Analyzing an equation concerning the “scalar potential of a bosonic Lagrangian obtained from Type I Supergravity”. Mathematical connections with MRB Constant, some parameters of Number Theory and Cosmology.

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Abstract

In this paper, we analyze an equation concerning the “scalar potential of a bosonic Lagrangian obtained from Type I Supergravity”. We obtain new possible mathematical connections with MRB Constant, some parameters of Number Theory and Cosmology.

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Analyzing an equation concerning the "scalar potential of a bosonic Lagrangian obtained from Type I Supergravity" [1]

We have that:

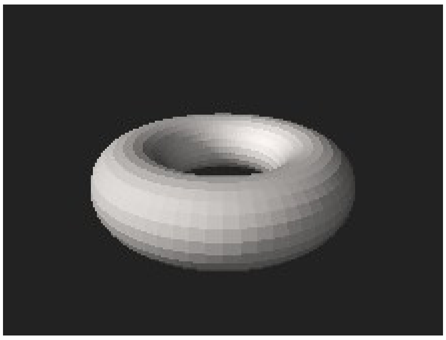
After reduction to $D = 5$, one works with a bosonic Lagrangian obtained from Type I supergravity reduced on $T^3 \times S^2$:

$$\mathcal{L}_5 = R * 1 - \frac{1}{2} d\Phi_i \wedge * d\Phi_i - \frac{1}{2} e^{\sqrt{2}\Phi_1} d\sigma \wedge * d\sigma - V * 1 \,,$$

where the scalar potential V is

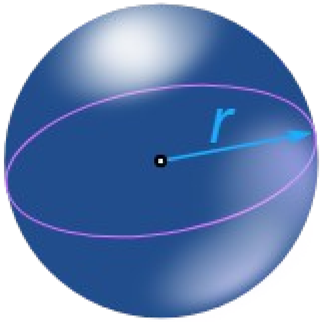
T^3 x S^2 = a torus in three dimensions (product of 3 circles), multiplied by a sphere in two dimensions

3d-Torus

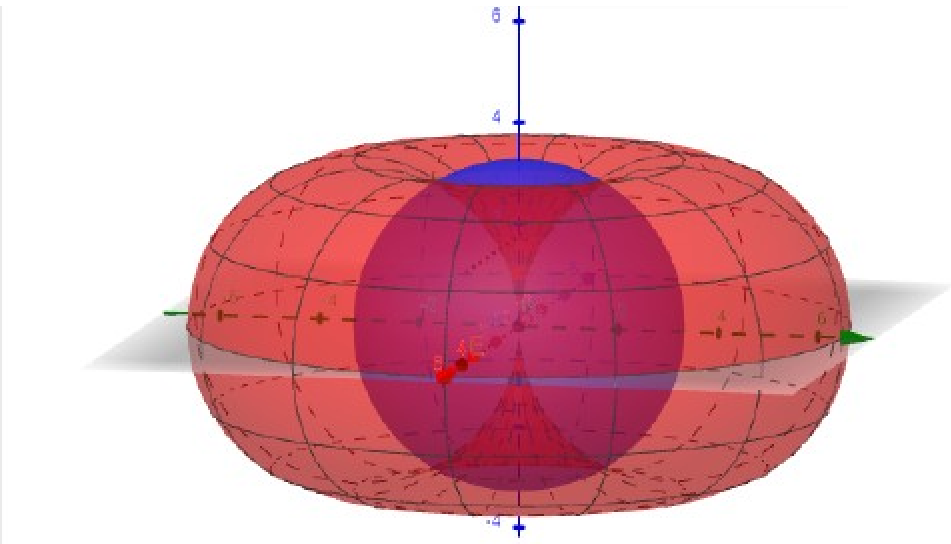


https://es.wikipedia.org/wiki/Toroide#/media/Archivo:Toroide.stl

2d-Sphere



https://www.mathsisfun.com/geometry/sphere.html



https://www.geogebra.org/m/wqstrvxy

We analyze the following equation concerning the scalar potential V:

$$V = 2g^2 e^{\sqrt{\frac{2}{5}}\Phi_2 - \frac{8}{\sqrt{15}}\Phi_3}\left(e^{-\sqrt{2}\Phi_1} + \sigma^2 + \frac{1}{4}e^{\sqrt{2}\Phi_1}(\sigma^2-2)^2 - 4e^{-\sqrt{\frac{2}{5}}\Phi_2 + \sqrt{\frac{3}{5}}\Phi_3}\right)$$

where

$$\sigma = \sqrt{2}\,\mathrm{sech}\,2\rho\,.$$

We obtain:

2g^2*e^((sqrt(2/5))*Φ-(8/(sqrt15))*Φ)*((e^((-sqrt2)*Φ)+(sqrt2 sech(2ρ))^2+1/4*e^((sqrt2)*Φ)*((sqrt2 sech(2ρ))^2-2)^2-4e^(-(sqrt(2/5))*Φ+(sqrt(3/5))*Φ)))

Input

$$2 g^2 e^{\sqrt{2/5}\,\Phi - 8/\sqrt{15}\,\Phi}\left(e^{-\sqrt{2}\,\Phi} + \left(\sqrt{2}\,\mathrm{sech}(2\rho)\right)^2 + \frac{1}{4} e^{\sqrt{2}\,\Phi}\left(\left(\sqrt{2}\,\mathrm{sech}(2\rho)\right)^2 - 2\right)^2 - 4\, e^{-\sqrt{2/5}\,\Phi + \sqrt{3/5}\,\Phi}\right)$$

sech(x) is the hyperbolic secant function

Φ is the golden ratio conjugate

Exact result

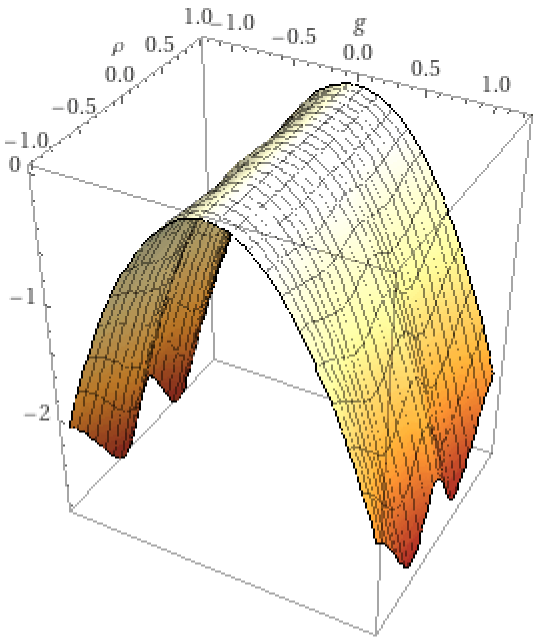
$$2 g^2 e^{\sqrt{2/5}\,\Phi - (8\Phi)/\sqrt{15}}\left(2\,\mathrm{sech}^2(2\rho) + \frac{1}{4}\left(2\,\mathrm{sech}^2(2\rho) - 2\right)^2 e^{\sqrt{2}\,\Phi} - 4\, e^{\sqrt{3/5}\,\Phi - \sqrt{2/5}\,\Phi} + e^{-\sqrt{2}\,\Phi}\right)$$

Exact form

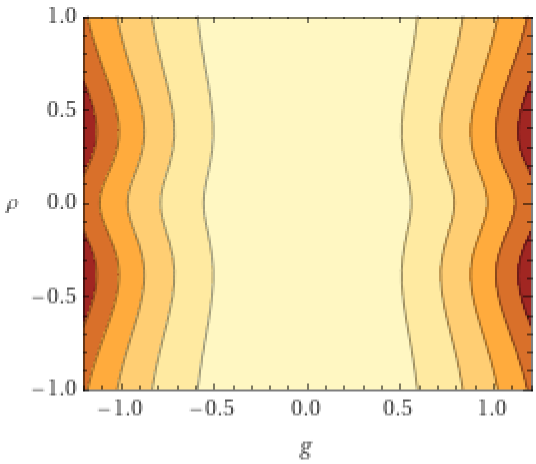
$$2\,g^2\,e^{\sqrt{\frac{2}{5}}\,(\phi-1)-\frac{8(\phi-1)}{\sqrt{15}}}\left(e^{(\sqrt{5}-1)/\sqrt{2}}\tanh^4(2\rho)+2\,\text{sech}^2(2\rho)+e^{-\sqrt{2}\,(\phi-1)}-4\,e^{\sqrt{\frac{3}{5}}\,(\phi-1)-\sqrt{\frac{2}{5}}\,(\phi-1)}\right)$$

$\tanh(x)$ is the hyperbolic tangent function
ϕ is the golden ratio

3D plot **(figure that can be related to a D-brane/Instanton)**



Contour plot



Alternate forms

$$2\,g^2\,e^{\left(\sqrt{2/5}\,-8/\sqrt{15}\,\right)\Phi}\left(2\,\text{sech}^2(2\,\rho)+\tanh^4(2\,\rho)\,e^{\sqrt{2}\,\Phi}-4\,e^{\left(\sqrt{3/5}\,-\sqrt{2/5}\,\right)\Phi}+e^{-\sqrt{2}\,\Phi}\right)$$

$$2\,e^{\sqrt{2/5}\,\Phi-(8\,\Phi)/\sqrt{15}}\,g^2\left(e^{-\sqrt{2}\,\Phi}-4\,e^{-\sqrt{2/5}\,\Phi+\sqrt{3/5}\,\Phi}+\frac{1}{4}\,e^{\sqrt{2}\,\Phi}\left(-2+\frac{2}{\cosh^2(2\,\rho)}\right)^2+\frac{2}{\cosh^2(2\,\rho)}\right)$$

$$2\,g^2\,e^{\sqrt{2/5}\,\Phi-(8\,\Phi)/\sqrt{15}}\left(\frac{8}{\left(e^{-2\,\rho}+e^{2\,\rho}\right)^2}+\frac{1}{4}\left(\frac{8}{\left(e^{-2\,\rho}+e^{2\,\rho}\right)^2}-2\right)^2 e^{\sqrt{2}\,\Phi}-4\,e^{\sqrt{3/5}\,\Phi-\sqrt{2/5}\,\Phi}+e^{-\sqrt{2}\,\Phi}\right)$$

$\cosh(x)$ is the hyperbolic cosine function

Expanded form

$$2\,g^2\,\text{sech}^4(2\,\rho)\,e^{\sqrt{2/5}\,\Phi+\sqrt{2}\,\Phi-(8\,\Phi)/\sqrt{15}}-4\,g^2\,\text{sech}^2(2\,\rho)\,e^{\sqrt{2/5}\,\Phi+\sqrt{2}\,\Phi-(8\,\Phi)/\sqrt{15}}+4\,g^2\,\text{sech}^2(2\,\rho)\,e^{\sqrt{2/5}\,\Phi-(8\,\Phi)/\sqrt{15}}+2\,g^2\,e^{\sqrt{2/5}\,\Phi+\sqrt{2}\,\Phi-(8\,\Phi)/\sqrt{15}}+2\,g^2\,e^{\sqrt{2/5}\,\Phi-\sqrt{2}\,\Phi-(8\,\Phi)/\sqrt{15}}-8\,g^2\,e^{\sqrt{3/5}\,\Phi-(8\,\Phi)/\sqrt{15}}$$

Alternate form assuming g and ρ are real

$$\frac{32 g^2 \cosh^4(2\rho)\, e^{\sqrt{2/5}\,\Phi+\sqrt{2}\,\Phi-(8\Phi)/\sqrt{15}}}{(\cosh(4\rho)+1)^4} - \frac{16 g^2 \cosh^2(2\rho)\, e^{\sqrt{2/5}\,\Phi+\sqrt{2}\,\Phi-(8\Phi)/\sqrt{15}}}{(\cosh(4\rho)+1)^2} + \frac{16 g^2 \cosh^2(2\rho)\, e^{\sqrt{2/5}\,\Phi-(8\Phi)/\sqrt{15}}}{(\cosh(4\rho)+1)^2} + 2 g^2 e^{\sqrt{2/5}\,\Phi+\sqrt{2}\,\Phi-(8\Phi)/\sqrt{15}} + 2 g^2 e^{\sqrt{2/5}\,\Phi-\sqrt{2}\,\Phi-(8\Phi)/\sqrt{15}} - 8 g^2 e^{\sqrt{3/5}\,\Phi-(8\Phi)/\sqrt{15}}$$

From the alternate form

$$2 e^{\sqrt{2/5}\,\Phi-(8\Phi)/\sqrt{15}} g^2 \left(e^{-\sqrt{2}\,\Phi} - 4 e^{-\sqrt{2/5}\,\Phi+\sqrt{3/5}\,\Phi} + \frac{1}{4} e^{\sqrt{2}\,\Phi}\left(-2+\frac{2}{\cosh^2(2\rho)}\right)^2 + \frac{2}{\cosh^2(2\rho)}\right)$$

we obtain:

2 e^(sqrt(2/5) Φ - (8 Φ)/sqrt(15)) g^2 (e^(-sqrt(2) Φ) - 4 e^(-sqrt(2/5) Φ + sqrt(3/5) Φ) + 1/4 e^(sqrt(2) Φ) (-2 + 2/(cosh^2(2 ρ)))^2 + 2/(cosh^2(2 ρ)))

Input

$$2 e^{\sqrt{\frac{2}{5}}\,\Phi-\frac{8\Phi}{\sqrt{15}}} g^2 \left(e^{-\sqrt{2}\,\Phi} - 4 e^{-\sqrt{2/5}\,\Phi+\sqrt{3/5}\,\Phi} + \frac{1}{4} e^{\sqrt{2}\,\Phi}\left(-2+\frac{2}{\cosh^2(2\rho)}\right)^2 + \frac{2}{\cosh^2(2\rho)}\right)$$

$\cosh(x)$ is the hyperbolic cosine function

Φ is the golden ratio conjugate

Exact result

$$2 g^2 e^{\sqrt{2/5}\,\Phi-(8\Phi)/\sqrt{15}} \left(2\,\text{sech}^2(2\rho) + \frac{1}{4}\left(2\,\text{sech}^2(2\rho)-2\right)^2 e^{\sqrt{2}\,\Phi} - 4 e^{\sqrt{3/5}\,\Phi-\sqrt{2/5}\,\Phi} + e^{-\sqrt{2}\,\Phi}\right)$$

From the above exact result

$$2 g^2 e^{\sqrt{2/5}\,\Phi-(8\Phi)/\sqrt{15}} \left(2\operatorname{sech}^2(2\rho)+\frac{1}{4}\left(2\operatorname{sech}^2(2\rho)-2\right)^2 e^{\sqrt{2}\,\Phi}-4 e^{\sqrt{3/5}\,\Phi-\sqrt{2/5}\,\Phi}+e^{-\sqrt{2}\,\Phi}\right)$$

we obtain:

2 g^2 e^(-(sqrt(2)+8/sqrt(15))Φ)(sech^4(2ρ) e^(sqrt(2/5)Φ+2sqrt(2)Φ)-2sech^2(2ρ) e^(sqrt(2/5)Φ+sqrt(2)Φ)(e^(sqrt(2)Φ)-1)+e^(sqrt(2/5)Φ+2sqrt(2)Φ)-4e^((sqrt(3/5)+sqrt(2))Φ)+e^(sqrt(2/5)Φ))

Input

$$2 g^2 \left(e^{-\left(\sqrt{2}+8/\sqrt{15}\right)\Phi} \left(\operatorname{sech}^4(2\rho)\, e^{\sqrt{2/5}\,\Phi+2\sqrt{2}\,\Phi}-\left(2\operatorname{sech}^2(2\rho)\right)\left(e^{\sqrt{2/5}\,\Phi+\sqrt{2}\,\Phi}\left(e^{\sqrt{2}\,\Phi}-1\right)\right)+ e^{\sqrt{2/5}\,\Phi+2\sqrt{2}\,\Phi}-4 e^{\left(\sqrt{3/5}+\sqrt{2}\right)\Phi}+e^{\sqrt{2/5}\,\Phi}\right)\right)$$

