385

[1/((((535.49165^1/12 product ((1-535.49165^n exp((2*4Pi*i)/5))) ((1-535.49165^n exp((-2*4Pi*i)/5))) 4.81048 , n=1 to 0.00864055))))]^1/1024

Input interpretation:

$$\left(1\Big/\left(\sqrt[12]{535.49165}\prod_{n=1}^{0.00864055}\left(1-535.49165^n\exp\left(\frac{1}{5}(2\times4(\pi i))\right)\right)\left(1-535.49165^n\exp\left(\frac{1}{5}(-2\times4(\pi i))\right)\right)\times4.81048\right)\right)\hat{}\,(1/1024)$$

i is the imaginary unit

Result:

0.999489

0.999489 result very near to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\dots}}}}\approx 0.9991104684$$

and to the dilaton value $\mathbf{0.989117352243 = \phi}$

1/8log base 0.999489 [1/((((535.49165^1/12 product ((1-535.49165^n exp((2*4Pi*i)/5))) ((1-535.49165^n exp((-2*4Pi*i)/5))) 4.81048 , n=1 to 0.00864055))))]-e

Input interpretation:

$$\frac{1}{8}\log_{0.999489}\left(1\Big/\left(\sqrt[12]{535.49165}\prod_{n=1}^{0.00864055}\left(1-535.49165^n\exp\left(\frac{1}{5}(2\times 4(\pi i))\right)\right)\left(1-535.49165^n\exp\left(\frac{1}{5}(-2\times 4(\pi i))\right)\right)\times 4.81048\right)\right)-e$$

$\log_b(x)$ is the base- b logarithm

i is the imaginary unit

Result:

125.331

125.331 result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0 and to the Higgs boson mass 125.18 GeV

1/8log base 0.999489 [1/((((535.49165^1/12 product ((1-535.49165^n exp((2*4Pi*i)/5))) ((1-535.49165^n exp((-2*4Pi*i)/5))) 4.81048 , n=1 to 0.00864055))))]+11+1/golden ratio

where 11 is a Lucas number

Input interpretation:

$$\frac{1}{8}\log_{0.999489}\left(1\Big/\left(\sqrt[12]{535.49165}\prod_{n=1}^{0.00864055}\left(1-535.49165^n\exp\left(\frac{1}{5}(2\times4(\pi i))\right)\right)\left(1-535.49165^n\exp\left(\frac{1}{5}(-2\times4(\pi i))\right)\right)\times4.81048\right)\right)+11+\frac{1}{\phi}$$

$\log_b(x)$ is the base- b logarithm

i is the imaginary unit

ϕ is the golden ratio

Result:

139.667

139.667 result practically equal to the rest mass of Pion meson 139.57 MeV

Now, we have that:

$$Z^B_{k,N}=\frac{V}{(8\pi^2\alpha' T)^{(p-1)/2}}\frac{1}{4\sin^2(2\pi k/N)q^{1/12}\prod_{n=1}^{\infty}(1-q^n\exp(4\pi ik/N)(1-q^n\exp(-4\pi ik/N))}\frac{1}{\eta^6(\tau)}. \quad (3.22)$$

$$\frac{1}{q^{1/12}\prod_{n=1}^{\infty}((1-q^n\exp(4\pi ik/N))(1-q^n\exp(-4\pi ik/N))\,\eta^6(\tau)}. \quad (3.14)$$

= 0.592385

1/(4sin^2(4Pi/5))

Input:

$$\frac{1}{4\sin^2\left(4\times\frac{\pi}{5}\right)}$$

Exact result:

$$\frac{1}{4\left(\frac{5}{8}-\frac{\sqrt{5}}{8}\right)}$$

Decimal approximation:

0.7236067977499789696409173668731276235440618359611525724270...

0.723606797….

Alternate forms:

$$\frac{1}{10}\left(5+\sqrt{5}\right)$$

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

$$\frac{\sqrt{5}}{10}+\frac{1}{2}$$

Minimal polynomial:

$$5x^2-5x+1$$

Alternative representations:

$$\frac{1}{4\sin^2\left(\frac{4\pi}{5}\right)}=\frac{1}{4\left(\frac{1}{\csc\left(\frac{4\pi}{5}\right)}\right)^2}$$

$$\frac{1}{4\sin^2\left(\frac{4\pi}{5}\right)}=\frac{1}{4\cos^2\left(\frac{\pi}{2}-\frac{4\pi}{5}\right)}$$

$$\frac{1}{4\sin^2\left(\frac{4\pi}{5}\right)}=\frac{1}{4\left(-\cos\left(\frac{\pi}{2}+\frac{4\pi}{5}\right)\right)^2}$$

Series representations:

$$\frac{1}{4\sin^2\left(\frac{4\pi}{5}\right)}=\frac{1}{4\left(\sum_{k=0}^{\infty}\frac{\left(-\frac{9}{100}\right)^k\pi^{2k}}{(2k)!}\right)^2}$$

$$\frac{1}{4\sin^2\left(\frac{4\pi}{5}\right)} = \frac{1}{16\left(\sum_{k=0}^{\infty}(-1)^k J_{1+2k}\left(\frac{4\pi}{5}\right)\right)^2}$$

$$\frac{1}{4\sin^2\left(\frac{4\pi}{5}\right)} \propto \frac{\theta\left(\frac{4\pi}{5}\right)^2}{4\left(\sum_{k=0}^{\infty}(-1)^k \frac{\partial^{2k}}{\partial\left(\frac{4\pi}{5}\right)^{2k}}\delta\left(\frac{4\pi}{5}\right)\right)^2}$$

1/(8Pi^2*0.9568666373*0.0864055)^3

Input interpretation:

$$\frac{1}{(8\pi^2 \times 0.9568666373 \times 0.0864055)^3}$$

Result:

0.00359462...

0.00359462…

Alternative representations:

$$\frac{1}{(8\pi^2\, 0.956867 \times 0.0864055)^3} = \frac{1}{(0.661428\,(180\,°)^2)^3}$$

$$\frac{1}{(8\pi^2\, 0.956867 \times 0.0864055)^3} = \frac{1}{(3.96857\,\zeta(2))^3}$$

$$\frac{1}{(8\pi^2\, 0.956867 \times 0.0864055)^3} = \frac{1}{(0.661428\cos^{-1}(-1)^2)^3}$$

Series representations:

$$\frac{1}{(8\pi^2\, 0.956867 \times 0.0864055)^3} = \frac{0.000843707}{\left(\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}\right)^6}$$

$$\frac{1}{(8\pi^2\, 0.956867 \times 0.0864055)^3} = \frac{0.0539973}{\left(-1+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}\right)^6}$$

$$\frac{1}{(8\pi^2\, 0.956867 \times 0.0864055)^3} = \frac{3.45582}{\left(\sum_{k=0}^{\infty} \frac{2^{-k}(-6+50k)}{\binom{3k}{k}}\right)^6}$$

Integral representations:

$$\frac{1}{(8\pi^2\, 0.956867 \times 0.0864055)^3} = \frac{0.0539973}{\left(\int_0^\infty \frac{1}{1+t^2}\,dt\right)^6}$$

$$\frac{1}{(8\pi^2\, 0.956867 \times 0.0864055)^3} = \frac{0.000843707}{\left(\int_0^1 \sqrt{1-t^2}\,dt\right)^6}$$

$$\frac{1}{(8\pi^2\, 0.956867 \times 0.0864055)^3} = \frac{0.0539973}{\left(\int_0^\infty \frac{\sin(t)}{t}\,dt\right)^6}$$

(0.592385 * 0.723606797 * 0.00359462)

Input interpretation:

$0.592385 \times 0.723606797 \times 0.00359462$

Result:

0.0015408475672761102539

Repeating decimal:

0.0015408475672761102539000

0.0015408475672....

golden ratio/(0.592385 * 0.723606797 * 0.00359462) + 64 + golden ratio

Input interpretation:

$$\frac{\phi}{0.592385 \times 0.723606797 \times 0.00359462} + 64 + \phi$$

ϕ is the golden ratio

Result:

1115.71...

1115.71… result practically equal to the rest mass of Lambda baryon 1115.683

Alternative representations:

$$\frac{\phi}{0.592385 \times 0.723607 \times 0.00359462} + 64 + \phi = 64 + 2 \sin(54°) + \frac{2 \sin(54°)}{0.00154085}$$

$$\frac{\phi}{0.592385 \times 0.723607 \times 0.00359462} + 64 + \phi = 64 - 2 \cos(216°) - \frac{2 \cos(216°)}{0.00154085}$$

$$\frac{\phi}{0.592385 \times 0.723607 \times 0.00359462} + 64 + \phi = 64 - 2 \sin(666°) - \frac{2 \sin(666°)}{0.00154085}$$

e/(0.592385 * 0.723606797 * 0.00359462)-47+11

where 47 and 11 are Lucas numbers

Input interpretation:

$$\frac{e}{0.592385 \times 0.723606797 \times 0.00359462} - 47 + 11$$

Result:

1728.15...