$\operatorname{sech}(x)$ is the hyperbolic secant function
Φ is the golden ratio conjugate

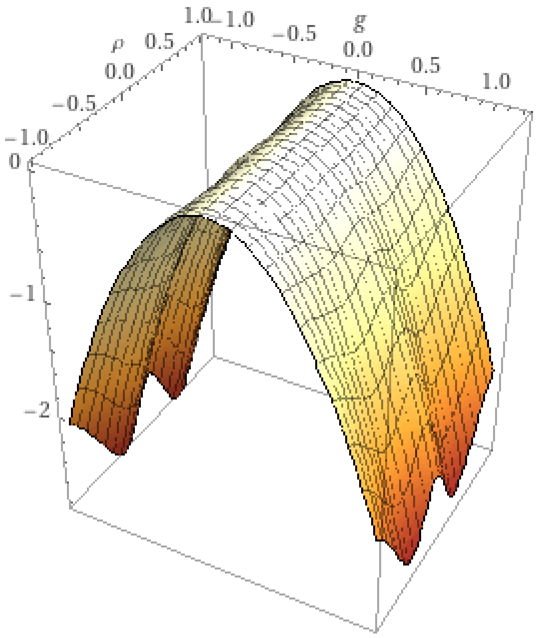
Exact result

$$2 g^2 e^{-\left(\sqrt{2}+8/\sqrt{15}\right)\Phi} \left(\operatorname{sech}^4(2\rho)\, e^{\sqrt{2/5}\,\Phi+2\sqrt{2}\,\Phi}-2\operatorname{sech}^2(2\rho)\, e^{\sqrt{2/5}\,\Phi+\sqrt{2}\,\Phi}\left(e^{\sqrt{2}\,\Phi}-1\right)+ e^{\sqrt{2/5}\,\Phi+2\sqrt{2}\,\Phi}-4 e^{\left(\sqrt{3/5}+\sqrt{2}\right)\Phi}+e^{\sqrt{2/5}\,\Phi}\right)$$

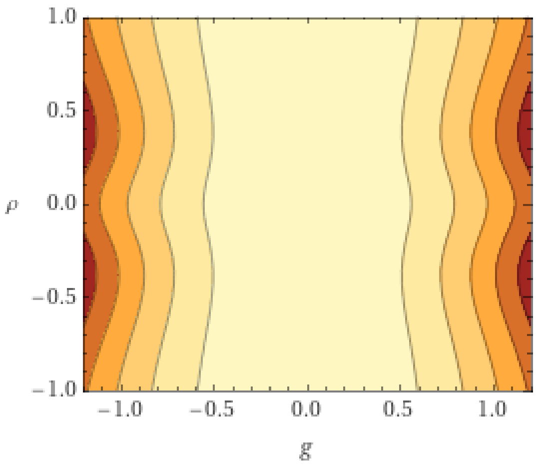
Exact form

$$2 e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\, g^2 \left(e^{\sqrt{10}}\operatorname{sech}^4(2\rho)+ \left(2 e^{1/\sqrt{2}+\sqrt{5/2}}-2 e^{\sqrt{10}}\right)\operatorname{sech}^2(2\rho)-4 e^{1/10\left(5\sqrt{3}+6\sqrt{10}-\sqrt{15}\right)}+e^{\sqrt{10}}+e^{\sqrt{2}}\right)$$

3D plot **(figure that can be related to a D-brane/Instanton)**



Contour plot



Alternate forms

$$2\, e^{-(\sqrt{2}+8/\sqrt{15})\Phi}\, g^2 \left(e^{\sqrt{2/5}\,\Phi} - 4\, e^{(\sqrt{3/5}+\sqrt{2})\Phi} + e^{\sqrt{2/5}\,\Phi+2\sqrt{2}\,\Phi} + \frac{e^{\sqrt{2/5}\,\Phi+2\sqrt{2}\,\Phi}}{\cosh^4(2\rho)} - \frac{2\, e^{\sqrt{2/5}\,\Phi+\sqrt{2}\,\Phi}\left(-1+e^{\sqrt{2}\,\Phi}\right)}{\cosh^2(2\rho)}\right)$$

$$2\, g^2\, e^{-(\sqrt{2}+8/\sqrt{15})\Phi} \left(-\frac{8\, e^{\sqrt{2/5}\,\Phi+\sqrt{2}\,\Phi}\left(e^{\sqrt{2}\,\Phi}-1\right)}{\left(e^{-2\rho}+e^{2\rho}\right)^2} + \frac{16\, e^{\sqrt{2/5}\,\Phi+2\sqrt{2}\,\Phi}}{\left(e^{-2\rho}+e^{2\rho}\right)^4} + e^{\sqrt{2/5}\,\Phi+2\sqrt{2}\,\Phi} - 4\, e^{(\sqrt{3/5}+\sqrt{2})\Phi} + e^{\sqrt{2/5}\,\Phi}\right)$$

$$\frac{1}{8}\, g^2\, \mathrm{sech}^4(2\rho)\, e^{(-\sqrt{2}-8/\sqrt{15})\Phi} \left(\left(e^{-8\rho} + 4\, e^{-4\rho} + 4\, e^{4\rho} + e^{8\rho} + 22\right) e^{(\sqrt{2/5}+2\sqrt{2})\Phi} - 64\cosh^4(2\rho)\, e^{(\sqrt{3/5}+\sqrt{2})\Phi} + 16\cosh^4(2\rho)\, e^{\sqrt{2/5}\,\Phi} - 32\cosh^2(2\rho)\, e^{(\sqrt{2/5}+\sqrt{2})\Phi}\left(e^{\sqrt{2}\,\Phi}-1\right)\right)$$

$\cosh(x)$ is the hyperbolic cosine function

Expanded form

$$2\, g^2\, \mathrm{sech}^4(2\rho)\exp\left(\sqrt{\frac{2}{5}}\,\Phi + 2\sqrt{2}\,\Phi - \left(\sqrt{2}+\frac{8}{\sqrt{15}}\right)\Phi\right) - 4\, g^2\, \mathrm{sech}^2(2\rho)\exp\left(\sqrt{\frac{2}{5}}\,\Phi + 2\sqrt{2}\,\Phi - \left(\sqrt{2}+\frac{8}{\sqrt{15}}\right)\Phi\right) + 2\, g^2 \exp\left(\sqrt{\frac{2}{5}}\,\Phi + 2\sqrt{2}\,\Phi - \left(\sqrt{2}+\frac{8}{\sqrt{15}}\right)\Phi\right) + 4\, g^2\, \mathrm{sech}^2(2\rho)\, e^{\sqrt{\frac{2}{5}}\,\Phi+\sqrt{2}\,\Phi-\left(\sqrt{2}+\frac{8}{\sqrt{15}}\right)\Phi} - 8\, g^2\, e^{\left(\sqrt{\frac{3}{5}}+\sqrt{2}\right)\Phi-\left(\sqrt{2}+\frac{8}{\sqrt{15}}\right)\Phi} + 2\, g^2\, e^{\sqrt{2/5}\,\Phi-(\sqrt{2}+8/\sqrt{15})\Phi}$$

Alternate form assuming g and ρ are real

$$\frac{32 g^2 \cosh^4(2\rho)\exp\left(\sqrt{\frac{2}{5}}\,\Phi + 2\sqrt{2}\,\Phi - \left(\sqrt{2} + \frac{8}{\sqrt{15}}\right)\Phi\right)}{(\cosh(4\rho)+1)^4} - \frac{16 g^2 \cosh^2(2\rho)\exp\left(\sqrt{\frac{2}{5}}\,\Phi + 2\sqrt{2}\,\Phi - \left(\sqrt{2} + \frac{8}{\sqrt{15}}\right)\Phi\right)}{(\cosh(4\rho)+1)^2} + 2 g^2 \exp\left(\sqrt{\frac{2}{5}}\,\Phi + 2\sqrt{2}\,\Phi - \left(\sqrt{2} + \frac{8}{\sqrt{15}}\right)\Phi\right) + \frac{16 g^2 \cosh^2(2\rho)\, e^{\sqrt{\frac{2}{5}}\,\Phi + \sqrt{2}\,\Phi - \left(\sqrt{2} + \frac{8}{\sqrt{15}}\right)\Phi}}{(\cosh(4\rho)+1)^2} - 8 g^2 e^{\left(\sqrt{\frac{3}{5}} + \sqrt{2}\right)\Phi - \left(\sqrt{2} + \frac{8}{\sqrt{15}}\right)\Phi} + 2 g^2 e^{\sqrt{2/5}\,\Phi - \left(\sqrt{2} + 8/\sqrt{15}\right)\Phi}$$

From the exact form

$$2 e^{-3\sqrt{2/5} - 4/\sqrt{3} + 4/\sqrt{15}}\, g^2 \left(e^{\sqrt{10}} \operatorname{sech}^4(2\rho) + \left(2 e^{1/\sqrt{2} + \sqrt{5/2}} - 2 e^{\sqrt{10}}\right)\operatorname{sech}^2(2\rho) - 4 e^{1/10\left(5\sqrt{3} + 6\sqrt{10} - \sqrt{15}\right)} + e^{\sqrt{10}} + e^{\sqrt{2}}\right)$$

we obtain:

2 e^(-3sqrt(2/5)-4/sqrt(3)+4/sqrt(15)) g^2(e^sqrt(10) sech^4(2ρ)+(2 e^(1/sqrt(2)+sqrt(5/2))-2 e^sqrt(10)) sech^2(2ρ)-4 e^(1/10(5sqrt(3)+6sqrt(10)-sqrt(15)))+e^sqrt(10)+e^sqrt(2))

Input

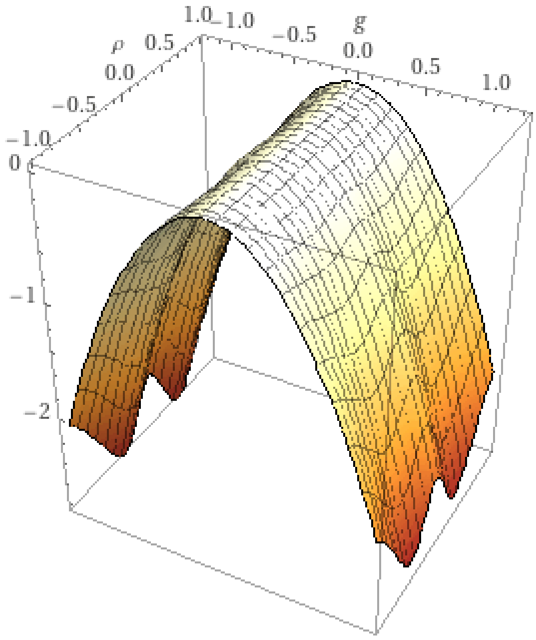
$$2 e^{-3\sqrt{2/5} - 4/\sqrt{3} + 4/\sqrt{15}} \left(g^2 \left(e^{\sqrt{10}} \operatorname{sech}^4(2\rho) + \left(2 e^{1/\sqrt{2} + \sqrt{5/2}} - 2 e^{\sqrt{10}}\right)\operatorname{sech}^2(2\rho) - 4 e^{1/10\left(5\sqrt{3} + 6\sqrt{10} - \sqrt{15}\right)} + e^{\sqrt{10}} + e^{\sqrt{2}}\right)\right)$$

sech(x) is the hyperbolic secant function

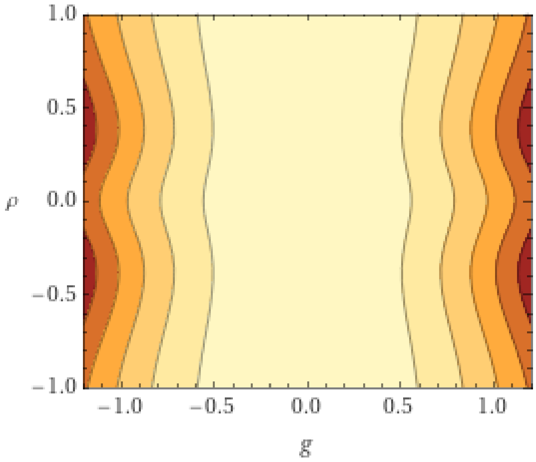
Exact result

$$2\,e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\;g^2\left(e^{\sqrt{10}}\,\operatorname{sech}^4(2\rho)+\left(2\,e^{1/\sqrt{2}+\sqrt{5/2}}-2\,e^{\sqrt{10}}\right)\operatorname{sech}^2(2\rho)-4\,e^{1/10\left(5\sqrt{3}+6\sqrt{10}-\sqrt{15}\right)}+e^{\sqrt{10}}+e^{\sqrt{2}}\right)$$

3D plot (figure that can be related to a D-brane/Instanton)



Contour plot



Alternate forms

$$2\,e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\,g^2\left(e^{\sqrt{10}}\,\operatorname{sech}^4(2\rho)+2\,e^{1/\sqrt{2}+\sqrt{5/2}}\,\operatorname{sech}^2(2\rho)-2\,e^{\sqrt{10}}\,\operatorname{sech}^2(2\rho)+e^{\sqrt{10}}+e^{\sqrt{2}}\right)-8\,e^{\sqrt{\frac{5}{3}}/2-5/(2\sqrt{3})}\,g^2$$

$$2\,e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\,g^2\left(e^{\sqrt{2}}+e^{\sqrt{10}}-4\,e^{1/10(5\sqrt{3}+6\sqrt{10}-\sqrt{15})}+\frac{e^{\sqrt{10}}}{\cosh^4(2\rho)}+\frac{-2\,e^{\sqrt{10}}+2\,e^{1/\sqrt{2}+\sqrt{5/2}}}{\cosh^2(2\rho)}\right)$$

$$2\,e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\,g^2\left(\frac{4\left(2\,e^{1/\sqrt{2}+\sqrt{5/2}}-2\,e^{\sqrt{10}}\right)}{\left(e^{-2\rho}+e^{2\rho}\right)^2}+\frac{16\,e^{\sqrt{10}}}{\left(e^{-2\rho}+e^{2\rho}\right)^4}-4\,e^{1/10(5\sqrt{3}+6\sqrt{10}-\sqrt{15})}+e^{\sqrt{10}}+e^{\sqrt{2}}\right)$$

$\cosh(x)$ is the hyperbolic cosine function

Expanded form

$$-8\exp\left(-3\sqrt{\frac{2}{5}}-\frac{4}{\sqrt{3}}+\frac{4}{\sqrt{15}}+\frac{1}{10}\left(5\sqrt{3}+6\sqrt{10}-\sqrt{15}\right)\right)g^2+2\,e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\,g^2\operatorname{sech}^4(2\rho)-4\,e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\,g^2\operatorname{sech}^2(2\rho)+4\,e^{-3\sqrt{2/5}+1/\sqrt{2}+\sqrt{5/2}-4/\sqrt{3}+4/\sqrt{15}}\,g^2\operatorname{sech}^2(2\rho)+2\,e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\,g^2+2\,e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}}\,g^2$$

Alternate form assuming g and ρ are positive

$$2\,e^{-3\sqrt{2/5}+\sqrt{\frac{5}{3}}/2-4/\sqrt{3}}\,g^2\left(e^{\sqrt{\frac{3}{5}}/2+\sqrt{10}}\,\operatorname{sech}^4(2\rho)-2\,e^{\sqrt{\frac{3}{5}}/2+\sqrt{5/2}}\left(e^{\sqrt{5/2}}-\sqrt[\sqrt{2}]{e}\right)\operatorname{sech}^2(2\rho)+e^{\sqrt{\frac{3}{5}}/2+\sqrt{10}}-4\,e^{3\sqrt{2/5}+\sqrt{3}/2}+e^{\sqrt{\frac{3}{5}}/2+\sqrt{2}}\right)$$