1728.15…

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

Alternative representation:

$$\frac{e}{0.592385 \times 0.723607 \times 0.00359462} - 47 + 11 = \frac{\exp(z)}{0.592385 \times 0.723607 \times 0.00359462} - 47 + 11 \quad \text{for } z = 1$$

Series representations:

$$\frac{e}{0.592385 \times 0.723607 \times 0.00359462} - 47 + 11 = -36 + 648.993 \sum_{k=0}^{\infty} \frac{1}{k!}$$

$$\frac{e}{0.592385 \times 0.723607 \times 0.00359462} - 47 + 11 = -36 + 324.497 \sum_{k=0}^{\infty} \frac{1+k}{k!}$$

$$\frac{e}{0.592385 \times 0.723607 \times 0.00359462} - 47 + 11 = -36 + \frac{648.993 \sum_{k=0}^{\infty} \frac{-1+k+z}{k!}}{z}$$

Pi/(0.592385 * 0.723606797 * 0.00359462)-256-55+1/golden ratio

where 55 is a Fibonacci number

Input interpretation:

$$\frac{\pi}{0.592385 \times 0.723606797 \times 0.00359462} - 256 - 55 + \frac{1}{\phi}$$

ϕ is the golden ratio

Result:

1728.49…

1728.49…

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

Alternative representations:

$$\frac{\pi}{0.592385 \times 0.723607 \times 0.00359462} - 256 - 55 + \frac{1}{\phi} = -311 + \frac{\pi}{0.00154085} + -\frac{1}{2\cos(216\,°)}$$

$$\frac{\pi}{0.592385 \times 0.723607 \times 0.00359462} - 256 - 55 + \frac{1}{\phi} = -311 + \frac{180^\circ}{0.00154085} + -\frac{1}{2\cos(216^\circ)}$$

$$\frac{\pi}{0.592385 \times 0.723607 \times 0.00359462} - 256 - 55 + \frac{1}{\phi} = -311 + \frac{\pi}{0.00154085} + \frac{1}{2\cos\left(\frac{\pi}{5}\right)}$$

Series representations:

$$\frac{\pi}{0.592385 \times 0.723607 \times 0.00359462} - 256 - 55 + \frac{1}{\phi} = -311 + \frac{1}{\phi} + 2595.97 \sum_{k=0}^{\infty} \frac{(-1)^k}{1 + 2k}$$

$$\frac{\pi}{0.592385 \times 0.723607 \times 0.00359462} - 256 - 55 + \frac{1}{\phi} = -1608.99 + \frac{1}{\phi} + 1297.99 \sum_{k=1}^{\infty} \frac{2^k}{\binom{2k}{k}}$$

$$\frac{\pi}{0.592385 \times 0.723607 \times 0.00359462} - 256 - 55 + \frac{1}{\phi} = -311 + \frac{1}{\phi} + 648.993 \sum_{k=0}^{\infty} \frac{2^{-k}(-6 + 50k)}{\binom{3k}{k}}$$

Integral representations:

$$\frac{\pi}{0.592385 \times 0.723607 \times 0.00359462} - 256 - 55 + \frac{1}{\phi} = -311 + \frac{1}{\phi} + 1297.99 \int_0^{\infty} \frac{1}{1 + t^2}\, dt$$

$$\frac{\pi}{0.592385 \times 0.723607 \times 0.00359462} - 256 - 55 + \frac{1}{\phi} = -311 + \frac{1}{\phi} + 2595.97 \int_0^{1} \sqrt{1 - t^2}\, dt$$

$$\frac{\pi}{0.592385 \times 0.723607 \times 0.00359462} - 256 - 55 + \frac{1}{\phi} = -311 + \frac{1}{\phi} + 1297.99 \int_0^{\infty} \frac{\sin(t)}{t}\, dt$$

1/5 * 1/(0.592385 * 0.723606797 * 0.00359462) + 11 - golden ratio

where 11 is a Lucas number

Input interpretation:

$$\frac{1}{5} \times \frac{1}{0.592385 \times 0.723606797 \times 0.00359462} + 11 - \phi$$

ϕ is the golden ratio

Result:

139.181...

139.181… result practically equal to the rest mass of Pion meson 139.57 MeV

Alternative representations:

$$\frac{1}{(0.592385 \times 0.723607 \times 0.00359462)\,5} + 11 - \phi = 11 + \frac{1}{0.00154085 \times 5} - 2\sin(54\,°)$$

$$\frac{1}{(0.592385 \times 0.723607 \times 0.00359462)\,5} + 11 - \phi = 11 - 2\cos\left(\frac{\pi}{5}\right) + \frac{1}{0.00154085 \times 5}$$

$$\frac{1}{(0.592385 \times 0.723607 \times 0.00359462)\,5} + 11 - \phi = 11 + 2\cos(216\,°) + \frac{1}{0.00154085 \times 5}$$

1/5 * 1/(0.592385 * 0.723606797 * 0.00359462) - Pi - golden ratio

Input interpretation:

$$\frac{1}{5} \times \frac{1}{0.592385 \times 0.723606797 \times 0.00359462} - \pi - \phi$$

ϕ is the golden ratio

Result:

125.039...

125.039… result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0 and to the Higgs boson mass 125.18 GeV

Alternative representations:

$$\frac{1}{(0.592385 \times 0.723607 \times 0.00359462)\,5} - \pi - \phi = -\pi - 2\cos\left(\frac{\pi}{5}\right) + \frac{1}{0.00154085 \times 5}$$

$$\frac{1}{(0.592385 \times 0.723607 \times 0.00359462)\,5} - \pi - \phi = -\pi + 2\cos(216\,°) + \frac{1}{0.00154085 \times 5}$$

$$\frac{1}{(0.592385 \times 0.723607 \times 0.00359462)\,5} - \pi - \phi = -180\,° - 2\cos\left(\frac{\pi}{5}\right) + \frac{1}{0.00154085 \times 5}$$

Series representations:

$$\frac{1}{(0.592385 \times 0.723607 \times 0.00359462)\,5} - \pi - \phi = 129.799 - \phi - 4\sum_{k=0}^{\infty} \frac{(-1)^k}{1+2k}$$

$$\frac{1}{(0.592385 \times 0.723607 \times 0.00359462)\,5} - \pi - \phi = 131.799 - \phi - 2\sum_{k=1}^{\infty} \frac{2^k}{\binom{2k}{k}}$$

$$\frac{1}{(0.592385 \times 0.723607 \times 0.00359462)\,5} - \pi - \phi = 129.799 - \phi - \sum_{k=0}^{\infty} \frac{2^{-k}(-6+50k)}{\binom{3k}{k}}$$

Integral representations:

$$\frac{1}{(0.592385 \times 0.723607 \times 0.00359462)\,5} - \pi - \phi = 129.799 - \phi - 2\int_0^{\infty} \frac{1}{1+t^2}\,dt$$

$$\frac{1}{(0.592385 \times 0.723607 \times 0.00359462)\,5} - \pi - \phi = 129.799 - \phi - 4\int_0^{1} \sqrt{1-t^2}\,dt$$

$$\frac{1}{(0.592385 \times 0.723607 \times 0.00359462)\,5} - \pi - \phi = 129.799 - \phi - 2\int_0^{\infty} \frac{\sin(t)}{t}\,dt$$

1/4 * 1/(0.592385 * 0.723606797 * 0.00359462)-29+golden ratio

where 29 is a Lucas number

Input interpretation:

$$\frac{1}{4} \times \frac{1}{0.592385 \times 0.723606797 \times 0.00359462} - 29 + \phi$$

ϕ is the golden ratio

Result:

134.866...

134.866… result practically equal to the rest mass of Pion meson 134.9766

Alternative representations:

$$\frac{1}{(0.592385 \times 0.723607 \times 0.00359462)\,4} - 29 + \phi = -29 + \frac{1}{0.00154085 \times 4} + 2\sin(54\,°)$$

$$\frac{1}{(0.592385 \times 0.723607 \times 0.00359462)\,4} - 29 + \phi = -29 - 2\cos(216\,°) + \frac{1}{0.00154085 \times 4}$$

$$\frac{1}{(0.592385 \times 0.723607 \times 0.00359462)\,4} - 29 + \phi = -29 + \frac{1}{0.00154085 \times 4} - 2\sin(666\,°)$$

3/2*1/(0.592385 * 0.723606797 * 0.00359462)-34

where 34 is a Fibonacci number

Input interpretation:

$$\frac{3}{2} \times \frac{1}{0.592385 \times 0.723606797 \times 0.00359462} - 34$$

Result:

939.49019582234209080743702534885574889749409137850055829 41...