Alternate form assuming g and ρ are real

$$\frac{32\,e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\,g^2\cosh^4(2\rho)}{(\cosh(4\rho)+1)^4}-\frac{16\,e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\,g^2\cosh^2(2\rho)}{(\cosh(4\rho)+1)^2}+\frac{16\,e^{-3\sqrt{2/5}+1/\sqrt{2}+\sqrt{5/2}-4/\sqrt{3}+4/\sqrt{15}}\,g^2\cosh^2(2\rho)}{(\cosh(4\rho)+1)^2}+2\,e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\,g^2-8\,e^{-\sqrt{\frac{3}{5}}/2-4/\sqrt{3}+\sqrt{3}/2+4/\sqrt{15}}\,g^2+2\,e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}}\,g^2$$

Derivative

$$\frac{\partial}{\partial g}\left(2\,e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\left(g^2\left(e^{\sqrt{10}}\,\operatorname{sech}^4(2\rho)+\left(2\,e^{1/\sqrt{2}+\sqrt{5/2}}-2\,e^{\sqrt{10}}\right)\operatorname{sech}^2(2\rho)-4\,e^{1/10(5\sqrt{3}+6\sqrt{10}-\sqrt{15})}+e^{\sqrt{10}}+e^{\sqrt{2}}\right)\right)\right)=4\,e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\,g\left(e^{\sqrt{10}}\,\operatorname{sech}^4(2\rho)+\left(2\,e^{1/\sqrt{2}+\sqrt{5/2}}-2\,e^{\sqrt{10}}\right)\operatorname{sech}^2(2\rho)-4\,e^{1/10(5\sqrt{3}+6\sqrt{10}-\sqrt{15})}+e^{\sqrt{10}}+e^{\sqrt{2}}\right)$$

Indefinite integral

$$\int 2\, e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\, g^2 \Big(e^{\sqrt{2}} + e^{\sqrt{10}} - 4\, e^{1/10(5\sqrt{3}+6\sqrt{10}-\sqrt{15})} + \left(-2\, e^{\sqrt{10}} + 2\, e^{1/\sqrt{2}+\sqrt{5/2}}\right)\operatorname{sech}^2(2\rho) + e^{\sqrt{10}}\operatorname{sech}^4(2\rho)\Big)\, dg =$$
$$-\frac{8}{3}\exp\left(-3\sqrt{\frac{2}{5}} - \frac{4}{\sqrt{3}} + \frac{4}{\sqrt{15}} + \frac{1}{10}\left(5\sqrt{3} + 6\sqrt{10} - \sqrt{15}\right)\right) g^3 +$$
$$\frac{2}{3}\, e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\, g^3 \operatorname{sech}^4(2\rho) +$$
$$\frac{2}{3}\, e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}} \left(2\, e^{1/\sqrt{2}+\sqrt{5/2}} - 2\, e^{\sqrt{10}}\right) g^3 \operatorname{sech}^2(2\rho) +$$
$$\frac{2}{3}\, e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\, g^3 + \frac{2}{3}\, e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}}\, g^3 + \text{constant}$$

Now, we analyze the indefinite integral:

$$\int 2\, e^{-3\sqrt{2/5} - 4/\sqrt{3} + 4/\sqrt{15}}\, g^2 \left(e^{\sqrt{2}} + e^{\sqrt{10}} - 4\, e^{1/10(5\sqrt{3} + 6\sqrt{10} - \sqrt{15})} + \left(-2\, e^{\sqrt{10}} + 2\, e^{1/\sqrt{2} + \sqrt{5/2}}\right) \operatorname{sech}^2(2\rho) + e^{\sqrt{10}} \operatorname{sech}^4(2\rho)\right) dg = -\frac{8}{3} \exp\left(-3\sqrt{\frac{2}{5}} - \frac{4}{\sqrt{3}} + \frac{4}{\sqrt{15}} + \frac{1}{10}\left(5\sqrt{3} + 6\sqrt{10} - \sqrt{15}\right)\right) g^3 + \frac{2}{3} e^{-3\sqrt{2/5} - 4/\sqrt{3} + \sqrt{10} + 4/\sqrt{15}}\, g^3 \operatorname{sech}^4(2\rho) + \frac{2}{3} e^{-3\sqrt{2/5} - 4/\sqrt{3} + 4/\sqrt{15}} \left(2\, e^{1/\sqrt{2} + \sqrt{5/2}} - 2\, e^{\sqrt{10}}\right) g^3 \operatorname{sech}^2(2\rho) + \frac{2}{3} e^{-3\sqrt{2/5} - 4/\sqrt{3} + \sqrt{10} + 4/\sqrt{15}}\, g^3 + \frac{2}{3} e^{-3\sqrt{2/5} + \sqrt{2} - 4/\sqrt{3} + 4/\sqrt{15}}\, g^3 + \text{constant}$$

From the result, we obtain:

-8/3 exp(-3 sqrt(2/5) - 4/sqrt(3) + 4/sqrt(15) + 1/10 (5 sqrt(3) + 6 sqrt(10) - sqrt(15))) g^3 + 2/3 e^(-3 sqrt(2/5) - 4/sqrt(3) + sqrt(10) + 4/sqrt(15)) g^3 sech^4(2 ρ)

Input

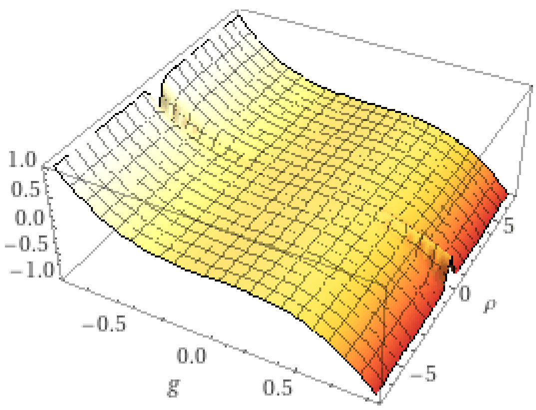
$$-\frac{8}{3} \exp\left(-3\sqrt{\frac{2}{5}} - \frac{4}{\sqrt{3}} + \frac{4}{\sqrt{15}} + \frac{1}{10}\left(5\sqrt{3} + 6\sqrt{10} - \sqrt{15}\right)\right) g^3 + \frac{2}{3} e^{-3\sqrt{2/5} - 4/\sqrt{3} + \sqrt{10} + 4/\sqrt{15}}\, g^3 \operatorname{sech}^4(2\rho)$$

$\operatorname{sech}(x)$ is the hyperbolic secant function

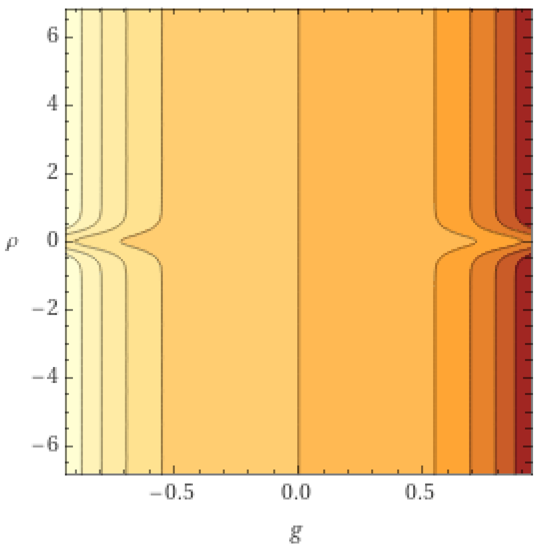
Exact result

$$\frac{2}{3} e^{-3\sqrt{2/5} - 4/\sqrt{3} + \sqrt{10} + 4/\sqrt{15}}\, g^3 \operatorname{sech}^4(2\rho) - \frac{8}{3} \exp\left(-3\sqrt{\frac{2}{5}} - \frac{4}{\sqrt{3}} + \frac{4}{\sqrt{15}} + \frac{1}{10}\left(5\sqrt{3} + 6\sqrt{10} - \sqrt{15}\right)\right) g^3$$

3D plot **(figure that can be related to a D-brane/Instanton)**



Contour plot



Alternate forms

$$\frac{2}{3} e^{(\sqrt{5}-8)/(2\sqrt{3})} g^3 \left(e^{\sqrt{7/4+(2\sqrt{6})/5}} \operatorname{sech}^4(2\rho) - 4 e^{\sqrt{3}/2}\right)$$

$$\frac{2}{3} e^{(\sqrt{5}-8)/(2\sqrt{3})} g^3 \left(e^{1/10(4\sqrt{10}+\sqrt{15})} \operatorname{sech}^4(2\rho) - 4 e^{\sqrt{3}/2}\right)$$

$$\frac{2}{3} e^{2\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}} g^3 \operatorname{sech}^4(2\rho) - \frac{8}{3} e^{\sqrt{\frac{5}{3}}/2-5/(2\sqrt{3})} g^3$$

Alternate form assuming g and ρ are real

$$\frac{32 e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}} g^3 \cosh^4(2\rho)}{3(\cosh(4\rho)+1)^4} - \frac{8}{3}\exp\left(-3\sqrt{\frac{2}{5}} - \frac{4}{\sqrt{3}} + \frac{4}{\sqrt{15}} + \frac{1}{10}\left(5\sqrt{3}+6\sqrt{10}-\sqrt{15}\right)\right) g^3$$

$\cosh(x)$ is the hyperbolic cosine function

Root

$\cosh(2\rho) \neq 0, \quad g = 0$

Property as a function

Parity

odd

Periodicity

periodic in ρ with period $\frac{i\pi}{2}$

Derivative

$$\frac{\partial}{\partial g}\left(-\frac{8}{3}\exp\left(-3\sqrt{\frac{2}{5}} - \frac{4}{\sqrt{3}} + \frac{4}{\sqrt{15}} + \frac{1}{10}\left(5\sqrt{3}+6\sqrt{10}-\sqrt{15}\right)\right) g^3 + \frac{2}{3} e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}} g^3 \operatorname{sech}^4(2\rho)\right) = 2 e^{(\sqrt{5}-8)/(2\sqrt{3})} g^2 \left(e^{1/10(4\sqrt{10}+\sqrt{15})} \operatorname{sech}^4(2\rho) - 4 e^{\sqrt{3}/2}\right)$$

Indefinite integral

$$\int\left(-\frac{8}{3}\exp\left(-3\sqrt{\frac{2}{5}}-\frac{4}{\sqrt{3}}+\frac{4}{\sqrt{15}}+\frac{1}{10}\left(5\sqrt{3}+6\sqrt{10}-\sqrt{15}\right)\right)g^3+\frac{2}{3}e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\,g^3\,\mathrm{sech}^4(2\rho)\right)dg=$$
$$\frac{1}{6}e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\,g^4\,\mathrm{sech}^4(2\rho)-\frac{2}{3}\exp\left(-3\sqrt{\frac{2}{5}}-\frac{4}{\sqrt{3}}+\frac{4}{\sqrt{15}}+\frac{1}{10}\left(5\sqrt{3}+6\sqrt{10}-\sqrt{15}\right)\right)g^4+\text{constant}$$

From the exact result

$$\frac{2}{3}e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\,g^3\,\mathrm{sech}^4(2\rho)-\frac{8}{3}\exp\left(-3\sqrt{\frac{2}{5}}-\frac{4}{\sqrt{3}}+\frac{4}{\sqrt{15}}+\frac{1}{10}\left(5\sqrt{3}+6\sqrt{10}-\sqrt{15}\right)\right)g^3$$

for g = 8 and ρ = 16 :

2/3 e^(-3 sqrt(2/5) - 4/sqrt(3) + sqrt(10) + 4/sqrt(15)) 8^3 sech^4(2*16) - 8/3 exp(-3 sqrt(2/5) - 4/sqrt(3) + 4/sqrt(15) + 1/10 (5 sqrt(3) + 6 sqrt(10) - sqrt(15))) 8^3

Input

$$\frac{2}{3}e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\times 8^3\,\mathrm{sech}^4(2\times 16)-\frac{8}{3}\exp\left(-3\sqrt{\frac{2}{5}}-\frac{4}{\sqrt{3}}+\frac{4}{\sqrt{15}}+\frac{1}{10}\left(5\sqrt{3}+6\sqrt{10}-\sqrt{15}\right)\right)\times 8^3$$

$\mathrm{sech}(x)$ is the hyperbolic secant function

Exact result

$$\frac{1024}{3} e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}} \operatorname{sech}^4(32) - \frac{4096}{3} \exp\left(-3\sqrt{\frac{2}{5}} - \frac{4}{\sqrt{3}} + \frac{4}{\sqrt{15}} + \frac{1}{10}(5\sqrt{3}+6\sqrt{10}-\sqrt{15})\right)$$

Decimal approximation

−614.7867313947158151469879707117072735708717255655294830534946287 …

-614.7867313947158

Alternate forms

$$\frac{1024}{3} e^{(\sqrt{5}-8)/(2\sqrt{3})} \left(e^{\sqrt{7/4+(2\sqrt{6})/5}} \operatorname{sech}^4(32) - 4 e^{\sqrt{3}/2}\right)$$

$$\frac{1024}{3} e^{(\sqrt{5}-8)/(2\sqrt{3})} \left(e^{1/10(4\sqrt{10}+\sqrt{15})} \operatorname{sech}^4(32) - 4 e^{\sqrt{3}/2}\right)$$

$$\frac{1024}{3} e^{2\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}} \operatorname{sech}^4(32) - \frac{4096}{3} e^{\sqrt{\frac{5}{3}}/2-5/(2\sqrt{3})}$$

Alternative representations

$$\frac{1}{3} e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}} \, 2\times 8^3 \operatorname{sech}^4(2\times 16) - \frac{8}{3} \exp\left(-3\sqrt{\frac{2}{5}} - \frac{4}{\sqrt{3}} + \frac{4}{\sqrt{15}} + \frac{1}{10}(5\sqrt{3}+6\sqrt{10}-\sqrt{15})\right) 8^3 = -\frac{8}{3} \exp\left(-\frac{4}{\sqrt{3}} + \frac{4}{\sqrt{15}} + \frac{1}{10}(5\sqrt{3}+6\sqrt{10}-\sqrt{15}) - 3\sqrt{\frac{2}{5}}\right) 8^3 + \frac{2}{3} \times 8^3 e^{-4/\sqrt{3}+4/\sqrt{15}+\sqrt{10}-3\sqrt{2/5}} \left(\frac{1}{\cos(-32 i)}\right)^4$$

$$\frac{1}{3} e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\ 2\times 8^3 \operatorname{sech}^4(2\times 16) - \frac{8}{3}\exp\left(-3\sqrt{\frac{2}{5}}-\frac{4}{\sqrt{3}}+\frac{4}{\sqrt{15}}+\frac{1}{10}\left(5\sqrt{3}+6\sqrt{10}-\sqrt{15}\right)\right)8^3 = -\frac{8}{3}\exp\left(-\frac{4}{\sqrt{3}}+\frac{4}{\sqrt{15}}+\frac{1}{10}\left(5\sqrt{3}+6\sqrt{10}-\sqrt{15}\right)-3\sqrt{\frac{2}{5}}\right)8^3 + \frac{2}{3}\times 8^3 e^{-4/\sqrt{3}+4/\sqrt{15}+\sqrt{10}-3\sqrt{2/5}}\left(\frac{2e^{32}}{1+e^{64}}\right)^4$$

$$\frac{1}{3} e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\ 2\times 8^3 \operatorname{sech}^4(2\times 16) - \frac{8}{3}\exp\left(-3\sqrt{\frac{2}{5}}-\frac{4}{\sqrt{3}}+\frac{4}{\sqrt{15}}+\frac{1}{10}\left(5\sqrt{3}+6\sqrt{10}-\sqrt{15}\right)\right)8^3 = -\frac{8}{3}\exp\left(-\frac{4}{\sqrt{3}}+\frac{4}{\sqrt{15}}+\frac{1}{10}\left(5\sqrt{3}+6\sqrt{10}-\sqrt{15}\right)-3\sqrt{\frac{2}{5}}\right)8^3 + \frac{2}{3}\times 8^3 e^{-4/\sqrt{3}+4/\sqrt{15}+\sqrt{10}-3\sqrt{2/5}}\left(\frac{2}{\frac{1}{e^{32}}+e^{32}}\right)^4$$

Series representations

$$\frac{1}{3} e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\ 2\times 8^3 \operatorname{sech}^4(2\times 16) - \frac{8}{3}\exp\left(-3\sqrt{\frac{2}{5}}-\frac{4}{\sqrt{3}}+\frac{4}{\sqrt{15}}+\frac{1}{10}\left(5\sqrt{3}+6\sqrt{10}-\sqrt{15}\right)\right)8^3 = -\frac{4096}{3} e^{\sqrt{3}/2+\left(-8+\sqrt{5}\right)/\left(2\sqrt{3}\right)} + \frac{16384}{3} e^{\frac{-8+\sqrt{5}}{2\sqrt{3}}+\frac{1}{10}\left(4\sqrt{10}+\sqrt{15}\right)}\left(\sum_{k=1}^{\infty}(-1)^k q^{-1+2k}\right)^4 \quad \text{for } q = e^{32}$$

$$\frac{1}{3} e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\ 2\times 8^3 \operatorname{sech}^4(2\times 16) - \frac{8}{3}\exp\left(-3\sqrt{\frac{2}{5}}-\frac{4}{\sqrt{3}}+\frac{4}{\sqrt{15}}+\frac{1}{10}\left(5\sqrt{3}+6\sqrt{10}-\sqrt{15}\right)\right)8^3 = -\frac{4096}{3} e^{-4/3\left(96+\sqrt{3}\right)+1/6\left(768+3\sqrt{3}+\sqrt{15}\right)} + \frac{16384}{3} e^{2\sqrt{2/5}+4/\sqrt{15}-4/3\left(96+\sqrt{3}\right)} \left(\sum_{k=0}^{\infty}(-1)^k e^{-64k}\right)^4$$

$$\frac{1}{3} e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\ 2\times 8^3 \operatorname{sech}^4(2\times 16) - \frac{8}{3}\exp\left(-3\sqrt{\frac{2}{5}}-\frac{4}{\sqrt{3}}+\frac{4}{\sqrt{15}}+\frac{1}{10}\left(5\sqrt{3}+6\sqrt{10}-\sqrt{15}\right)\right)8^3 = -\frac{4096}{3}\exp\left(-3\sqrt{\frac{2}{5}}-\frac{4}{\sqrt{3}}+\frac{4}{\sqrt{15}}+\frac{1}{10}\left(5\sqrt{3}+6\sqrt{10}-\sqrt{15}\right)\right) + \frac{16384}{3} e^{-128-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}} \left(\sum_{k=0}^{\infty}(-1)^k e^{-64k}\right)^4$$

Integral representation

$$\frac{1}{3} e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\ 2\times 8^3 \operatorname{sech}^4(2\times 16) - \frac{8}{3}\exp\left(-3\sqrt{\frac{2}{5}}-\frac{4}{\sqrt{3}}+\frac{4}{\sqrt{15}}+\frac{1}{10}\left(5\sqrt{3}+6\sqrt{10}-\sqrt{15}\right)\right)8^3 = -\frac{4096}{3}\exp\left(-3\sqrt{\frac{2}{5}}-\frac{4}{\sqrt{3}}+\frac{4}{\sqrt{15}}+\frac{1}{10}\left(5\sqrt{3}+6\sqrt{10}-\sqrt{15}\right)\right) + \frac{16384\, e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}} \left(\int_0^{\infty}\frac{t^{(64i)/\pi}}{1+t^2}\,dt\right)^4}{3\pi^4}$$

-614.7867313947158+ 2/3 e^(-3 sqrt(2/5) - 4/sqrt(3) + 4/sqrt(15)) (2 e^(1/sqrt(2) + sqrt(5/2)) - 2 e^sqrt(10)) g^3 sech^2(2 ρ) + 2/3 e^(-3 sqrt(2/5) - 4/sqrt(3) + sqrt(10) + 4/sqrt(15)) g^3 + 2/3 e^(-3 sqrt(2/5) + sqrt(2) - 4/sqrt(3) + 4/sqrt(15)) g^3

Input

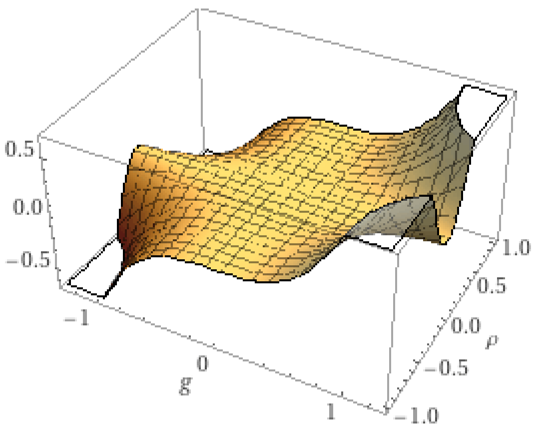
$$\frac{2}{3}\left(e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\left(2e^{1/\sqrt{2}+\sqrt{5/2}}-2e^{\sqrt{10}}\right)\right)g^3\,\mathrm{sech}^2(2\rho)+\frac{2}{3}e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}g^3+\frac{2}{3}e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}}g^3$$

$\mathrm{sech}(x)$ is the hyperbolic secant function

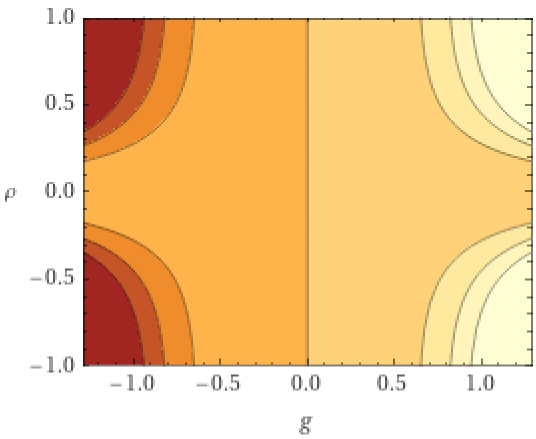
Exact result

$$\frac{2}{3}e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\left(2e^{1/\sqrt{2}+\sqrt{5/2}}-2e^{\sqrt{10}}\right)g^3\,\mathrm{sech}^2(2\rho)+\frac{2}{3}e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}g^3+\frac{2}{3}e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}}g^3$$

3D plot **(figure that can be related to a D-brane/Instanton)**



Contour plot



Alternate forms

$$\frac{2}{3} e^{-3\sqrt{2/5} - 4/\sqrt{3} + 4/\sqrt{15}} g^3 \left(2 e^{\sqrt{3+\sqrt{5}}} \operatorname{sech}^2(2\rho) + e^{\sqrt{10}} \left(1 - 2\operatorname{sech}^2(2\rho)\right) + e^{\sqrt{2}}\right)$$

$$-\frac{2}{3} e^{-3\sqrt{2/5} - 4/\sqrt{3} + 4/\sqrt{15}} g^3 \left(-2 e^{1/\sqrt{2} + \sqrt{5/2}} \operatorname{sech}^2(2\rho) + 2 e^{\sqrt{10}} \operatorname{sech}^2(2\rho) - e^{\sqrt{10}} - e^{\sqrt{2}}\right)$$

$$\left(e^{-3\sqrt{2/5} - 4/\sqrt{3} + 4/\sqrt{15}} g^3 \left(e^{\sqrt{10}} \cosh(4\rho) + e^{\sqrt{2}} \cosh(4\rho) + 4 e^{1/\sqrt{2} + \sqrt{5/2}} - 3 e^{\sqrt{10}} + e^{\sqrt{2}}\right)\right) \Big/ \left(3 (\cosh(\rho) - i \sinh(\rho))^2 (\cosh(\rho) + i \sinh(\rho))^2\right)$$

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

Expanded form

$$-\frac{4}{3} e^{-3\sqrt{2/5} - 4/\sqrt{3} + \sqrt{10} + 4/\sqrt{15}} g^3 \operatorname{sech}^2(2\rho) + \frac{4}{3} e^{-3\sqrt{2/5} + 1/\sqrt{2} + \sqrt{5/2} - 4/\sqrt{3} + 4/\sqrt{15}} g^3 \operatorname{sech}^2(2\rho) + \frac{2}{3} e^{-3\sqrt{2/5} - 4/\sqrt{3} + \sqrt{10} + 4/\sqrt{15}} g^3 + \frac{2}{3} e^{-3\sqrt{2/5} + \sqrt{2} - 4/\sqrt{3} + 4/\sqrt{15}} g^3$$

Alternate form assuming g and ρ are real

$$-\frac{16\,e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\;g^3\cosh^2(2\,\rho)}{3\,(\cosh(4\,\rho)+1)^2}+\frac{16\,e^{-3\sqrt{2/5}+1/\sqrt{2}+\sqrt{5/2}-4/\sqrt{3}+4/\sqrt{15}}\;g^3\cosh^2(2\,\rho)}{3\,(\cosh(4\,\rho)+1)^2}+\frac{2}{3}\,e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\;g^3+\frac{2}{3}\,e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}}\;g^3$$

Root

$\cosh(2\,\rho)\neq 0\,,\quad g=0$

Roots

$\rho\approx 0.50000\,i\,(6.2832\,n+3.0557)\,,\quad n\in\mathbb{Z}$

$\rho\approx 0.50000\,i\,(6.2832\,n-3.0557)\,,\quad n\in\mathbb{Z}$

$\rho\approx 0.50000\,i\,(6.2832\,n+0.085899)\,,\quad n\in\mathbb{Z}$

$\rho\approx 0.50000\,i\,(6.2832\,n-0.085899)\,,\quad n\in\mathbb{Z}$

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

Integer root

$g=0$

Property as a function

Parity

odd

Periodicity

periodic in ρ with period $\frac{i\pi}{2}$

Roots for the variable ρ

$$\rho = \frac{1}{2}\left(-\cosh^{-1}\left(-\sqrt{\frac{2\left(e^{\sqrt{10}} - e^{1/\sqrt{2}+\sqrt{5/2}}\right)}{e^{\sqrt{2}} + e^{\sqrt{10}}}}\right) + 2 i \pi c_1\right)$$

$$\rho = \frac{1}{2}\left(\cosh^{-1}\left(-\sqrt{\frac{2\left(e^{\sqrt{10}} - e^{1/\sqrt{2}+\sqrt{5/2}}\right)}{e^{\sqrt{2}} + e^{\sqrt{10}}}}\right) + 2 i \pi c_1\right)$$

$$\rho = \frac{1}{2}\left(-\cosh^{-1}\left(\sqrt{\frac{2\left(e^{\sqrt{10}} - e^{1/\sqrt{2}+\sqrt{5/2}}\right)}{e^{\sqrt{2}} + e^{\sqrt{10}}}}\right) + 2 i \pi c_1\right)$$

$\cosh^{-1}(x)$ is the inverse hyperbolic cosine function

Derivative

$$\frac{\partial}{\partial g}\left(\frac{2}{3}\left(e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\left(2 e^{1/\sqrt{2}+\sqrt{5/2}} - 2 e^{\sqrt{10}}\right)\right) g^3 \operatorname{sech}^2(2\rho) + \frac{2}{3} e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}} g^3 + \frac{2}{3} e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}} g^3\right) = 2 e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}} g^2 \left(\left(2 e^{1/\sqrt{2}+\sqrt{5/2}} - 2 e^{\sqrt{10}}\right) \operatorname{sech}^2(2\rho) + e^{\sqrt{10}} + e^{\sqrt{2}}\right)$$

Indefinite integral

$$\int\left(\frac{2}{3} e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}} g^3 + \frac{2}{3} e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}} g^3 + \frac{2}{3} e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\left(-2 e^{\sqrt{10}} + 2 e^{1/\sqrt{2}+\sqrt{5/2}}\right) g^3 \operatorname{sech}^2(2\rho)\right) dg = \frac{1}{6} e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\left(2 e^{1/\sqrt{2}+\sqrt{5/2}} - 2 e^{\sqrt{10}}\right) g^4 \operatorname{sech}^2(2\rho) + \frac{1}{6} e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}} g^4 + \frac{1}{6} e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}} g^4 + \text{constant}$$

From the exact result

$$\frac{2}{3} e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}} \left(2 e^{1/\sqrt{2}+\sqrt{5/2}} - 2 e^{\sqrt{10}}\right) g^3 \operatorname{sech}^2(2\rho) + \frac{2}{3} e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}} g^3 + \frac{2}{3} e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}} g^3$$

for g = 8 and ρ = 16 :

2/3 e^(-3sqrt(2/5)-4/sqrt(3)+4/sqrt(15))(2e^(1/sqrt(2)+sqrt(5/2))-2 e^sqrt(10)) 8^3 sech^2(2*16)+2/3 e^(-3√(2/5)-4/√(3)+√(10)+4/√(15)) 8^3+2/3 e^(-3√(2/5)+√(2)-4/√(3)+4/√(15)) 8^3

Input

$$\frac{2}{3} \left(e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}} \left(2 e^{1/\sqrt{2}+\sqrt{5/2}} - 2 e^{\sqrt{10}}\right)\right) \times 8^3 \operatorname{sech}^2(2\times 16) + \frac{2}{3} e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}} \times 8^3 + \frac{2}{3} e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}} \times 8^3$$

sech(x) is the hyperbolic secant function

Exact result

$$\frac{1024}{3} e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}} + \frac{1024}{3} e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}} + \frac{1024}{3} e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}} \left(2 e^{1/\sqrt{2}+\sqrt{5/2}} - 2 e^{\sqrt{10}}\right) \operatorname{sech}^2(32)$$

Decimal approximation

396.1037037075239760149136580576596043755783515109852720274628903 3...

396.103703707523….