939.49019... result practically equal to the neutron mass in MeV

Now, from the previous equation

$$Z_{k,N}^{B} = \frac{V}{(8\pi^2\alpha' T)^{(p-1)/2}} \frac{1}{4\sin^2(2\pi k/N) q^{1/12} \prod_{n=1}^{\infty}(1 - q^n \exp(4\pi i k/N)(1 - q^n \exp(-4\pi i k/N))} \frac{1}{\eta^6(\tau)}. \quad (3.22)$$

we have also, for V = 1.9559391549

1.9559391549/(8Pi^2*0.9568666373*0.0864055)^3

Input interpretation:

$$\frac{1.9559391549}{(8\pi^2 \times 0.9568666373 \times 0.0864055)^3}$$

Result:

0.00703085…

0.00703085…

Alternative representations:

$$\frac{1.95593915490000}{(8\pi^2\, 0.956867 \times 0.0864055)^3} = \frac{1.95593915490000}{(0.661428\,(180\,°)^2)^3}$$

$$\frac{1.95593915490000}{(8\pi^2\, 0.956867 \times 0.0864055)^3} = \frac{1.95593915490000}{(3.96857\,\zeta(2))^3}$$

$$\frac{1.95593915490000}{(8\pi^2\, 0.956867 \times 0.0864055)^3} = \frac{1.95593915490000}{(0.661428\cos^{-1}(-1)^2)^3}$$

Series representations:

$$\frac{1.95593915490000}{(8\pi^2\, 0.956867 \times 0.0864055)^3} = \frac{0.00165024}{\left(\sum_{k=0}^{\infty} \frac{(-1)^k}{1+2k}\right)^6}$$

$$\frac{1.95593915490000}{(8\pi^2\, 0.956867 \times 0.0864055)^3} = \frac{0.105615}{\left(-1+\sum_{k=1}^{\infty} \frac{2^k}{\binom{2k}{k}}\right)^6}$$

$$\frac{1.95593915490000}{(8\pi^2\, 0.956867 \times 0.0864055)^3} = \frac{6.75938}{\left(\sum_{k=0}^{\infty} \frac{2^{-k}(-6+50k)}{\binom{3k}{k}}\right)^6}$$

Integral representations:

$$\frac{1.95593915490000}{(8\pi^2\, 0.956867 \times 0.0864055)^3} = \frac{0.105615}{\left(\int_0^\infty \frac{1}{1+t^2}\, dt\right)^6}$$

$$\frac{1.95593915490000}{(8\pi^2\, 0.956867 \times 0.0864055)^3} = \frac{0.00165024}{\left(\int_0^1 \sqrt{1-t^2}\, dt\right)^6}$$

$$\frac{1.95593915490000}{(8\pi^2\, 0.956867 \times 0.0864055)^3} = \frac{0.105615}{\left(\int_0^\infty \frac{\sin(t)}{t}\, dt\right)^6}$$

1/ (((1.9559391549/(8Pi^2*0.9568666373*0.0864055)^3)))-3

where 3 is a Fibonacci number

Input interpretation:

$$\frac{1}{\frac{1.9559391549}{(8\pi^2 \times 0.9568666373 \times 0.0864055)^3}} - 3$$

Result:

139.230...

139.230… result practically equal to the rest mass of Pion meson 139.57 MeV

Alternative representations:

$$\frac{1}{\frac{1.95593915490000}{(8\pi^2\, 0.956867 \times 0.0864055)^3}} - 3 = -3 + \frac{1}{\frac{1.95593915490000}{\left(0.661428\,(180\,°)^2\right)^3}}$$

$$\frac{1}{\frac{1.95593915490000}{(8\pi^2\, 0.956867 \times 0.0864055)^3}} - 3 = -3 + \frac{1}{\frac{1.95593915490000}{(3.96857\,\zeta(2))^3}}$$

$$\frac{1}{\frac{1.95593915490000}{(8\pi^2\, 0.956867 \times 0.0864055)^3}} - 3 = -3 + \frac{1}{\frac{1.95593915490000}{\left(0.661428\cos^{-1}(-1)^2\right)^3}}$$

Series representations:

$$\frac{1}{\frac{1.95593915490000}{(8\pi^2\, 0.956867\times 0.0864055)^3}}-3=-3+605.973\left(\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}\right)^6$$

$$\frac{1}{\frac{1.95593915490000}{(8\pi^2\, 0.956867\times 0.0864055)^3}}-3=-3+9.46832\left(-1+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}\right)^6$$

$$\frac{1}{\frac{1.95593915490000}{(8\pi^2\, 0.956867\times 0.0864055)^3}}-3=-3+0.147943\left(\sum_{k=0}^{\infty}\frac{2^{-k}(-6+50k)}{\binom{3k}{k}}\right)^6$$

Integral representations:

$$\frac{1}{\frac{1.95593915490000}{(8\pi^2\, 0.956867\times 0.0864055)^3}}-3=-3+9.46832\left(\int_0^{\infty}\frac{1}{1+t^2}\,dt\right)^6$$

$$\frac{1}{\frac{1.95593915490000}{(8\pi^2\, 0.956867\times 0.0864055)^3}}-3=-3+605.973\left(\int_0^{1}\sqrt{1-t^2}\,dt\right)^6$$

$$\frac{1}{\frac{1.95593915490000}{(8\pi^2\, 0.956867\times 0.0864055)^3}}-3=-3+9.46832\left(\int_0^{\infty}\frac{\sin(t)}{t}\,dt\right)^6$$

Thence, we obtain:

(0.592385 * 0.723606797 * 0.00703085)

Input interpretation:

$0.592385\times 0.723606797\times 0.00703085$

Result:

0.003013800657199715068250

0.003013800657199715068250

From which:

1/(0.592385 * 0.723606797 * 0.00703085)

Input interpretation:

$$\frac{1}{0.592385 \times 0.723606797 \times 0.00703085}$$

Result:

331.8069486815873212540190048201382812511441443306746388516...

331.80694868…

From the formula of coefficients of the '5th order' mock theta function ψ_1(q): (A053261 OEIS Sequence)

sqrt(golden ratio) * exp(Pi*sqrt(n/15)) / (2*5^(1/4)*sqrt(n))

for n = 125, we obtain:

sqrt(golden ratio) * exp(Pi*sqrt(125/15)) / (2*5^(1/4)*sqrt(125)) + golden ratio

Input:

$$\sqrt{\phi} \times \frac{\exp\left(\pi \sqrt{\frac{125}{15}}\right)}{2 \sqrt[4]{5} \sqrt{125}} + \phi$$

ϕ is the golden ratio

Exact result:

$$\frac{e^{(5\pi)/\sqrt{3}} \sqrt{\phi}}{10 \times 5^{3/4}} + \phi$$

Decimal approximation:

331.8975144032454894461212136088952958184224685185000611495...

331.8975144…

Property:

$$\frac{e^{(5\pi)/\sqrt{3}} \sqrt{\phi}}{10 \times 5^{3/4}} + \phi \text{ is a transcendental number}$$

Alternate forms:

$$\frac{\left(10\times 5^{3/4}\sqrt{\phi}+e^{(5\pi)/\sqrt{3}}\right)\sqrt{\phi}}{10\times 5^{3/4}}$$

$$\frac{1}{2}\left(1+\sqrt{5}\right)+\frac{1}{50}\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}\,e^{(5\pi)/\sqrt{3}}$$

$$\frac{1}{100}\left(50+50\sqrt{5}+\sqrt[4]{5}\sqrt{2\left(1+\sqrt{5}\right)}\,e^{(5\pi)/\sqrt{3}}\right)$$