Alternate forms

$$\frac{1024}{3} e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}} \left(e^{\sqrt{2}} + 2 e^{1/\sqrt{2}+\sqrt{5/2}} \operatorname{sech}^2(32) + e^{\sqrt{10}} \left(1 - 2\operatorname{sech}^2(32)\right)\right)$$

$$-\frac{1024}{3} e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}} \left(-e^{\sqrt{2}} - e^{\sqrt{10}} + 2 e^{\sqrt{10}} \operatorname{sech}^2(32) - 2 e^{1/\sqrt{2}+\sqrt{5/2}} \operatorname{sech}^2(32)\right)$$

$$\left(1024 e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}} \left(e^{\sqrt{2}} + e^{\sqrt{10}} + 2 e^{64+\sqrt{2}} + e^{128+\sqrt{2}} + 8 e^{64+1/\sqrt{2}+\sqrt{5/2}} - 6 e^{64+\sqrt{10}} + e^{128+\sqrt{10}}\right)\right) \Big/ \left(3 \left(e^{32} + -i\right)^2 \left(e^{32} + i\right)^2\right)$$

Alternative representations

$$\frac{1}{3}\left(2\times 8^3 \operatorname{sech}^2(2\times 16)\right) e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}} \left(2 e^{1/\sqrt{2}+\sqrt{5/2}} - 2 e^{\sqrt{10}}\right) + \frac{1}{3}\left(e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\, 8^3\right)2 + \frac{1}{3}\left(e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}}\, 8^3\right)2 = \frac{2}{3}\times 8^3 e^{-4/\sqrt{3}+4/\sqrt{15}+\sqrt{2}-3\sqrt{2/5}} + \frac{2}{3}\times 8^3 e^{-4/\sqrt{3}+4/\sqrt{15}+\sqrt{10}-3\sqrt{2/5}} + \frac{2}{3}\times 8^3 \left(2 e^{1/\sqrt{2}+\sqrt{5/2}} - 2 e^{\sqrt{10}}\right) e^{-4/\sqrt{3}+4/\sqrt{15}-3\sqrt{2/5}} \left(\frac{1}{\cosh(32)}\right)^2$$

$$\frac{1}{3}\left(2\times 8^3 \operatorname{sech}^2(2\times 16)\right) e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}} \left(2 e^{1/\sqrt{2}+\sqrt{5/2}} - 2 e^{\sqrt{10}}\right) + \frac{1}{3}\left(e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\, 8^3\right)2 + \frac{1}{3}\left(e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}}\, 8^3\right)2 = \frac{2}{3}\times 8^3 e^{-4/\sqrt{3}+4/\sqrt{15}+\sqrt{2}-3\sqrt{2/5}} + \frac{2}{3}\times 8^3 e^{-4/\sqrt{3}+4/\sqrt{15}+\sqrt{10}-3\sqrt{2/5}} + \frac{2}{3}\times 8^3 \left(2 e^{1/\sqrt{2}+\sqrt{5/2}} - 2 e^{\sqrt{10}}\right) e^{-4/\sqrt{3}+4/\sqrt{15}-3\sqrt{2/5}} \left(\frac{1}{\cos(-32 i)}\right)^2$$

$$\frac{1}{3}\left(2\times 8^3 \operatorname{sech}^2(2\times 16)\right) e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}} \left(2 e^{1/\sqrt{2}+\sqrt{5/2}} - 2 e^{\sqrt{10}}\right) + \frac{1}{3}\left(e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\, 8^3\right)2 + \frac{1}{3}\left(e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}}\, 8^3\right)2 = \frac{2}{3}\times 8^3 e^{-4/\sqrt{3}+4/\sqrt{15}+\sqrt{2}-3\sqrt{2/5}} + \frac{2}{3}\times 8^3 e^{-4/\sqrt{3}+4/\sqrt{15}+\sqrt{10}-3\sqrt{2/5}} + \frac{2}{3}\times 8^3 \left(2 e^{1/\sqrt{2}+\sqrt{5/2}} - 2 e^{\sqrt{10}}\right) e^{-4/\sqrt{3}+4/\sqrt{15}-3\sqrt{2/5}} \left(\frac{1}{\cos(32 i)}\right)^2$$

$\cosh(x)$ is the hyperbolic cosine function
i is the imaginary unit

Series representations

$$\frac{1}{3}\left(2\times 8^3\,\mathrm{sech}^2(2\times 16)\right) e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\left(2e^{1/\sqrt{2}+\sqrt{5/2}}-2e^{\sqrt{10}}\right)+\frac{1}{3}\left(e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\,8^3\right)2+\frac{1}{3}\left(e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}}\,8^3\right)2=\frac{1024}{3}e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\left(e^{\sqrt{2}}+e^{\sqrt{10}}+\left(2e^{\sqrt{10}}-2e^{1/\sqrt{2}+\sqrt{5/2}}\right)\sum_{k=-\infty}^{\infty}\frac{1}{\left(32+i\left(\frac{1}{2}+k\right)\pi\right)^2}\right)$$

$$\frac{1}{3}\left(2\times 8^3\,\mathrm{sech}^2(2\times 16)\right) e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\left(2e^{1/\sqrt{2}+\sqrt{5/2}}-2e^{\sqrt{10}}\right)+\frac{1}{3}\left(e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\,8^3\right)2+\frac{1}{3}\left(e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}}\,8^3\right)2=\frac{1024}{3}e^{-64-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\left(e^{64}\left(e^{\sqrt{2}}+e^{\sqrt{10}}\right)+\left(-8e^{\sqrt{10}}+8e^{1/\sqrt{2}+\sqrt{5/2}}\right)\left(\sum_{k=0}^{\infty}(-1)^k e^{-64k}\right)^2\right)$$

$$\frac{1}{3}\left(2\times 8^3\,\mathrm{sech}^2(2\times 16)\right) e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\left(2e^{1/\sqrt{2}+\sqrt{5/2}}-2e^{\sqrt{10}}\right)+\frac{1}{3}\left(e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\,8^3\right)2+\frac{1}{3}\left(e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}}\,8^3\right)2=\frac{1024}{3}e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\left(e^{\sqrt{2}}+e^{\sqrt{10}}+\left(-8e^{\sqrt{10}}+8e^{1/\sqrt{2}+\sqrt{5/2}}\right)\left(\sum_{k=1}^{\infty}(-1)^k q^{-1+2k}\right)^2\right)\ \text{for } q=e^{32}$$

Integral representation

$$\frac{1}{3}\left(2\times 8^3\,\mathrm{sech}^2(2\times 16)\right) e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\left(2e^{1/\sqrt{2}+\sqrt{5/2}}-2e^{\sqrt{10}}\right)+\frac{1}{3}\left(e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\,8^3\right)2+\frac{1}{3}\left(e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}}\,8^3\right)2=\frac{1}{3\pi^2}1024\,e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\left(e^{\sqrt{2}}\pi^2+e^{\sqrt{10}}\pi^2-8e^{\sqrt{10}}\left(\int_0^\infty\frac{t^{(64i)/\pi}}{1+t^2}\,dt\right)^2+8e^{1/\sqrt{2}+\sqrt{5/2}}\left(\int_0^\infty\frac{t^{(64i)/\pi}}{1+t^2}\,dt\right)^2\right)$$

From the exact result

$$\frac{1024}{3} e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}} + \frac{1024}{3} e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}} + \frac{1024}{3} e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}} \left(2 e^{1/\sqrt{2}+\sqrt{5/2}} - 2 e^{\sqrt{10}}\right) \operatorname{sech}^2(32)$$

-614.7867313947158+1024/3 e^(-3 √(2/5) + √(2) - 4/√(3) + 4/√(15)) + 1024/3 e^(-3 √(2/5) - 4/√(3) + √(10) + 4/√(15)) + 1024/3 e^(-3 √(2/5) - 4/√(3) + 4/√(15)) (2 e^(1/√(2) + √(5/2)) - 2 e^√(10)) sech^2(32)

we obtain:

-614.7867313947158+1024/3 e^(-3√(2/5)+√(2)-4/√(3)+4/√(15))+1024/3 e^(-3√(2/5)-4/√(3)+√(10)+4/√(15))+1024/3 e^(-3√(2/5)-4/√(3)+4/√(15))(2e^(1/√(2)+√(5/2))-2 e^√(10)) sech^2(32)

Input interpretation

$$-614.7867313947158 + \frac{1024}{3} e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}} + \frac{1024}{3} e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}} + \frac{1024}{3} \left(e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}} \left(2 e^{1/\sqrt{2}+\sqrt{5/2}} - 2 e^{\sqrt{10}}\right)\right) \operatorname{sech}^2(32)$$

sech(x) is the hyperbolic secant function

Result

−218.6830276871918…

-218.6830276871918…. final result

Alternative representations

$$-614.78673139471580000+\frac{1}{3}e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}}\,1024+\frac{1}{3}e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\,1024+\frac{1}{3}\left(\left(e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\left(2e^{1/\sqrt{2}+\sqrt{5/2}}-2e^{\sqrt{10}}\right)\right)\operatorname{sech}^2(32)\right)1024=$$

$$-614.78673139471580000+\frac{1024}{3}e^{-4/\sqrt{3}+4/\sqrt{15}+\sqrt{2}-3\sqrt{2/5}}+\frac{1024}{3}e^{-4/\sqrt{3}+4/\sqrt{15}+\sqrt{10}-3\sqrt{2/5}}+\frac{1024}{3}\left(2e^{1/\sqrt{2}+\sqrt{5/2}}-2e^{\sqrt{10}}\right)e^{-4/\sqrt{3}+4/\sqrt{15}-3\sqrt{2/5}}\left(\frac{1}{\cosh(32)}\right)^2$$

$$-614.78673139471580000+\frac{1}{3}e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}}\,1024+\frac{1}{3}e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\,1024+\frac{1}{3}\left(\left(e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\left(2e^{1/\sqrt{2}+\sqrt{5/2}}-2e^{\sqrt{10}}\right)\right)\operatorname{sech}^2(32)\right)1024=$$

$$-614.78673139471580000+\frac{1024}{3}e^{-4/\sqrt{3}+4/\sqrt{15}+\sqrt{2}-3\sqrt{2/5}}+\frac{1024}{3}e^{-4/\sqrt{3}+4/\sqrt{15}+\sqrt{10}-3\sqrt{2/5}}+\frac{1024}{3}\left(2e^{1/\sqrt{2}+\sqrt{5/2}}-2e^{\sqrt{10}}\right)e^{-4/\sqrt{3}+4/\sqrt{15}-3\sqrt{2/5}}\left(\frac{1}{\cos(-32i)}\right)^2$$

$$-614.78673139471580000+\frac{1}{3}e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}}\,1024+\frac{1}{3}e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\,1024+\frac{1}{3}\left(\left(e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\left(2e^{1/\sqrt{2}+\sqrt{5/2}}-2e^{\sqrt{10}}\right)\right)\operatorname{sech}^2(32)\right)1024=$$

$$-614.78673139471580000+\frac{1024}{3}e^{-4/\sqrt{3}+4/\sqrt{15}+\sqrt{2}-3\sqrt{2/5}}+\frac{1024}{3}e^{-4/\sqrt{3}+4/\sqrt{15}+\sqrt{10}-3\sqrt{2/5}}+\frac{1024}{3}\left(2e^{1/\sqrt{2}+\sqrt{5/2}}-2e^{\sqrt{10}}\right)e^{-4/\sqrt{3}+4/\sqrt{15}-3\sqrt{2/5}}\left(\frac{1}{\cos(32i)}\right)^2$$

$\cosh(x)$ is the hyperbolic cosine function

i is the imaginary unit

Series representations

$$
\begin{aligned}
&-614.78673139471580000 + \\
&\quad \frac{1}{3} e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}}\ 1024 + \frac{1}{3} e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\ 1024 + \\
&\quad \frac{1}{3}\left(\left(e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\left(2\,e^{1/\sqrt{2}+\sqrt{5/2}} - 2\,e^{\sqrt{10}}\right)\right)\operatorname{sech}^2(32)\right)1024 =
\end{aligned}
$$

$$
-614.786731394715800\, e^{-\frac{4}{\exp\left(i\pi\left\lfloor\frac{\arg(3-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(3-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}}
$$

$$
\left(1.0000000000000000000\, e^{\frac{4}{\exp\left(i\pi\left\lfloor\frac{\arg(3-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(3-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}} - \right.
$$

$$
0.5552060835128608524\, e^{\frac{4}{\exp\left(i\pi\left\lfloor\frac{\arg(15-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(15-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}+\sum_{k=0}^{\infty}\frac{(-1)^{1+k}x^{-k}\left(3\left(\frac{2}{5}-x\right)^k\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{2}{5}-x\right)}{2\pi}\right\rfloor\right)-(2-x)^k\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\right)\left(-\frac{1}{2}\right)_k\sqrt{x}}{k!}}
$$

$$
-\ 0.5552060835128608524\, e^{\frac{4}{\exp\left(i\pi\left\lfloor\frac{\arg(15-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(15-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}+\sum_{k=0}^{\infty}\frac{(-1)^{1+k}x^{-k}\left(3\left(\frac{2}{5}-x\right)^k\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{2}{5}-x\right)}{2\pi}\right\rfloor\right)-(10-x)^k\exp\left(i\pi\left\lfloor\frac{\arg(10-x)}{2\pi}\right\rfloor\right)\right)\left(-\frac{1}{2}\right)_k\sqrt{x}}{k!}}
$$

$$
+\ 1.1104121670257217048\, e^{\frac{1}{\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}+\frac{4}{\exp\left(i\pi\left\lfloor\frac{\arg(15-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(15-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}+\sum_{k=0}^{\infty}\frac{(-1)^{1+k}x^{-k}\left(3\left(\frac{2}{5}-x\right)^k\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{2}{5}-x\right)}{2\pi}\right\rfloor\right)-\left(\frac{5}{2}-x\right)^k\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{5}{2}-x\right)}{2\pi}\right\rfloor\right)\right)\left(-\frac{1}{2}\right)_k\sqrt{x}}{k!}}
$$

$$
\sum_{k=-\infty}^{\infty}\frac{1}{\left(32+i\left(\frac{1}{2}+k\right)\pi\right)^2} - 1.1104121670257217048
$$

$$
e^{\frac{4}{\exp\left(i\pi\left\lfloor\frac{\arg(15-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(15-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}+\sum_{k=0}^{\infty}\frac{(-1)^{1+k}x^{-k}\left(3\left(\frac{2}{5}-x\right)^k\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{2}{5}-x\right)}{2\pi}\right\rfloor\right)-(10-x)^k\exp\left(i\pi\left\lfloor\frac{\arg(10-x)}{2\pi}\right\rfloor\right)\right)\left(-\frac{1}{2}\right)_k\sqrt{x}}{k!}}
$$

$$
\left.\sum_{k=-\infty}^{\infty}\frac{1}{\left(32+i\left(\frac{1}{2}+k\right)\pi\right)^2}\right) \quad \text{for } (x \in \mathbb{R} \text{ and } x < 0)
$$

$$-614.78673139471580000+\frac{1}{3}e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}}\,1024+\frac{1}{3}e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\,1024+\frac{1}{3}\left(\left(e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\left(2e^{1/\sqrt{2}+\sqrt{5/2}}-2e^{\sqrt{10}}\right)\right)\operatorname{sech}^2(32)\right)1024=$$

$$-614.786731394715800\,e^{-\frac{4}{\exp\left(i\pi\left\lfloor\frac{\arg(3-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(3-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}}\Bigg(1.0000000000000000000\,e^{\frac{4}{\exp\left(i\pi\left\lfloor\frac{\arg(3-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(3-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}}-$$

$$0.5552060835128608524\,e^{\frac{4}{\exp\left(i\pi\left\lfloor\frac{\arg(15-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(15-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}+\sum_{k=0}^{\infty}\frac{(-1)^{1+k}x^{-k}\left(3\left(\frac{2}{5}-x\right)^k\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{2}{5}-x\right)}{2\pi}\right\rfloor\right)-(2-x)^k\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\right)\left(-\frac{1}{2}\right)_k\sqrt{x}}{k!}}$$

$$-0.5552060835128608524\,e^{\frac{4}{\exp\left(i\pi\left\lfloor\frac{\arg(15-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(15-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}+\sum_{k=0}^{\infty}\frac{(-1)^{1+k}x^{-k}\left(3\left(\frac{2}{5}-x\right)^k\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{2}{5}-x\right)}{2\pi}\right\rfloor\right)-(10-x)^k\exp\left(i\pi\left\lfloor\frac{\arg(10-x)}{2\pi}\right\rfloor\right)\right)\left(-\frac{1}{2}\right)_k\sqrt{x}}{k!}}$$

$$-4.441648668102886819\,e^{\frac{1}{\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}+\frac{4}{\exp\left(i\pi\left\lfloor\frac{\arg(15-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(15-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}+\sum_{k=0}^{\infty}\frac{(-1)^{1+k}x^{-k}\left(3\left(\frac{2}{5}-x\right)^k\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{2}{5}-x\right)}{2\pi}\right\rfloor\right)-\left(\frac{5}{2}-x\right)^k\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{5}{2}-x\right)}{2\pi}\right\rfloor\right)\right)\left(-\frac{1}{2}\right)_k\sqrt{x}}{k!}}$$

$$\left(\sum_{k=1}^{\infty}(-1)^k q^{-1+2k}\right)^2+4.441648668102886819\,e^{\frac{4}{\exp\left(i\pi\left\lfloor\frac{\arg(15-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(15-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}+\sum_{k=0}^{\infty}\frac{(-1)^{1+k}x^{-k}\left(3\left(\frac{2}{5}-x\right)^k\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{2}{5}-x\right)}{2\pi}\right\rfloor\right)-(10-x)^k\exp\left(i\pi\left\lfloor\frac{\arg(10-x)}{2\pi}\right\rfloor\right)\right)\left(-\frac{1}{2}\right)_k\sqrt{x}}{k!}}$$

$$\left(\sum_{k=1}^{\infty}(-1)^k q^{-1+2k}\right)^2\Bigg)\quad \text{for } \left(x\in\mathbb{R}\text{ and }x<0\text{ and }q=e^{32}\right)$$

$$-614.78673139471580000 + \frac{1}{3} e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}}\, 1024 + \frac{1}{3} e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\, 1024 + \frac{1}{3}\left(\left(e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\left(2 e^{1/\sqrt{2}+\sqrt{5/2}} - 2 e^{\sqrt{10}}\right)\right)\operatorname{sech}^2(32)\right) 1024 =$$

$$-614.786731394715800\, e^{-\frac{4}{\exp\left(i\pi\left\lfloor\frac{\arg(3-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k (3-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}}$$

$$\left(1.0000000000000000000\, e^{\frac{4}{\exp\left(i\pi\left\lfloor\frac{\arg(3-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k (3-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}} - \right.$$

$$0.5552060835128608524\, e^{\frac{4}{\exp\left(i\pi\left\lfloor\frac{\arg(15-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k (15-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}} + \sum_{k=0}^{\infty}\frac{(-1)^{1+k} x^{-k}\left(3\left(\frac{2}{5}-x\right)^k \exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{2}{5}-x\right)}{2\pi}\right\rfloor\right) - (2-x)^k \exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\right)\left(-\frac{1}{2}\right)_k \sqrt{x}}{k!}}$$

$$- 0.5552060835128608524\, e^{\frac{4}{\exp\left(i\pi\left\lfloor\frac{\arg(15-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k (15-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}} + \sum_{k=0}^{\infty}\frac{(-1)^{1+k} x^{-k}\left(3\left(\frac{2}{5}-x\right)^k \exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{2}{5}-x\right)}{2\pi}\right\rfloor\right) - (10-x)^k \exp\left(i\pi\left\lfloor\frac{\arg(10-x)}{2\pi}\right\rfloor\right)\right)\left(-\frac{1}{2}\right)_k \sqrt{x}}{k!}}$$

$$- 1.1104121670257217048\, e^{\frac{1}{\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k (2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}} + \frac{4}{\exp\left(i\pi\left\lfloor\frac{\arg(15-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k (15-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}} + \sum_{k=0}^{\infty}\frac{(-1)^{1+k} x^{-k}\left(3\left(\frac{2}{5}-x\right)^k \exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{2}{5}-x\right)}{2\pi}\right\rfloor\right) - \left(\frac{5}{2}-x\right)^k \exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{5}{2}-x\right)}{2\pi}\right\rfloor\right)\right)\left(-\frac{1}{2}\right)_k \sqrt{x}}{k!}}$$

$$\pi^2\left(\sum_{k=0}^{\infty}\frac{4(-1)^k(1+2k)}{4096+(\pi+2k\pi)^2}\right)^2 + 1.1104121670257217048\, e^{\frac{4}{\exp\left(i\pi\left\lfloor\frac{\arg(15-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k (15-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}} + \sum_{k=0}^{\infty}\frac{(-1)^{1+k} x^{-k}\left(3\left(\frac{2}{5}-x\right)^k \exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{2}{5}-x\right)}{2\pi}\right\rfloor\right) - (10-x)^k \exp\left(i\pi\left\lfloor\frac{\arg(10-x)}{2\pi}\right\rfloor\right)\right)\left(-\frac{1}{2}\right)_k \sqrt{x}}{k!}}$$

$$\left.\pi^2\left(\sum_{k=0}^{\infty}\frac{4(-1)^k(1+2k)}{4096+(\pi+2k\pi)^2}\right)^2\right) \quad \text{for } (x \in \mathbb{R} \text{ and } x < 0)$$

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)
$\mathbb{R}$ is the set of real numbers

Integral representation

$$-614.78673139471580000 + \frac{1}{3} e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}}\, 1024 + \frac{1}{3} e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\, 1024 + \frac{1}{3}\left(\left(e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\left(2 e^{1/\sqrt{2}+\sqrt{5/2}} - 2 e^{\sqrt{10}}\right)\right)\operatorname{sech}^2(32)\right) 1024 = -\frac{1}{\pi^2} 614.786731394715800\, e^{-3\sqrt{2/5}-4/\sqrt{3}} \left(1.0000000000000000000\, e^{3\sqrt{2/5}+4/\sqrt{3}}\, \pi^2 - 0.5552060835128608524\, e^{\sqrt{2}+4/\sqrt{15}}\, \pi^2 - 0.5552060835128608524\, e^{\sqrt{10}+4/\sqrt{15}}\, \pi^2 - 4.441648668102886819\, e^{1/\sqrt{2}+\sqrt{5/2}+4/\sqrt{15}} \left(\int_0^\infty \frac{t^{(64 i)/\pi}}{1+t^2}\, dt\right)^2 + 4.441648668102886819\, e^{\sqrt{10}+4/\sqrt{15}} \left(\int_0^\infty \frac{t^{(64 i)/\pi}}{1+t^2}\, dt\right)^2\right)$$

From which, after some calculations:

-18(-614.7867313947158+1024/3 e^(-3√(2/5)+√(2)-4/√(3)+4/√(15))+1024/3 e^(-3√(2/5)-4/√(3)+√(10)+4/√(15))+1024/3 e^(-3√(2/5)-4/√(3)+4/√(15))(2e^(1/√(2)+√(5/2))-2 e^√(10)) sech^2(32))+144+2*8-π/10

Input interpretation

$$-18\left(-614.7867313947158 + \frac{1024}{3} e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}} + \frac{1024}{3} e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}} + \frac{1024}{3}\left(e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\left(2 e^{1/\sqrt{2}+\sqrt{5/2}} - 2 e^{\sqrt{10}}\right)\right)\operatorname{sech}^2(32)\right) + 144 + 2\times 8 - \frac{\pi}{10}$$

$\operatorname{sech}(x)$ is the hyperbolic secant function

Result

4095.980339104094…

4095.980339104094….≈ 4096 = 64^2 , that multiplied by 2 give 8192, indeed:

The total amplitude vanishes for gauge group SO(8192), while the vacuum energy is negative and independent of the gauge group.
The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, SO(2^{13}) i.e. SO(8192). (From: “Dilaton Tadpole for the Open Bosonic String “ Michael R. Douglas and Benjamin Grinstein - September 2,1986)

Alternative representations

$$-18\left(-614.78673139471580000+\frac{1}{3}e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}}\,1024+\frac{1}{3}e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\,1024+\frac{1}{3}\left(\left(e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\left(2e^{1/\sqrt{2}+\sqrt{5/2}}-2e^{\sqrt{10}}\right)\right)\operatorname{sech}^2(32)\right)1024\right)+144+2\times 8-\frac{\pi}{10}=160-\frac{\pi}{10}-18\left(-614.78673139471580000+\frac{1024}{3}e^{-4/\sqrt{3}+4/\sqrt{15}+\sqrt{2}-3\sqrt{2/5}}+\frac{1024}{3}e^{-4/\sqrt{3}+4/\sqrt{15}+\sqrt{10}-3\sqrt{2/5}}+\frac{1024}{3}\left(2e^{1/\sqrt{2}+\sqrt{5/2}}-2e^{\sqrt{10}}\right)e^{-4/\sqrt{3}+4/\sqrt{15}-3\sqrt{2/5}}\left(\frac{1}{\cosh(32)}\right)^2\right)$$

$$-18\left(-614.78673139471580000+\frac{1}{3}e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}}\,1024+\frac{1}{3}e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\,1024+\frac{1}{3}\left(\left(e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\left(2e^{1/\sqrt{2}+\sqrt{5/2}}-2e^{\sqrt{10}}\right)\right)\operatorname{sech}^2(32)\right)1024\right)+144+2\times 8-\frac{\pi}{10}=160-\frac{\pi}{10}-18\left(-614.78673139471580000+\frac{1024}{3}e^{-4/\sqrt{3}+4/\sqrt{15}+\sqrt{2}-3\sqrt{2/5}}+\frac{1024}{3}e^{-4/\sqrt{3}+4/\sqrt{15}+\sqrt{10}-3\sqrt{2/5}}+\frac{1024}{3}\left(2e^{1/\sqrt{2}+\sqrt{5/2}}-2e^{\sqrt{10}}\right)e^{-4/\sqrt{3}+4/\sqrt{15}-3\sqrt{2/5}}\left(\frac{1}{\cos(-32i)}\right)^2\right)$$

$$-18\left(-614.78673139471580000+\right.$$
$$\frac{1}{3}e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}}\ 1024+\frac{1}{3}e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\ 1024+$$
$$\left.\frac{1}{3}\left(\left(e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\left(2e^{1/\sqrt{2}+\sqrt{5/2}}-2e^{\sqrt{10}}\right)\right)\operatorname{sech}^2(32)\right)1024\right)+$$
$$144+2\times 8-\frac{\pi}{10}=160-\frac{\pi}{10}-18\left(-614.78673139471580000+\right.$$
$$\frac{1024}{3}e^{-4/\sqrt{3}+4/\sqrt{15}+\sqrt{2}-3\sqrt{2/5}}+\frac{1024}{3}e^{-4/\sqrt{3}+4/\sqrt{15}+\sqrt{10}-3\sqrt{2/5}}+$$
$$\left.\frac{1024}{3}\left(2e^{1/\sqrt{2}+\sqrt{5/2}}-2e^{\sqrt{10}}\right)e^{-4/\sqrt{3}+4/\sqrt{15}-3\sqrt{2/5}}\left(\frac{1}{\cos(32i)}\right)^2\right)$$

$\cosh(x)$ is the hyperbolic cosine function

i is the imaginary unit

Series representations

$$-18\left(-614.78673139471580000+\frac{1}{3}e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}}\,1024+\frac{1}{3}e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\,1024+\frac{1}{3}\left(\left(e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\left(2e^{1/\sqrt{2}+\sqrt{5/2}}-2e^{\sqrt{10}}\right)\right)\operatorname{sech}^2(32)\right)1024\right)+$$

$$144+2\times 8-\frac{\pi}{10}=-0.1000000000000000000$$

$$-\frac{4}{e^{\exp\left(i\pi\left\lfloor\frac{\arg(3-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(3-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}}$$

$$\left(-112261.61165104884400\,e^{\frac{4}{\exp\left(i\pi\left\lfloor\frac{\arg(3-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(3-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}}+\right.$$

$$61440.00000000000000\,e^{\frac{4}{e^{\exp\left(i\pi\left\lfloor\frac{\arg(15-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(15-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}}+\sum_{k=0}^{\infty}\frac{(-1)^{1+k}x^{-k}\left(3\left(\frac{2}{5}-x\right)^k\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{2}{5}-x\right)}{2\pi}\right\rfloor\right)-(2-x)^k\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\right)\left(-\frac{1}{2}\right)_k\sqrt{x}}{k!}}$$

$$+\,61440.00000000000000\,e^{\frac{4}{e^{\exp\left(i\pi\left\lfloor\frac{\arg(15-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(15-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}}+\sum_{k=0}^{\infty}\frac{(-1)^{1+k}x^{-k}\left(3\left(\frac{2}{5}-x\right)^k\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{2}{5}-x\right)}{2\pi}\right\rfloor\right)-(10-x)^k\exp\left(i\pi\left\lfloor\frac{\arg(10-x)}{2\pi}\right\rfloor\right)\right)\left(-\frac{1}{2}\right)_k\sqrt{x}}{k!}}$$

$$+\,1.0000000000000000000\,e^{\frac{4}{\exp\left(i\pi\left\lfloor\frac{\arg(3-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(3-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}}\pi-122880.00000000000000$$

$$e^{\frac{1}{e^{\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}}+\frac{4}{\exp\left(i\pi\left\lfloor\frac{\arg(15-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(15-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}+\sum_{k=0}^{\infty}\frac{(-1)^{1+k}x^{-k}\left(3\left(\frac{2}{5}-x\right)^k\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{2}{5}-x\right)}{2\pi}\right\rfloor\right)-\left(\frac{5}{2}-x\right)^k\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{5}{2}-x\right)}{2\pi}\right\rfloor\right)\right)\left(-\frac{1}{2}\right)_k\sqrt{x}}{k!}}$$

$$\sum_{k=-\infty}^{\infty}\frac{1}{\left(32+i\left(\frac{1}{2}+k\right)\pi\right)^2}+122880.00000000000000$$

$$e^{\frac{4}{e^{\exp\left(i\pi\left\lfloor\frac{\arg(15-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(15-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}}+\sum_{k=0}^{\infty}\frac{(-1)^{1+k}x^{-k}\left(3\left(\frac{2}{5}-x\right)^k\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{2}{5}-x\right)}{2\pi}\right\rfloor\right)-(10-x)^k\exp\left(i\pi\left\lfloor\frac{\arg(10-x)}{2\pi}\right\rfloor\right)\right)\left(-\frac{1}{2}\right)_k\sqrt{x}}{k!}}$$

$$\left.\sum_{k=-\infty}^{\infty}\frac{1}{\left(32+i\left(\frac{1}{2}+k\right)\pi\right)^2}\right)\quad\text{for }(x\in\mathbb{R}\text{ and }x<0)$$

$$-18\left(-614.78673139471580000+\frac{1}{3}e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}}\,1024+\frac{1}{3}e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\,1024+\frac{1}{3}\left(\left(e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\left(2e^{1/\sqrt{2}+\sqrt{5/2}}-2e^{\sqrt{10}}\right)\right)\operatorname{sech}^2(32)\right)1024\right)+$$

$$144+2\times 8-\frac{\pi}{10}=-0.10000000000000000000$$

$$-\frac{4}{e^{\exp\left(i\pi\left\lfloor\frac{\arg(3-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(3-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}}$$

$$\left(-112261.61165104884400\,e^{\frac{4}{\exp\left(i\pi\left\lfloor\frac{\arg(3-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(3-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}}+\right.$$

$$61440.00000000000000\,e^{\frac{4}{\exp\left(i\pi\left\lfloor\frac{\arg(15-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(15-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}+\sum_{k=0}^{\infty}\frac{(-1)^{1+k}x^{-k}\left(3\left(\frac{2}{5}-x\right)^k\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{2}{5}-x\right)}{2\pi}\right\rfloor\right)-(2-x)^k\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\right)\left(-\frac{1}{2}\right)_k\sqrt{x}}{k!}}$$

$$+61440.00000000000000\,e^{\frac{4}{\exp\left(i\pi\left\lfloor\frac{\arg(15-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(15-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}+\sum_{k=0}^{\infty}\frac{(-1)^{1+k}x^{-k}\left(3\left(\frac{2}{5}-x\right)^k\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{2}{5}-x\right)}{2\pi}\right\rfloor\right)-(10-x)^k\exp\left(i\pi\left\lfloor\frac{\arg(10-x)}{2\pi}\right\rfloor\right)\right)\left(-\frac{1}{2}\right)_k\sqrt{x}}{k!}}$$

$$+1.0000000000000000000\,e^{\frac{4}{\exp\left(i\pi\left\lfloor\frac{\arg(3-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(3-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}}\pi+491520.0000000000000$$