Series representations:

$$\frac{\sqrt{\phi}\exp\left(\pi\sqrt{\frac{125}{15}}\right)}{2\sqrt[4]{5}\sqrt{125}}+\phi=\left(10\,\phi\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(125-z_0)^k z_0^{-k}}{k!}+5^{3/4}\exp\left(\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{25}{3}-z_0\right)^k z_0^{-k}}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(\phi-z_0)^k z_0^{-k}}{k!}\right)\Bigg/\left(10\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(125-z_0)^k z_0^{-k}}{k!}\right)\text{ for not }((z_0\in\mathbb{R}\text{ and }-\infty<z_0\leq 0))$$

$$\frac{\sqrt{\phi}\exp\left(\pi\sqrt{\frac{125}{15}}\right)}{2\sqrt[4]{5}\sqrt{125}}+\phi=\left(10\,\phi\exp\left(i\pi\left\lfloor\frac{\arg(125-x)}{2\pi}\right\rfloor\right)\sum_{k=0}^{\infty}\frac{(-1)^k(125-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}+5^{3/4}\exp\left(i\pi\left\lfloor\frac{\arg(\phi-x)}{2\pi}\right\rfloor\right)\exp\left(\pi\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{25}{3}-x\right)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{25}{3}-x\right)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k(\phi-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\Bigg/\left(10\exp\left(i\pi\left\lfloor\frac{\arg(125-x)}{2\pi}\right\rfloor\right)\sum_{k=0}^{\infty}\frac{(-1)^k(125-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\text{ for }(x\in\mathbb{R}\text{ and }x<0)$$

$$\frac{\sqrt{\phi}\exp\left(\pi\sqrt{\frac{125}{15}}\right)}{2\sqrt[4]{5}\sqrt{125}}+\phi=$$

$$\left(\left(\frac{1}{z_0}\right)^{-1/2\lfloor\arg(125-z_0)/(2\pi)\rfloor} z_0^{-1/2\lfloor\arg(125-z_0)/(2\pi)\rfloor}\left(10\,\phi\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(125-z_0)/(2\pi)\rfloor} z_0^{1/2\lfloor\arg(125-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(125-z_0)^k z_0^{-k}}{k!}+5^{3/4}\exp\left(\pi\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(\frac{25}{3}-z_0\right)/(2\pi)\right\rfloor} z_0^{1/2\left(1+\left\lfloor\arg\left(\frac{25}{3}-z_0\right)/(2\pi)\right\rfloor\right)}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{25}{3}-z_0\right)^k z_0^{-k}}{k!}\right)\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(\phi-z_0)/(2\pi)\rfloor} z_0^{1/2\lfloor\arg(\phi-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(\phi-z_0)^k z_0^{-k}}{k!}\right)\right)\Bigg/\left(10\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(125-z_0)^k z_0^{-k}}{k!}\right)$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

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

$\arg(z)$ is the complex argument

$\lfloor x\rfloor$ is the floor function

i is the imaginary unit

golden ratio/ (0.592385 * 0.723606797 * 0.00703085) + 11

where 11 is a Lucas number

Input interpretation:

$$\frac{\phi}{0.592385\times 0.723606797\times 0.00703085}+11$$

ϕ is the golden ratio

Result:

547.875…

547.875… result practically equal to the rest mass of Eta meson 547.853

Alternative representations:

$$\frac{\phi}{0.592385 \times 0.723607 \times 0.00703085} + 11 = 11 + \frac{2 \sin(54^\circ)}{0.0030138}$$

$$\frac{\phi}{0.592385 \times 0.723607 \times 0.00703085} + 11 = 11 - \frac{2 \cos(216^\circ)}{0.0030138}$$

$$\frac{\phi}{0.592385 \times 0.723607 \times 0.00703085} + 11 = 11 - \frac{2 \sin(666^\circ)}{0.0030138}$$

Pi/ (0.592385 * 0.723606797 * 0.00703085) - 21 - golden ratio

where 21 is a Fibonacci number

Input interpretation:

$$\frac{\pi}{0.592385 \times 0.723606797 \times 0.00703085} - 21 - \phi$$

ϕ is the golden ratio

Result:

1019.78...

1019.78… result practically equal to the rest mass of Phi meson 1019.445

Alternative representations:

$$\frac{\pi}{0.592385 \times 0.723607 \times 0.00703085} - 21 - \phi = -21 + 2 \cos(216^\circ) + \frac{\pi}{0.0030138}$$

$$\frac{\pi}{0.592385 \times 0.723607 \times 0.00703085} - 21 - \phi = -21 - 2 \cos\left(\frac{\pi}{5}\right) + \frac{\pi}{0.0030138}$$

$$\frac{\pi}{0.592385 \times 0.723607 \times 0.00703085} - 21 - \phi = -21 + 2 \cos(216^\circ) + \frac{180^\circ}{0.0030138}$$

Series representations:

$$\frac{\pi}{0.592385 \times 0.723607 \times 0.00703085} - 21 - \phi = -21 - \phi + 1327.23 \sum_{k=0}^{\infty} \frac{(-1)^k}{1+2k}$$

$$\frac{\pi}{0.592385 \times 0.723607 \times 0.00703085} - 21 - \phi = -684.614 - \phi + 663.614 \sum_{k=1}^{\infty} \frac{2^k}{\binom{2k}{k}}$$

$$\frac{\pi}{0.592385 \times 0.723607 \times 0.00703085} - 21 - \phi = -21 - \phi + 331.807 \sum_{k=0}^{\infty} \frac{2^{-k}(-6+50k)}{\binom{3k}{k}}$$

Integral representations:

$$\frac{\pi}{0.592385 \times 0.723607 \times 0.00703085} - 21 - \phi = -21 - \phi + 663.614 \int_0^{\infty} \frac{1}{1+t^2}\, dt$$

$$\frac{\pi}{0.592385 \times 0.723607 \times 0.00703085} - 21 - \phi = -21 - \phi + 1327.23 \int_0^{1} \sqrt{1-t^2}\, dt$$

$$\frac{\pi}{0.592385 \times 0.723607 \times 0.00703085} - 21 - \phi = -21 - \phi + 663.614 \int_0^{\infty} \frac{\sin(t)}{t}\, dt$$

5/ (0.592385 * 0.723606797 * 0.00703085) + 76 -7

where 76 and 7 are Lucas numbers

Input interpretation:

$$\frac{5}{0.592385 \times 0.723606797 \times 0.00703085} + 76 - 7$$

Result:

1728.034743407936606270095024100691406255720721653373194258...

1728.0347434….

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

4 / (0.592385 * 0.723606797 * 0.00703085) + 55

where 55 is a Fibonacci number

Input interpretation:

$$\frac{4}{0.592385 \times 0.723606797 \times 0.00703085} + 55$$

Result:

1382.227794726349285016076019280553125004576577322698555406...

1382.227794... result practically equal to the rest mass of Sigma baryon 1382.8

Pi / (0.592385 * 0.723606797 * 0.00703085) + 199 - 11+ golden ratio

where 199 and 11 are Lucas numbers

Input interpretation:

$$\frac{\pi}{0.592385 \times 0.723606797 \times 0.00703085} + 199 - 11 + \phi$$

ϕ is the golden ratio

Result:

1232.02...

1232.02… result practically equal to the rest mass of Delta baryon 1232

Alternative representations:

$$\frac{\pi}{0.592385 \times 0.723607 \times 0.00703085} + 199 - 11 + \phi = 188 - 2\cos(216\,°) + \frac{\pi}{0.0030138}$$

$$\frac{\pi}{0.592385 \times 0.723607 \times 0.00703085} + 199 - 11 + \phi = 188 + 2\cos\left(\frac{\pi}{5}\right) + \frac{\pi}{0.0030138}$$

$$\frac{\pi}{0.592385 \times 0.723607 \times 0.00703085} + 199 - 11 + \phi = 188 - 2\cos(216^\circ) + \frac{180^\circ}{0.0030138}$$

Series representations:

$$\frac{\pi}{0.592385 \times 0.723607 \times 0.00703085} + 199 - 11 + \phi = 188 + \phi + 1327.23 \sum_{k=0}^{\infty} \frac{(-1)^k}{1 + 2k}$$

$$\frac{\pi}{0.592385 \times 0.723607 \times 0.00703085} + 199 - 11 + \phi = -475.614 + \phi + 663.614 \sum_{k=1}^{\infty} \frac{2^k}{\binom{2k}{k}}$$

$$\frac{\pi}{0.592385 \times 0.723607 \times 0.00703085} + 199 - 11 + \phi = 188 + \phi + 331.807 \sum_{k=0}^{\infty} \frac{2^{-k}(-6 + 50k)}{\binom{3k}{k}}$$

Integral representations:

$$\frac{\pi}{0.592385 \times 0.723607 \times 0.00703085} + 199 - 11 + \phi = 188 + \phi + 663.614 \int_0^{\infty} \frac{1}{1 + t^2}\, dt$$

$$\frac{\pi}{0.592385 \times 0.723607 \times 0.00703085} + 199 - 11 + \phi = 188 + \phi + 1327.23 \int_0^1 \sqrt{1 - t^2}\, dt$$

$$\frac{\pi}{0.592385 \times 0.723607 \times 0.00703085} + 199 - 11 + \phi = 188 + \phi + 663.614 \int_0^{\infty} \frac{\sin(t)}{t}\, dt$$

(((Pi / (0.592385 * 0.723606797 * 0.00703085) + 123)))

where 123 is a Lucas number

Input interpretation:

$$\frac{\pi}{0.592385 \times 0.723606797 \times 0.00703085} + 123$$

Result:

1165.40…

1165.40… result very near to the following Ramanujan's class invariant $Q = (G_{505}/G_{101/5})^3 = 1164{,}2696$

Alternative representations:

$$\frac{\pi}{0.592385 \times 0.723607 \times 0.00703085} + 123 = 123 + \frac{180\,°}{0.0030138}$$

$$\frac{\pi}{0.592385 \times 0.723607 \times 0.00703085} + 123 = 123 - \frac{i \log(-1)}{0.0030138}$$

$$\frac{\pi}{0.592385 \times 0.723607 \times 0.00703085} + 123 = 123 + \frac{\cos^{-1}(-1)}{0.0030138}$$

Series representations:

$$\frac{\pi}{0.592385 \times 0.723607 \times 0.00703085} + 123 = 123 + 1327.23 \sum_{k=0}^{\infty} \frac{(-1)^k}{1 + 2k}$$

$$\frac{\pi}{0.592385 \times 0.723607 \times 0.00703085} + 123 = -540.614 + 663.614 \sum_{k=1}^{\infty} \frac{2^k}{\binom{2k}{k}}$$

$$\frac{\pi}{0.592385 \times 0.723607 \times 0.00703085} + 123 = 123 + 331.807 \sum_{k=0}^{\infty} \frac{2^{-k}(-6 + 50k)}{\binom{3k}{k}}$$

Integral representations:

$$\frac{\pi}{0.592385 \times 0.723607 \times 0.00703085} + 123 = 123 + 663.614 \int_0^{\infty} \frac{1}{1 + t^2}\, dt$$

$$\frac{\pi}{0.592385 \times 0.723607 \times 0.00703085} + 123 = 123 + 1327.23 \int_0^1 \sqrt{1 - t^2}\, dt$$

$$\frac{\pi}{0.592385 \times 0.723607 \times 0.00703085} + 123 = 123 + 663.614 \int_0^\infty \frac{\sin(t)}{t}\, dt$$

(((Pi / (0.592385 * 0.723606797 * 0.00703085) + 123)))^1/14

Input interpretation:

$$\sqrt[14]{\frac{\pi}{0.592385 \times 0.723606797 \times 0.00703085} + 123}$$

Result:

1.655899557313776720520014098754014866363054874833473603063...

1.655899557313.... result 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...

(((Pi / (0.592385 * 0.723606797 * 0.00703085) + 123)))^1/14 - (29+7+2)/10^3

where 29, 7 and 2 are Lucas numbers

Input interpretation:

$$\sqrt[14]{\frac{\pi}{0.592385 \times 0.723606797 \times 0.00703085} + 123} - \frac{29+7+2}{10^3}$$

Result:

1.617899557313776720520014098754014866363054874833473603063...

1.6178995573…. result that is a very good approximation to the value of the golden ratio 1,618033988749...

Alternative representations:

$$\sqrt[14]{\frac{\pi}{0.592385 \times 0.723607 \times 0.00703085} + 123} - \frac{29+7+2}{10^3} = \sqrt[14]{123 + \frac{180°}{0.0030138}} - \frac{38}{10^3}$$

$$\sqrt[14]{\frac{\pi}{0.592385\times0.723607\times0.00703085}+123}-\frac{29+7+2}{10^3}=\sqrt[14]{123-\frac{i\log(-1)}{0.0030138}}-\frac{38}{10^3}$$

$$\sqrt[14]{\frac{\pi}{0.592385\times0.723607\times0.00703085}+123}-\frac{29+7+2}{10^3}=\sqrt[14]{123+\frac{\cos^{-1}(-1)}{0.0030138}}-\frac{38}{10^3}$$

Series representations:

$$\sqrt[14]{\frac{\pi}{0.592385\times0.723607\times0.00703085}+123}-\frac{29+7+2}{10^3}=-\frac{19}{500}+\sqrt[14]{123+1327.23\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}}$$

$$\sqrt[14]{\frac{\pi}{0.592385\times0.723607\times0.00703085}+123}-\frac{29+7+2}{10^3}=-\frac{19}{500}+\sqrt[14]{-540.614+663.614\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}}$$

$$\sqrt[14]{\frac{\pi}{0.592385\times0.723607\times0.00703085}+123}-\frac{29+7+2}{10^3}=-\frac{19}{500}+\sqrt[14]{123+331.807x+663.614\sum_{k=1}^{\infty}\frac{\sin(kx)}{k}}\quad\text{for } (x\in\mathbb{R}\text{ and }x>0)$$

Integral representations:

$$\sqrt[14]{\frac{\pi}{0.592385\times0.723607\times0.00703085}+123}-\frac{29+7+2}{10^3}=-\frac{19}{500}+\sqrt[14]{123+663.614\int_0^{\infty}\frac{1}{1+t^2}\,dt}$$

$$\sqrt[14]{\frac{\pi}{0.592385 \times 0.723607 \times 0.00703085} + 123} - \frac{29+7+2}{10^3} =$$

$$-\frac{19}{500} + \sqrt[14]{123 + 1327.23 \int_0^1 \sqrt{1-t^2}\, dt}$$

$$\sqrt[14]{\frac{\pi}{0.592385 \times 0.723607 \times 0.00703085} + 123} - \frac{29+7+2}{10^3} =$$

$$-\frac{19}{500} + \sqrt[14]{123 + 663.614 \int_0^\infty \frac{\sin(t)}{t}\, dt}$$

Now, we have that:

$$\frac{1}{4}\exp(2\pi\widetilde{T})\sum_{s\in\mathbb{Z}}(-1)^s\left(\tanh \pi N s/4\widetilde{T} - \frac{1}{N}\tanh \pi s/4\widetilde{T}\right)\frac{1}{\sinh \pi s/2\widetilde{T}}. \qquad (4.20)$$

For s = 2, N = 5, $\tilde{T} = 0.0864055$

1/4 exp(2*Pi*0.0864055) sum ((-1)^s (tanh ((5Pi*s)/(4*0.0864055)))-1/5 tanh((Pi*s)/(4*0.0864055)) * 1/((sinh(Pi*s)/(2*0.0864055)))), s = 1 to 233

Input interpretation:

$$\frac{1}{4}\exp(2\pi \times 0.0864055) \sum_{s=1}^{233}\left((-1)^s \tanh\left(\frac{5\pi s}{4\times 0.0864055}\right) - \frac{1}{5}\left(\tanh\left(\frac{\pi s}{4\times 0.0864055}\right) \times \frac{1}{\frac{\sinh(\pi s)}{2\times 0.0864055}}\right)\right)$$

tanh(x) is the hyperbolic tangent function

sinh(x) is the hyperbolic sine function

Result:

−0.431594

-0.431594

From which:

1/10^27[(((-2/(((1/4 exp(2*Pi*0.0864055) sum ((-1)^s (tanh ((5Pi*s)/(4*0.0864055)))-1/5 tanh((Pi*s)/(4*0.0864055)) * 1/((sinh(Pi*s)/(2*0.0864055)))), s = 1 to 233))))))^1/3 + 5/10^3]

where 5 is a Fibonacci number

Input interpretation:

$$\frac{1}{10^{27}}\left(\left(\left(-\left(2\middle/\left(\frac{1}{4}\exp(2\pi\times 0.0864055)\sum_{s=1}^{233}\left((-1)^s\tanh\left(\frac{5\pi s}{4\times 0.0864055}\right)-\frac{1}{5}\left(\tanh\left(\frac{\pi s}{4\times 0.0864055}\right)\times\frac{1}{\frac{\sinh(\pi s)}{2\times 0.0864055}}\right)\right)\right)\right)\right)\right)\text{^}(1/3)+\frac{5}{10^3}\right)$$

tanh(x) is the hyperbolic tangent function

sinh(x) is the hyperbolic sine function

Result:

1.67219×10^{-27}

$1.67219*10^{-27}$ result practically equal to the proton mass in kg

We have also:

$$V(x)-\left(\tanh\pi Nx/4-\frac{1}{N}\tanh\pi x/4\right)\frac{1}{\sinh\pi x/2}. \qquad (4.23)$$

N = 5, x = 1/5

(tanh (5Pi/20)-1/5 tanh (Pi/20)) * 1/(sinh (Pi/10))

Input:

$$\left(\tanh\left(5\times\frac{\pi}{20}\right)-\frac{1}{5}\tanh\left(\frac{\pi}{20}\right)\right)\times\frac{1}{\sinh\left(\frac{\pi}{10}\right)}$$

tanh(x) is the hyperbolic tangent function

sinh(x) is the hyperbolic sine function

Exact result:

$$\left(\tanh\left(\frac{\pi}{4}\right) - \frac{1}{5}\tanh\left(\frac{\pi}{20}\right)\right)\operatorname{csch}\left(\frac{\pi}{10}\right)$$

csch(x) is the hyperbolic cosecant function

Decimal approximation:

1.955939154900132951224555504284020433882363208631026457577...