$$e^{\frac{1}{\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}+\frac{4}{\exp\left(i\pi\left\lfloor\frac{\arg(15-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(15-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}+\sum_{k=0}^{\infty}\frac{(-1)^{1+k}x^{-k}\left(3\left(\frac{2}{5}-x\right)^k\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{2}{5}-x\right)}{2\pi}\right\rfloor\right)-\left(\frac{5}{2}-x\right)^k\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{5}{2}-x\right)}{2\pi}\right\rfloor\right)\right)\left(-\frac{1}{2}\right)_k\sqrt{x}}{k!}}$$

$$\left(\sum_{k=1}^{\infty}(-1)^k q^{-1+2k}\right)^2-491520.0000000000000$$

$$e^{\frac{4}{\exp\left(i\pi\left\lfloor\frac{\arg(15-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(15-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}+\sum_{k=0}^{\infty}\frac{(-1)^{1+k}x^{-k}\left(3\left(\frac{2}{5}-x\right)^k\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{2}{5}-x\right)}{2\pi}\right\rfloor\right)-(10-x)^k\exp\left(i\pi\left\lfloor\frac{\arg(10-x)}{2\pi}\right\rfloor\right)\right)\left(-\frac{1}{2}\right)_k\sqrt{x}}{k!}}$$

$$\left.\left(\sum_{k=1}^{\infty}(-1)^k q^{-1+2k}\right)^2\right)\quad\text{for }\left(x\in\mathbb{R}\text{ and }x<0\text{ and }q=e^{32}\right)$$

$$-18\Big(-614.78673139471580000 +$$

$$\frac{1}{3} e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}}\ 1024 + \frac{1}{3} e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\ 1024 +$$

$$\frac{1}{3}\Big(\Big(e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\ \Big(2\,e^{1/\sqrt{2}+\sqrt{5/2}} - 2\,e^{\sqrt{10}}\Big)\Big)\operatorname{sech}^2(32)\Big)\ 1024\Big) +$$

$$144 + 2\times 8 - \frac{\pi}{10} = -0.1000000000000000000$$

$$e^{-\frac{4}{\exp\left(i\pi\left\lfloor\frac{\arg(3-x)}{2\pi}\right\rfloor\right)\sqrt{x}\,\sum_{k=0}^{\infty}\frac{(-1)^k (3-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}}$$

$$\Bigg(-112261.61165104884400\, e^{\frac{4}{\exp\left(i\pi\left\lfloor\frac{\arg(3-x)}{2\pi}\right\rfloor\right)\sqrt{x}\,\sum_{k=0}^{\infty}\frac{(-1)^k (3-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}} +$$

$$61440.00000000000000$$

$$e^{\frac{4}{\exp\left(i\pi\left\lfloor\frac{\arg(15-x)}{2\pi}\right\rfloor\right)\sqrt{x}\,\sum_{k=0}^{\infty}\frac{(-1)^k (15-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}} + \sum_{k=0}^{\infty}\frac{(-1)^{1+k} x^{-k}\left(3\left(\frac{2}{5}-x\right)^k \exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{2}{5}-x\right)}{2\pi}\right\rfloor\right) - (2-x)^k \exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\right)\left(-\frac{1}{2}\right)_k \sqrt{x}}{k!}}$$

$$+\ 61440.00000000000000$$

$$e^{\frac{4}{\exp\left(i\pi\left\lfloor\frac{\arg(15-x)}{2\pi}\right\rfloor\right)\sqrt{x}\,\sum_{k=0}^{\infty}\frac{(-1)^k (15-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}} + \sum_{k=0}^{\infty}\frac{(-1)^{1+k} x^{-k}\left(3\left(\frac{2}{5}-x\right)^k \exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{2}{5}-x\right)}{2\pi}\right\rfloor\right) - (10-x)^k \exp\left(i\pi\left\lfloor\frac{\arg(10-x)}{2\pi}\right\rfloor\right)\right)\left(-\frac{1}{2}\right)_k \sqrt{x}}{k!}}$$

$$+\ 1.0000000000000000000$$

$$e^{\frac{4}{\exp\left(i\pi\left\lfloor\frac{\arg(3-x)}{2\pi}\right\rfloor\right)\sqrt{x}\,\sum_{k=0}^{\infty}\frac{(-1)^k (3-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}}\ \pi + 122880.00000000000000$$

$$e^{\frac{1}{\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\,\sum_{k=0}^{\infty}\frac{(-1)^k (2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}} + \frac{4}{\exp\left(i\pi\left\lfloor\frac{\arg(15-x)}{2\pi}\right\rfloor\right)\sqrt{x}\,\sum_{k=0}^{\infty}\frac{(-1)^k (15-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}} + \sum_{k=0}^{\infty}\frac{(-1)^{1+k} x^{-k}\left(3\left(\frac{2}{5}-x\right)^k \exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{2}{5}-x\right)}{2\pi}\right\rfloor\right) - \left(\frac{5}{2}-x\right)^k \exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{5}{2}-x\right)}{2\pi}\right\rfloor\right)\right)\left(-\frac{1}{2}\right)_k \sqrt{x}}{k!}}$$

$$\pi^2\left(\sum_{k=0}^{\infty}\frac{4(-1)^k(1+2k)}{4096+(\pi+2k\pi)^2}\right)^2 - 122880.00000000000000$$

$$e^{\frac{4}{\exp\left(i\pi\left\lfloor\frac{\arg(15-x)}{2\pi}\right\rfloor\right)\sqrt{x}\,\sum_{k=0}^{\infty}\frac{(-1)^k (15-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}} + \sum_{k=0}^{\infty}\frac{(-1)^{1+k} x^{-k}\left(3\left(\frac{2}{5}-x\right)^k \exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{2}{5}-x\right)}{2\pi}\right\rfloor\right) - (10-x)^k \exp\left(i\pi\left\lfloor\frac{\arg(10-x)}{2\pi}\right\rfloor\right)\right)\left(-\frac{1}{2}\right)_k \sqrt{x}}{k!}}$$

$$\pi^2\left(\sum_{k=0}^{\infty}\frac{4(-1)^k(1+2k)}{4096+(\pi+2k\pi)^2}\right)^2 \Bigg) \quad \text{for } (x \in \mathbb{R} \text{ and } x < 0)$$

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

$n!$ is the factorial function

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

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

Integral representation

$$-18\left(-614.78673139471580000+\frac{1}{3}e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}}\,1024+\frac{1}{3}e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\,1024+\frac{1}{3}\left(\left(e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\left(2e^{1/\sqrt{2}+\sqrt{5/2}}-2e^{\sqrt{10}}\right)\right)\operatorname{sech}^2(32)\right)1024\right)+144+2\times 8-\frac{\pi}{10}=-\frac{1}{\pi^2}0.1000000000000000000\,e^{-3\sqrt{2/5}-4/\sqrt{3}}\left(-112261.61165104884400\,e^{3\sqrt{2/5}+4/\sqrt{3}}\,\pi^2+61440.00000000000000\,e^{\sqrt{2}+4/\sqrt{15}}\,\pi^2+61440.00000000000000\,e^{\sqrt{10}+4/\sqrt{15}}\,\pi^2+1.0000000000000000000\,e^{3\sqrt{2/5}+4/\sqrt{3}}\,\pi^3+491520.0000000000000\,e^{1/\sqrt{2}+\sqrt{5/2}+4/\sqrt{15}}\left(\int_0^\infty\frac{t^{(64i)/\pi}}{1+t^2}\,dt\right)^2-491520.0000000000000\,e^{\sqrt{10}+4/\sqrt{15}}\left(\int_0^\infty\frac{t^{(64i)/\pi}}{1+t^2}\,dt\right)^2\right)$$

27√((-18(-614.7867313947+1024/3 e^(-3√(2/5)+√(2)-4/√(3)+4/√(15))+1024/3 e^(-3√(2/5)-4/√(3)+√(10)+4/√(15))+1024/3 e^(-3√(2/5)-4/√(3)+4/√(15))(2e^(1/√(2)+√(5/2))-2 e^√(10)) sech^2(32))+144+2*8-π/10))+1

Input interpretation

$$27\sqrt{\left(-18\left(-614.7867313947+\frac{1024}{3}e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}}+\frac{1024}{3}e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}+\frac{1024}{3}\left(e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\left(2e^{1/\sqrt{2}+\sqrt{5/2}}-2e^{\sqrt{10}}\right)\right)\operatorname{sech}^2(32)\right)+144+2\times 8-\frac{\pi}{10}\right)}+1$$

$\operatorname{sech}(x)$ is the hyperbolic secant function

Result

1728.995852775…

1728.995852775….

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve ($1728 = 8^2 * 3^3$). The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number)

Alternative representations

$$27\sqrt{\left(-18\left(-614.78673139470000+\frac{1}{3}e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}}\,1024+\frac{1}{3}e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\,1024+\frac{1}{3}\left(\left(e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\left(2e^{1/\sqrt{2}+\sqrt{5/2}}-2e^{\sqrt{10}}\right)\right)\operatorname{sech}^2(32)\right)1024\right)+144+2\times 8-\frac{\pi}{10}\right)}+1=$$

$$1+27\sqrt{\left(160-\frac{\pi}{10}-18\left(-614.78673139470000+\frac{1024}{3}e^{-4/\sqrt{3}+4/\sqrt{15}+\sqrt{2}-3\sqrt{2/5}}+\frac{1024}{3}e^{-4/\sqrt{3}+4/\sqrt{15}+\sqrt{10}-3\sqrt{2/5}}+\frac{1024}{3}\left(2e^{1/\sqrt{2}+\sqrt{5/2}}-2e^{\sqrt{10}}\right)e^{-4/\sqrt{3}+4/\sqrt{15}-3\sqrt{2/5}}\left(\frac{1}{\cosh(32)}\right)^2\right)\right)}$$

$$27\sqrt{\left(-18\left(-614.78673139470000+\frac{1}{3}e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}}\,1024+\frac{1}{3}e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\,1024+\frac{1}{3}\left(\left(e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\left(2e^{1/\sqrt{2}+\sqrt{5/2}}-2e^{\sqrt{10}}\right)\right)\operatorname{sech}^2(32)\right)1024\right)+144+2\times 8-\frac{\pi}{10}\right)}+1=$$

$$1+27\sqrt{\left(160-\frac{\pi}{10}-18\left(-614.78673139470000+\frac{1024}{3}e^{-4/\sqrt{3}+4/\sqrt{15}+\sqrt{2}-3\sqrt{2/5}}+\frac{1024}{3}e^{-4/\sqrt{3}+4/\sqrt{15}+\sqrt{10}-3\sqrt{2/5}}+\frac{1024}{3}\left(2e^{1/\sqrt{2}+\sqrt{5/2}}-2e^{\sqrt{10}}\right)e^{-4/\sqrt{3}+4/\sqrt{15}-3\sqrt{2/5}}\left(\frac{1}{\cos(-32i)}\right)^2\right)\right)}$$

$$27\sqrt{\left(-18\left(-614.78673139470000+\frac{1}{3}e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}}\,1024+\frac{1}{3}e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\,1024+\frac{1}{3}\left(\left(e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\left(2e^{1/\sqrt{2}+\sqrt{5/2}}-2e^{\sqrt{10}}\right)\right)\operatorname{sech}^2(32)\right)1024\right)+144+2\times 8-\frac{\pi}{10}\right)}+1=$$

$$1+27\sqrt{\left(160-\frac{\pi}{10}-18\left(-614.78673139470000+\frac{1024}{3}e^{-4/\sqrt{3}+4/\sqrt{15}+\sqrt{2}-3\sqrt{2/5}}+\frac{1024}{3}e^{-4/\sqrt{3}+4/\sqrt{15}+\sqrt{10}-3\sqrt{2/5}}+\frac{1024}{3}\left(2e^{1/\sqrt{2}+\sqrt{5/2}}-2e^{\sqrt{10}}\right)e^{-4/\sqrt{3}+4/\sqrt{15}-3\sqrt{2/5}}\left(\frac{1}{\cos(32i)}\right)^2\right)\right)}$$

$\cosh(x)$ is the hyperbolic cosine function

i is the imaginary unit

Series representations

$$27\sqrt{\left(-18\left(-614.78673139470000+\frac{1}{3}e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}}\,1024+\frac{1}{3}e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\,1024+\frac{1}{3}\left(\left(e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\left(2e^{1/\sqrt{2}+\sqrt{5/2}}-2e^{\sqrt{10}}\right)\right)\operatorname{sech}^2(32)\right)1024\right)+144+2\times 8-\frac{\pi}{10}\right)}+1=$$

$$1+27\sqrt{\left(160-\frac{\pi}{10}-18\left(-614.78673139470000+\frac{1024}{3}e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}}+\frac{1024}{3}e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}+\frac{4096}{3}e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\left(2e^{1/\sqrt{2}+\sqrt{5/2}}-2e^{\sqrt{10}}\right)\left(\sum_{k=1}^{\infty}(-1)^k q^{-1+2k}\right)^2\right)\right)} \quad \text{for } q=e^{32}$$

$$27\sqrt{\left(-18\left(-614.78673139470000+\frac{1}{3}e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}}\,1024+\frac{1}{3}e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\,1024+\frac{1}{3}\left(\left(e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\left(2e^{1/\sqrt{2}+\sqrt{5/2}}-2e^{\sqrt{10}}\right)\right)\operatorname{sech}^2(32)\right)1024\right)+144+2\times 8-\frac{\pi}{10}\right)}+1 =$$

$$1+27\sqrt{\left(e^{-3\sqrt{2/5}-4/\sqrt{3}}\left(-6144.000000000000\,e^{\sqrt{2}+4/\sqrt{15}}+e^{3\sqrt{2/5}+4/\sqrt{3}}(11\,225.16116510460-0.1000000000000000\,\pi)-12\,288.000000000000\,e^{1/\sqrt{2}+\sqrt{5/2}+4/\sqrt{15}}\operatorname{sech}^2(32)+e^{\sqrt{10}+4/\sqrt{15}}\left(-6144.000000000000+12\,288.000000000000\operatorname{sech}^2(32)\right)\right)\right)}$$

$$\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(e^{-3\sqrt{2/5}-4/\sqrt{3}}\left(-6144.000000000000\,e^{\sqrt{2}+4/\sqrt{15}}+e^{3\sqrt{2/5}+4/\sqrt{3}}(11\,225.16116510460-0.1000000000000000\,\pi)-12\,288.000000000000\,e^{1/\sqrt{2}+\sqrt{5/2}+4/\sqrt{15}}\operatorname{sech}^2(32)+e^{\sqrt{10}+4/\sqrt{15}}\left(-6144.000000000000+12\,288.000000000000\operatorname{sech}^2(32)\right)\right)\right)^{-k}$$

$$27\sqrt{\left(-18\left(-614.78673139470000+\frac{1}{3}e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}}\,1024+\frac{1}{3}e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\,1024+\frac{1}{3}\left(\left(e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\left(2e^{1/\sqrt{2}+\sqrt{5/2}}-2e^{\sqrt{10}}\right)\right)\operatorname{sech}^2(32)\right)1024\right)+144+2\times 8-\frac{\pi}{10}\right)}+1 =$$

$$1+27\sqrt{\left(e^{-3\sqrt{2/5}-4/\sqrt{3}}\left(-6144.000000000000\,e^{\sqrt{2}+4/\sqrt{15}}+e^{3\sqrt{2/5}+4/\sqrt{3}}(11\,225.16116510460-0.1000000000000000\,\pi)-12\,288.000000000000\,e^{1/\sqrt{2}+\sqrt{5/2}+4/\sqrt{15}}\operatorname{sech}^2(32)+e^{\sqrt{10}+4/\sqrt{15}}\left(-6144.000000000000+12\,288.000000000000\operatorname{sech}^2(32)\right)\right)\right)}$$

$$\sum_{k=0}^{\infty}\frac{1}{k!}(-1)^k\left(-\frac{1}{2}\right)_k\left(e^{-3\sqrt{2/5}-4/\sqrt{3}}\left(-6144.000000000000\,e^{\sqrt{2}+4/\sqrt{15}}+e^{3\sqrt{2/5}+4/\sqrt{3}}(11\,225.16116510460-0.1000000000000000\,\pi)-12\,288.000000000000\,e^{1/\sqrt{2}+\sqrt{5/2}+4/\sqrt{15}}\operatorname{sech}^2(32)+e^{\sqrt{10}+4/\sqrt{15}}\left(-6144.000000000000+12\,288.000000000000\operatorname{sech}^2(32)\right)\right)\right)^{-k}$$