1.9559391549….

Property:

$\operatorname{csch}\left(\frac{\pi}{10}\right)\left(-\frac{1}{5}\tanh\left(\frac{\pi}{20}\right) + \tanh\left(\frac{\pi}{4}\right)\right)$ is a transcendental number

Alternate forms:

$$-\frac{1}{5}\left(\tanh\left(\frac{\pi}{20}\right) - 5\tanh\left(\frac{\pi}{4}\right)\right)\operatorname{csch}\left(\frac{\pi}{10}\right)$$

$$\tanh\left(\frac{\pi}{4}\right)\operatorname{csch}\left(\frac{\pi}{10}\right) - \frac{1}{5}\tanh\left(\frac{\pi}{20}\right)\operatorname{csch}\left(\frac{\pi}{10}\right)$$

$$\frac{4\left(4\cosh\left(\frac{\pi}{10}\right) - 1\right)}{5\left(1 - 2\cosh\left(\frac{\pi}{10}\right) + 2\cosh\left(\frac{\pi}{5}\right)\right)}$$

cosh(x) is the hyperbolic cosine function

Alternative representations:

$$\frac{\tanh\left(\frac{5\pi}{20}\right) - \frac{1}{5}\tanh\left(\frac{\pi}{20}\right)}{\sinh\left(\frac{\pi}{10}\right)} = \frac{-1 + \frac{2}{1+e^{-(10\pi)/20}} - \frac{1}{5}\left(-1 + \frac{2}{1+e^{-(2\pi)/20}}\right)}{i\cos\left(\frac{\pi}{2} + \frac{i\pi}{10}\right)}$$

$$\frac{\tanh\left(\frac{5\pi}{20}\right) - \frac{1}{5}\tanh\left(\frac{\pi}{20}\right)}{\sinh\left(\frac{\pi}{10}\right)} = \frac{-1 + \frac{2}{1+e^{-(10\pi)/20}} - \frac{1}{5}\left(-1 + \frac{2}{1+e^{-(2\pi)/20}}\right)}{\frac{1}{2}\left(-e^{-\pi/10} + e^{\pi/10}\right)}$$

$$\frac{\tanh\left(\frac{5\pi}{20}\right) - \frac{1}{5}\tanh\left(\frac{\pi}{20}\right)}{\sinh\left(\frac{\pi}{10}\right)} = -\frac{-1 + \frac{2}{1+e^{-(10\pi)/20}} - \frac{1}{5}\left(-1 + \frac{2}{1+e^{-(2\pi)/20}}\right)}{i\cos\left(\frac{\pi}{2} - \frac{i\pi}{10}\right)}$$

Series representations:

$$\frac{\tanh\left(\frac{5\pi}{20}\right) - \frac{1}{5}\tanh\left(\frac{\pi}{20}\right)}{\sinh\left(\frac{\pi}{10}\right)} = \sum_{k=1}^{\infty} \frac{768\,(1-2k)^2 \operatorname{csch}\left(\frac{\pi}{10}\right)}{\left(5 - 16k + 16k^2\right)\left(101 - 400k + 400k^2\right)\pi}$$

$$\frac{\tanh\left(\frac{5\pi}{20}\right) - \frac{1}{5}\tanh\left(\frac{\pi}{20}\right)}{\sinh\left(\frac{\pi}{10}\right)} = -\frac{4\left(-2 + \sum_{k=0}^{\infty} (-1)^{1+k} e^{-1/2(1+k)\pi}\left(-5 + e^{2/5(1+k)\pi}\right)\right)\left(1 + 2\sum_{k=1}^{\infty} \frac{(-1)^k}{1+100k^2}\right)}{\pi}$$

$$\frac{\tanh\left(\frac{5\pi}{20}\right) - \frac{1}{5}\tanh\left(\frac{\pi}{20}\right)}{\sinh\left(\frac{\pi}{10}\right)} = -4\left(-2 + \sum_{k=0}^{\infty} (-1)^{1+k} e^{-1/2(1+k)\pi}\left(-5 + e^{2/5(1+k)\pi}\right)\right)\sum_{k=-\infty}^{\infty} \frac{(-1)^k}{\pi + 100k^2\pi}$$

Integral representations:

$$\frac{\tanh\left(\frac{5\pi}{20}\right) - \frac{1}{5}\tanh\left(\frac{\pi}{20}\right)}{\sinh\left(\frac{\pi}{10}\right)} = -\frac{2\left(\int_0^{\frac{\pi}{20}} \operatorname{sech}^2(t)\,dt - 5\int_0^{\frac{\pi}{4}} \operatorname{sech}^2(t)\,dt\right)}{\pi \int_0^1 \cosh\left(\frac{\pi t}{10}\right)dt}$$

$$\frac{\tanh\left(\frac{5\pi}{20}\right) - \frac{1}{5}\tanh\left(\frac{\pi}{20}\right)}{\sinh\left(\frac{\pi}{10}\right)} = \int_0^{\frac{\pi}{20}} -\frac{8\,i\left(\operatorname{sech}^2(t) - 25\operatorname{sech}^2(5t)\right)}{\sqrt{\pi}\int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{e^{\pi^2/(400s)+s}}{s^{3/2}}\,ds}\,dt \quad \text{for } \gamma > 0$$

From which:

((((tanh (5Pi/20)-1/5 tanh (Pi/20)) * 1/(sinh (Pi/10)))))^11+123+golden ratio^2

where 123 is a Lucas number

Input:

$$\left(\left(\tanh\left(5\times\frac{\pi}{20}\right) - \frac{1}{5}\tanh\left(\frac{\pi}{20}\right)\right)\times\frac{1}{\sinh\left(\frac{\pi}{10}\right)}\right)^{11} + 123 + \phi^2$$

$\tanh(x)$ is the hyperbolic tangent function

$\sinh(x)$ is the hyperbolic sine function

ϕ is the golden ratio

Exact result:

$$\phi^2 + 123 + \left(\tanh\left(\frac{\pi}{4}\right) - \frac{1}{5}\tanh\left(\frac{\pi}{20}\right)\right)^{11} \operatorname{csch}^{11}\left(\frac{\pi}{10}\right)$$

csch(x) is the hyperbolic cosecant function

Decimal approximation:

1728.526591678978524326466630150302026002712558017996618425...

1728.52659...

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

Property:

$$123 + \phi^2 + \operatorname{csch}^{11}\left(\frac{\pi}{10}\right)\left(-\frac{1}{5}\tanh\left(\frac{\pi}{20}\right) + \tanh\left(\frac{\pi}{4}\right)\right)^{11}$$ is a transcendental number

Alternate forms:

$$\frac{1}{2}\left(249 + \sqrt{5}\right) + \left(\tanh\left(\frac{\pi}{4}\right) - \frac{1}{5}\tanh\left(\frac{\pi}{20}\right)\right)^{11} \operatorname{csch}^{11}\left(\frac{\pi}{10}\right)$$

$$\frac{1}{2}\left(249 + \sqrt{5}\right) - \frac{\left(\tanh\left(\frac{\pi}{20}\right) - 5\tanh\left(\frac{\pi}{4}\right)\right)^{11} \operatorname{csch}^{11}\left(\frac{\pi}{10}\right)}{48\,828\,125}$$

$$123 + \frac{1}{4}\left(1 + \sqrt{5}\right)^2 + \left(\tanh\left(\frac{\pi}{4}\right) - \frac{1}{5}\tanh\left(\frac{\pi}{20}\right)\right)^{11} \operatorname{csch}^{11}\left(\frac{\pi}{10}\right)$$

Alternative representations:

$$\left(\frac{\tanh\left(\frac{5\pi}{20}\right) - \frac{1}{5}\tanh\left(\frac{\pi}{20}\right)}{\sinh\left(\frac{\pi}{10}\right)}\right)^{11} + 123 + \phi^2 =$$

$$123 + \phi^2 + \left(\frac{-1 + \frac{2}{1+e^{-(10\pi)/20}} - \frac{1}{5}\left(-1 + \frac{2}{1+e^{-(2\pi)/20}}\right)}{i\cos\left(\frac{\pi}{2} + \frac{i\pi}{10}\right)}\right)^{11}$$

$$\left(\frac{\tanh\left(\frac{5\pi}{20}\right)-\frac{1}{5}\tanh\left(\frac{\pi}{20}\right)}{\sinh\left(\frac{\pi}{10}\right)}\right)^{11}+123+\phi^2 = 123+\phi^2+\left(\frac{-1+\frac{2}{1+e^{-(10\pi)/20}}-\frac{1}{5}\left(-1+\frac{2}{1+e^{-(2\pi)/20}}\right)}{\frac{1}{2}\left(-e^{-\pi/10}+e^{\pi/10}\right)}\right)^{11}$$

$$\left(\frac{\tanh\left(\frac{5\pi}{20}\right)-\frac{1}{5}\tanh\left(\frac{\pi}{20}\right)}{\sinh\left(\frac{\pi}{10}\right)}\right)^{11}+123+\phi^2 = 123+\phi^2+\left(-\frac{-1+\frac{2}{1+e^{-(10\pi)/20}}-\frac{1}{5}\left(-1+\frac{2}{1+e^{-(2\pi)/20}}\right)}{i\cos\left(\frac{\pi}{2}-\frac{i\pi}{10}\right)}\right)^{11}$$

Series representations:

$$\left(\frac{\tanh\left(\frac{5\pi}{20}\right)-\frac{1}{5}\tanh\left(\frac{\pi}{20}\right)}{\sinh\left(\frac{\pi}{10}\right)}\right)^{11}+123+\phi^2 = 123+\phi^2+\operatorname{csch}^{11}\left(\frac{\pi}{10}\right)\left(\sum_{k=1}^{\infty}\frac{768(1-2k)^2}{(5-16k+16k^2)(101-400k+400k^2)\pi}\right)^{11}$$

$$\left(\frac{\tanh\left(\frac{5\pi}{20}\right)-\frac{1}{5}\tanh\left(\frac{\pi}{20}\right)}{\sinh\left(\frac{\pi}{10}\right)}\right)^{11}+123+\phi^2 = \frac{1}{2}\left(249+\sqrt{5}-4096\left(\sum_{k=1}^{\infty}\frac{768(1-2k)^2}{(5-16k+16k^2)(101-400k+400k^2)\pi}\right)^{11}\left(\sum_{k=1}^{\infty}q^{-1+2k}\right)^{11}\right) \text{ for } q=e^{\pi/10}$$

$$\left(\frac{\tanh\left(\frac{5\pi}{20}\right)-\frac{1}{5}\tanh\left(\frac{\pi}{20}\right)}{\sinh\left(\frac{\pi}{10}\right)}\right)^{11}+123+\phi^2 = 123+\phi^2+\left(\frac{10}{\pi}+\frac{1}{5}\pi\sum_{k=1}^{\infty}\frac{100(-1)^k}{(1+100k^2)\pi^2}\right)^{11}\left(\sum_{k=1}^{\infty}\frac{768(1-2k)^2}{(5-16k+16k^2)(101-400k+400k^2)\pi}\right)^{11}$$

((((tanh (5Pi/20)-1/5 tanh (Pi/20)) * 1/(sinh (Pi/10)))))^7+29+1/golden ratio

where 29 is a Lucas number

Input:

$$\left(\left(\tanh\left(5\times\frac{\pi}{20}\right)-\frac{1}{5}\tanh\left(\frac{\pi}{20}\right)\right)\times\frac{1}{\sinh\left(\frac{\pi}{10}\right)}\right)^7+29+\frac{1}{\phi}$$

tanh(x) is the hyperbolic tangent function

sinh(x) is the hyperbolic sine function

ϕ is the golden ratio

Exact result:

$$\frac{1}{\phi}+29+\left(\tanh\left(\frac{\pi}{4}\right)-\frac{1}{5}\tanh\left(\frac{\pi}{20}\right)\right)^7\operatorname{csch}^7\left(\frac{\pi}{10}\right)$$

csch(x) is the hyperbolic cosecant function

Decimal approximation:

139.1365082334322762072623701285966484343160032636900658669...

139.136508… result practically equal to the rest mass of Pion meson 139.57 MeV

Property:

$$29+\frac{1}{\phi}+\operatorname{csch}^7\left(\frac{\pi}{10}\right)\left(-\frac{1}{5}\tanh\left(\frac{\pi}{20}\right)+\tanh\left(\frac{\pi}{4}\right)\right)^7$$ is a transcendental number

Alternate forms:

$$\frac{1}{2}\left(57+\sqrt{5}\right)+\left(\tanh\left(\frac{\pi}{4}\right)-\frac{1}{5}\tanh\left(\frac{\pi}{20}\right)\right)^7\operatorname{csch}^7\left(\frac{\pi}{10}\right)$$

$$29+\frac{2}{1+\sqrt{5}}+\left(\tanh\left(\frac{\pi}{4}\right)-\frac{1}{5}\tanh\left(\frac{\pi}{20}\right)\right)^7\operatorname{csch}^7\left(\frac{\pi}{10}\right)$$

$$29+\frac{1}{\phi}+\frac{\left(-\frac{\sinh\left(\frac{\pi}{20}\right)}{5\cosh\left(\frac{\pi}{20}\right)}+\frac{\sinh\left(\frac{\pi}{4}\right)}{\cosh\left(\frac{\pi}{4}\right)}\right)^7}{\sinh^7\left(\frac{\pi}{10}\right)}$$

cosh(x) is the hyperbolic cosine function

Expanded form:

$$\frac{1}{\phi}+29-\frac{\tanh^7\left(\frac{\pi}{20}\right)\operatorname{csch}^7\left(\frac{\pi}{10}\right)}{78\,125}+\tanh^7\left(\frac{\pi}{4}\right)\operatorname{csch}^7\left(\frac{\pi}{10}\right)+\frac{7\tanh^6\left(\frac{\pi}{20}\right)\tanh\left(\frac{\pi}{4}\right)\operatorname{csch}^7\left(\frac{\pi}{10}\right)}{15\,625}-\frac{7}{5}\tanh\left(\frac{\pi}{20}\right)\tanh^6\left(\frac{\pi}{4}\right)\operatorname{csch}^7\left(\frac{\pi}{10}\right)-\frac{21\tanh^5\left(\frac{\pi}{20}\right)\tanh^2\left(\frac{\pi}{4}\right)\operatorname{csch}^7\left(\frac{\pi}{10}\right)}{3125}+\frac{21}{25}\tanh^2\left(\frac{\pi}{20}\right)\tanh^5\left(\frac{\pi}{4}\right)\operatorname{csch}^7\left(\frac{\pi}{10}\right)+\frac{7}{125}\tanh^4\left(\frac{\pi}{20}\right)\tanh^3\left(\frac{\pi}{4}\right)\operatorname{csch}^7\left(\frac{\pi}{10}\right)-\frac{7}{25}\tanh^3\left(\frac{\pi}{20}\right)\tanh^4\left(\frac{\pi}{4}\right)\operatorname{csch}^7\left(\frac{\pi}{10}\right)$$

Alternative representations:

$$\left(\frac{\tanh\left(\frac{5\pi}{20}\right)-\frac{1}{5}\tanh\left(\frac{\pi}{20}\right)}{\sinh\left(\frac{\pi}{10}\right)}\right)^7+29+\frac{1}{\phi}=29+\frac{1}{\phi}+\left(\frac{-1+\frac{2}{1+e^{-(10\pi)/20}}-\frac{1}{5}\left(-1+\frac{2}{1+e^{-(2\pi)/20}}\right)}{i\cos\left(\frac{\pi}{2}+\frac{i\pi}{10}\right)}\right)^7$$

$$\left(\frac{\tanh\left(\frac{5\pi}{20}\right)-\frac{1}{5}\tanh\left(\frac{\pi}{20}\right)}{\sinh\left(\frac{\pi}{10}\right)}\right)^7+29+\frac{1}{\phi}=29+\frac{1}{\phi}+\left(\frac{-1+\frac{2}{1+e^{-(10\pi)/20}}-\frac{1}{5}\left(-1+\frac{2}{1+e^{-(2\pi)/20}}\right)}{\frac{1}{2}\left(-e^{-\pi/10}+e^{\pi/10}\right)}\right)^7$$

$$\left(\frac{\tanh\left(\frac{5\pi}{20}\right)-\frac{1}{5}\tanh\left(\frac{\pi}{20}\right)}{\sinh\left(\frac{\pi}{10}\right)}\right)^7+29+\frac{1}{\phi}=29+\frac{1}{\phi}+\left(-\frac{-1+\frac{2}{1+e^{-(10\pi)/20}}-\frac{1}{5}\left(-1+\frac{2}{1+e^{-(2\pi)/20}}\right)}{i\cos\left(\frac{\pi}{2}-\frac{i\pi}{10}\right)}\right)^7$$

Series representations:

$$\left(\frac{\tanh\left(\frac{5\pi}{20}\right)-\frac{1}{5}\tanh\left(\frac{\pi}{20}\right)}{\sinh\left(\frac{\pi}{10}\right)}\right)^7+29+\frac{1}{\phi}=29+\frac{1}{\phi}+\operatorname{csch}^7\left(\frac{\pi}{10}\right)\left(\sum_{k=1}^{\infty}\frac{768\,(1-2k)^2}{(5-16k+16k^2)(101-400k+400k^2)\pi}\right)^7$$

$$\left(\frac{\tanh\left(\frac{5\pi}{20}\right)-\frac{1}{5}\tanh\left(\frac{\pi}{20}\right)}{\sinh\left(\frac{\pi}{10}\right)}\right)^7+29+\frac{1}{\phi}=29+\frac{1}{\phi}+$$
$$\left(\frac{10}{\pi}+\frac{1}{5}\pi\sum_{k=1}^{\infty}\frac{100(-1)^k}{(1+100k^2)\pi^2}\right)^7\left(\sum_{k=1}^{\infty}\frac{768(1-2k)^2}{(5-16k+16k^2)(101-400k+400k^2)\pi}\right)^7$$

$$\left(\frac{\tanh\left(\frac{5\pi}{20}\right)-\frac{1}{5}\tanh\left(\frac{\pi}{20}\right)}{\sinh\left(\frac{\pi}{10}\right)}\right)^7+29+\frac{1}{\phi}=$$
$$29+\frac{1}{\phi}-128\left(1-2\sum_{k=0}^{\infty}(-1)^k e^{-1/2(1+k)\pi}+\frac{1}{5}\left(-1+2\sum_{k=0}^{\infty}(-1)^k e^{-1/10(1+k)\pi}\right)\right)^7$$
$$\left(\sum_{k=1}^{\infty}q^{-1+2k}\right)^7 \quad \text{for } q=e^{\pi/10}$$

((((tanh (5Pi/20)-1/5 tanh (Pi/20)) * 1/(sinh (Pi/10)))))^7+11+Pi+golden ratio

where 11 is a Lucas number

Input:

$$\left(\left(\tanh\left(5\times\frac{\pi}{20}\right)-\frac{1}{5}\tanh\left(\frac{\pi}{20}\right)\right)\times\frac{1}{\sinh\left(\frac{\pi}{10}\right)}\right)^7+11+\pi+\phi$$

tanh(x) is the hyperbolic tangent function

sinh(x) is the hyperbolic sine function

ϕ is the golden ratio

Exact result:

$$\phi+11+\pi+\left(\tanh\left(\frac{\pi}{4}\right)-\frac{1}{5}\tanh\left(\frac{\pi}{20}\right)\right)^7\operatorname{csch}^7\left(\frac{\pi}{10}\right)$$

csch(x) is the hyperbolic cosecant function

Decimal approximation:

125.2781008870220694457250135118761513185131726630651716879...

125.2781008… result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0 and to the Higgs boson mass 125.18 GeV

Alternate forms:

$$\frac{1}{2}\left(23+\sqrt{5}\right)+\pi+\left(\tanh\left(\frac{\pi}{4}\right)-\frac{1}{5}\tanh\left(\frac{\pi}{20}\right)\right)^7\operatorname{csch}^7\left(\frac{\pi}{10}\right)$$

$$11+\frac{1}{2}\left(1+\sqrt{5}\right)+\pi+\left(\tanh\left(\frac{\pi}{4}\right)-\frac{1}{5}\tanh\left(\frac{\pi}{20}\right)\right)^7\operatorname{csch}^7\left(\frac{\pi}{10}\right)$$

$$11+\phi+\pi+\frac{\left(-\frac{\sinh\left(\frac{\pi}{20}\right)}{5\cosh\left(\frac{\pi}{20}\right)}+\frac{\sinh\left(\frac{\pi}{4}\right)}{\cosh\left(\frac{\pi}{4}\right)}\right)^7}{\sinh^7\left(\frac{\pi}{10}\right)}$$

cosh(x) is the hyperbolic cosine function

Alternative representations:

$$\left(\frac{\tanh\left(\frac{5\pi}{20}\right)-\frac{1}{5}\tanh\left(\frac{\pi}{20}\right)}{\sinh\left(\frac{\pi}{10}\right)}\right)^7+11+\pi+\phi=$$
$$11+\phi+\pi+\left(\frac{-1+\frac{2}{1+e^{-(10\pi)/20}}-\frac{1}{5}\left(-1+\frac{2}{1+e^{-(2\pi)/20}}\right)}{i\cos\left(\frac{\pi}{2}+\frac{i\pi}{10}\right)}\right)^7$$

$$\left(\frac{\tanh\left(\frac{5\pi}{20}\right)-\frac{1}{5}\tanh\left(\frac{\pi}{20}\right)}{\sinh\left(\frac{\pi}{10}\right)}\right)^7+11+\pi+\phi=$$
$$11+\phi+\pi+\left(\frac{-1+\frac{2}{1+e^{-(10\pi)/20}}-\frac{1}{5}\left(-1+\frac{2}{1+e^{-(2\pi)/20}}\right)}{\frac{1}{2}\left(-e^{-\pi/10}+e^{\pi/10}\right)}\right)^7$$

$$\left(\frac{\tanh\left(\frac{5\pi}{20}\right)-\frac{1}{5}\tanh\left(\frac{\pi}{20}\right)}{\sinh\left(\frac{\pi}{10}\right)}\right)^7+11+\pi+\phi=$$
$$11+\phi+\pi+\left(-\frac{-1+\frac{2}{1+e^{-(10\pi)/20}}-\frac{1}{5}\left(-1+\frac{2}{1+e^{-(2\pi)/20}}\right)}{i\cos\left(\frac{\pi}{2}-\frac{i\pi}{10}\right)}\right)^7$$

Series representations:

$$\left(\frac{\tanh\left(\frac{5\pi}{20}\right)-\frac{1}{5}\tanh\left(\frac{\pi}{20}\right)}{\sinh\left(\frac{\pi}{10}\right)}\right)^7+11+\pi+\phi=$$
$$11+\phi+\pi+\operatorname{csch}^7\left(\frac{\pi}{10}\right)\left(\sum_{k=1}^{\infty}\frac{768(1-2k)^2}{(5-16k+16k^2)(101-400k+400k^2)\pi}\right)^7$$

$$\left(\frac{\tanh\left(\frac{5\pi}{20}\right)-\frac{1}{5}\tanh\left(\frac{\pi}{20}\right)}{\sinh\left(\frac{\pi}{10}\right)}\right)^7+11+\pi+\phi=$$
$$11+\phi+\pi+16\,384\left(2+\sum_{k=0}^{\infty}(-1)^k e^{-1/2(1+k)\pi}\left(-5+e^{2/5(1+k)\pi}\right)\right)^7\left(\sum_{k=-\infty}^{\infty}\frac{(-1)^k}{\pi+100k^2\pi}\right)^7$$

$$\left(\frac{\tanh\left(\frac{5\pi}{20}\right)-\frac{1}{5}\tanh\left(\frac{\pi}{20}\right)}{\sinh\left(\frac{\pi}{10}\right)}\right)^7+11+\pi+\phi=$$
$$\frac{1}{2}\left(23+\sqrt{5}+2\pi-256\left(\sum_{k=1}^{\infty}\frac{768(1-2k)^2}{(5-16k+16k^2)(101-400k+400k^2)\pi}\right)^7\left(\sum_{k=1}^{\infty}q^{-1+2k}\right)^7\right)\quad\text{for } q=e^{\pi/10}$$

References

Open Strings On The Rindler Horizon
Edward Witten - arXiv:1810.11912v4 [hep-th] 26 Nov 201

With regard the formula of coefficients of the '5th order' mock theta function ψ_1(q), see:

a) *Srinivasa Ramanujan*, **Collected Papers**, Chelsea, New York, 1962, pp. 354-355

b) *Srinivasa Ramanujan*, **The Lost Notebook and Other Unpublished Papers**, Narosa Publishing House, New Delhi, 1988, pp. 19, 21, 22