$\binom{n}{m}$ is the binomial coefficient

$n!$ is the factorial function
$(a)_n$ is the Pochhammer symbol (rising factorial)

Integral representation

$$27\sqrt{\left(-18\left(-614.78673139470000+\frac{1}{3}e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}}\,1024+\frac{1}{3}e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\,1024+\frac{1}{3}\left(\left(e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\left(2e^{1/\sqrt{2}+\sqrt{5/2}}-2e^{\sqrt{10}}\right)\right)\operatorname{sech}^2(32)\right)1024\right)+144+2\times 8-\frac{\pi}{10}\right)}+1=$$

$$1+27\sqrt{\left(160-\frac{\pi}{10}-18\left(-614.78673139470000+\frac{1024}{3}e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}}+\frac{1024}{3}e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}+\frac{1}{3\pi^2}4096\,e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\left(2e^{1/\sqrt{2}+\sqrt{5/2}}-2e^{\sqrt{10}}\right)\left(\int_0^\infty\frac{t^{(64i)/\pi}}{1+t^2}\,dt\right)^2\right)\right)}$$

(27√((-18(-614.78673+1024/3 e^(-3√(2/5)+√(2)-4/√(3)+4/√(15))+1024/3 e^(-3√(2/5)-4/√(3)+√(10)+4/√(15))+1024/3 e^(-3√(2/5)-4/√(3)+4/√(15))(2e^(1/√(2)+√(5/2))-2 e^√(10)) sech^2(32))+144+16-π/10))+1)^1/15

Input interpretation

$$\left(27\sqrt{\left(-18\left(-614.78673+\frac{1024}{3}e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}}+\frac{1024}{3}e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}+\frac{1024}{3}\left(e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\left(2e^{1/\sqrt{2}+\sqrt{5/2}}-2e^{\sqrt{10}}\right)\right)\operatorname{sech}^2(32)\right)+144+16-\frac{\pi}{10}\right)}+1\right)^\wedge(1/15)$$

$\operatorname{sech}(x)$ is the hyperbolic secant function

Result

1.643814965552871246954223487244567909688576595031868277107474 9643
…

1.6438149655528712469 5….

1.6438149655528712469 5+(MRB const)^(1-1/(4π)+π)

Input interpretation

$1.64381496555287124695 + C_{\mathrm{MRB}}^{1-1/(4\pi)+\pi}$

C_{MRB} is the MRB constant

Result

1.64493776093440337431…

1.6449377609344….≈ ζ(2) = π²/6 = 1.644934 (trace of the instanton shape)

From the derivative result

$$\frac{\partial}{\partial g}\left(2 e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\left(g^2\left(e^{\sqrt{10}}\operatorname{sech}^4(2\rho)+\left(2 e^{1/\sqrt{2}+\sqrt{5/2}}-2 e^{\sqrt{10}}\right)\operatorname{sech}^2(2\rho)-4 e^{1/10(5\sqrt{3}+6\sqrt{10}-\sqrt{15})}+e^{\sqrt{10}}+e^{\sqrt{2}}\right)\right)\right)= 4 e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\, g\left(e^{\sqrt{10}}\operatorname{sech}^4(2\rho)+\left(2 e^{1/\sqrt{2}+\sqrt{5/2}}-2 e^{\sqrt{10}}\right)\operatorname{sech}^2(2\rho)-4 e^{1/10(5\sqrt{3}+6\sqrt{10}-\sqrt{15})}+e^{\sqrt{10}}+e^{\sqrt{2}}\right)$$

4 e^(-3 sqrt(2/5) - 4/sqrt(3) + 4/sqrt(15)) g (e^sqrt(10) sech^4(2 ρ) + (2 e^(1/sqrt(2) + sqrt(5/2)) - 2 e^sqrt(10)) sech^2(2 ρ) - 4 e^(1/10 (5 sqrt(3) + 6 sqrt(10) - sqrt(15))) + e^sqrt(10) + e^sqrt(2))

Input

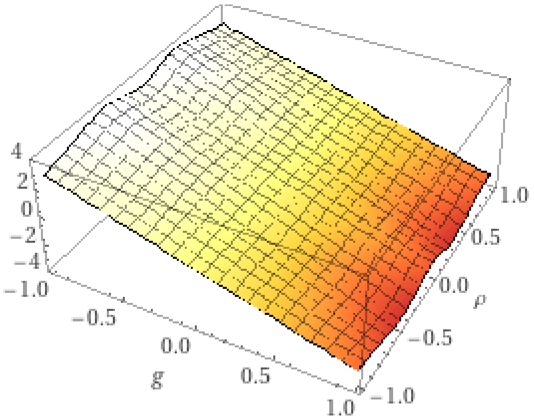
$$\left(4 e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\right) g\left(e^{\sqrt{10}}\operatorname{sech}^4(2\rho)+\left(2 e^{1/\sqrt{2}+\sqrt{5/2}}-2 e^{\sqrt{10}}\right)\operatorname{sech}^2(2\rho)-4 e^{1/10(5\sqrt{3}+6\sqrt{10}-\sqrt{15})}+e^{\sqrt{10}}+e^{\sqrt{2}}\right)$$

$\operatorname{sech}(x)$ is the hyperbolic secant function

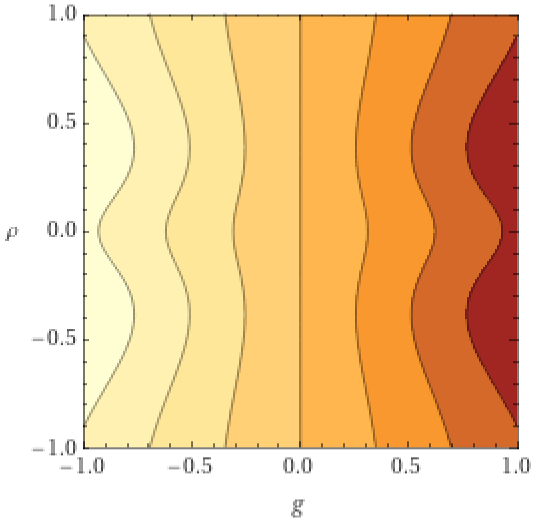
Exact result

$$4\,e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\,g\left(e^{\sqrt{10}}\,\mathrm{sech}^4(2\,\rho)+\left(2\,e^{1/\sqrt{2}+\sqrt{5/2}}-2\,e^{\sqrt{10}}\right)\mathrm{sech}^2(2\,\rho)-4\,e^{1/10\left(5\sqrt{3}+6\sqrt{10}-\sqrt{15}\right)}+e^{\sqrt{10}}+e^{\sqrt{2}}\right)$$

3D plot **(figure that can be related to a D-brane/Instanton)**



Contour plot



Alternate forms

$$4\,e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\,g\left(e^{\sqrt{10}}\,\operatorname{sech}^4(2\rho)+2\,e^{1/\sqrt{2}+\sqrt{5/2}}\,\operatorname{sech}^2(2\rho)-2\,e^{\sqrt{10}}\,\operatorname{sech}^2(2\rho)+e^{\sqrt{10}}+e^{\sqrt{2}}\right)-16\,e^{\sqrt{\frac{5}{3}}/2-5/(2\sqrt{3})}\,g$$

$$e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\,g\left(e^{\sqrt{10}}\left(4\operatorname{sech}^4(2\rho)+4\right)-8\left(e^{\sqrt{10}}-e^{1/\sqrt{2}+\sqrt{5/2}}\right)\operatorname{sech}^2(2\rho)-16\,e^{3\sqrt{2/5}-\sqrt{\frac{3}{5}}/2+\sqrt{3}/2}+4\,e^{\sqrt{2}}\right)$$

$$4\,e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\,g\left(e^{\sqrt{2}}+e^{\sqrt{10}}-4\,e^{1/10\left(5\sqrt{3}+6\sqrt{10}-\sqrt{15}\right)}+\frac{e^{\sqrt{10}}}{\cosh^4(2\rho)}+\frac{-2\,e^{\sqrt{10}}+2\,e^{1/\sqrt{2}+\sqrt{5/2}}}{\cosh^2(2\rho)}\right)$$

$\cosh(x)$ is the hyperbolic cosine function

Expanded form

$$-16\exp\left(-3\sqrt{\frac{2}{5}}-\frac{4}{\sqrt{3}}+\frac{4}{\sqrt{15}}+\frac{1}{10}\left(5\sqrt{3}+6\sqrt{10}-\sqrt{15}\right)\right)g+4\,e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\,g\operatorname{sech}^4(2\rho)-8\,e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\,g\operatorname{sech}^2(2\rho)+8\,e^{-3\sqrt{2/5}+1/\sqrt{2}+\sqrt{5/2}-4/\sqrt{3}+4/\sqrt{15}}\,g\operatorname{sech}^2(2\rho)+4\,e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\,g+4\,e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}}\,g$$

Alternate form assuming g and ρ are real

$$\frac{64\, e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\, g \cosh^4(2\rho)}{(\cosh(4\rho)+1)^4} - \frac{32\, e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\, g \cosh^2(2\rho)}{(\cosh(4\rho)+1)^2} + \frac{32\, e^{-3\sqrt{2/5}+1/\sqrt{2}+\sqrt{5/2}-4/\sqrt{3}+4/\sqrt{15}}\, g \cosh^2(2\rho)}{(\cosh(4\rho)+1)^2} + 4\, e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\, g - 16\, e^{-\sqrt{\frac{3}{5}}/2-4/\sqrt{3}+\sqrt{3}/2+4/\sqrt{15}}\, g + 4\, e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}}\, g$$

Derivative

$$\frac{\partial}{\partial g}\left(\left(4\, e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\right) g \left(e^{\sqrt{10}} \operatorname{sech}^4(2\rho) + \left(2\, e^{1/\sqrt{2}+\sqrt{5/2}} - 2\, e^{\sqrt{10}}\right)\operatorname{sech}^2(2\rho) - 4\, e^{1/10\left(5\sqrt{3}+6\sqrt{10}-\sqrt{15}\right)} + e^{\sqrt{10}} + e^{\sqrt{2}}\right)\right) = 4\, e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}} \left(e^{\sqrt{10}} \operatorname{sech}^4(2\rho) + \left(2\, e^{1/\sqrt{2}+\sqrt{5/2}} - 2\, e^{\sqrt{10}}\right)\operatorname{sech}^2(2\rho) - 4\, e^{1/10\left(5\sqrt{3}+6\sqrt{10}-\sqrt{15}\right)} + e^{\sqrt{10}} + e^{\sqrt{2}}\right)$$

Indefinite integral

$$\int 4\, e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\, g \left(e^{\sqrt{2}} + e^{\sqrt{10}} - 4\, e^{1/10\left(5\sqrt{3}+6\sqrt{10}-\sqrt{15}\right)} + \left(-2\, e^{\sqrt{10}} + 2\, e^{1/\sqrt{2}+\sqrt{5/2}}\right)\operatorname{sech}^2(2\rho) + e^{\sqrt{10}} \operatorname{sech}^4(2\rho)\right) dg = -8 \exp\left(-3\sqrt{\frac{2}{5}} - \frac{4}{\sqrt{3}} + \frac{4}{\sqrt{15}} + \frac{1}{10}\left(5\sqrt{3} + 6\sqrt{10} - \sqrt{15}\right)\right) g^2 + 2\, e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\, g^2 \operatorname{sech}^4(2\rho) + 2\, e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}} \left(2\, e^{1/\sqrt{2}+\sqrt{5/2}} - 2\, e^{\sqrt{10}}\right) g^2 \operatorname{sech}^2(2\rho) + 2\, e^{-3\sqrt{2/5}-4/\sqrt{3}+\sqrt{10}+4/\sqrt{15}}\, g^2 + 2\, e^{-3\sqrt{2/5}+\sqrt{2}-4/\sqrt{3}+4/\sqrt{15}}\, g^2 + \text{constant}$$

And again from the derivative result

$$\frac{\partial}{\partial g}\left(\left(4\, e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\right) g \left(e^{\sqrt{10}}\operatorname{sech}^4(2\rho)+\left(2\, e^{1/\sqrt{2}+\sqrt{5/2}}-2\, e^{\sqrt{10}}\right)\operatorname{sech}^2(2\rho)-4\, e^{1/10(5\sqrt{3}+6\sqrt{10}-\sqrt{15})}+e^{\sqrt{10}}+e^{\sqrt{2}}\right)\right)=4\, e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\left(e^{\sqrt{10}}\operatorname{sech}^4(2\rho)+\left(2\, e^{1/\sqrt{2}+\sqrt{5/2}}-2\, e^{\sqrt{10}}\right)\operatorname{sech}^2(2\rho)-4\, e^{1/10(5\sqrt{3}+6\sqrt{10}-\sqrt{15})}+e^{\sqrt{10}}+e^{\sqrt{2}}\right)$$

we obtain:

4e^(-3sqrt(2/5)-4/sqrt(3)+4/sqrt(15))(e^sqrt(10) sech^4(2ρ)+(2e^(1/sqrt(2)+sqrt(5/2))-2e^sqrt(10)) sech^2(2ρ)-4e^(1/10(5sqrt(3)+6 sqrt(10)-sqrt(15)))+e^sqrt(10)+e^sqrt(2))

Input

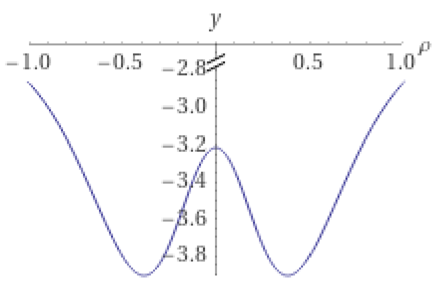
$$4\, e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\left(e^{\sqrt{10}}\operatorname{sech}^4(2\rho)+\left(2\, e^{1/\sqrt{2}+\sqrt{5/2}}-2\, e^{\sqrt{10}}\right)\operatorname{sech}^2(2\rho)-4\, e^{1/10(5\sqrt{3}+6\sqrt{10}-\sqrt{15})}+e^{\sqrt{10}}+e^{\sqrt{2}}\right)$$

$\operatorname{sech}(x)$ is the hyperbolic secant function

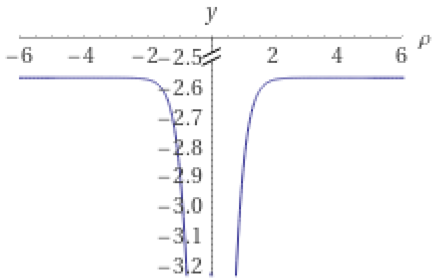
Exact result

$$4\, e^{-3\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}}\left(e^{\sqrt{10}}\operatorname{sech}^4(2\rho)+\left(2\, e^{1/\sqrt{2}+\sqrt{5/2}}-2\, e^{\sqrt{10}}\right)\operatorname{sech}^2(2\rho)-4\, e^{1/10(5\sqrt{3}+6\sqrt{10}-\sqrt{15})}+e^{\sqrt{10}}+e^{\sqrt{2}}\right)$$

Plots **(figures that can be related to the open strings)**



(ρ from −1 to 1)



(ρ from −6 to 6)

Alternate forms

$$4 e^{-3\sqrt{2/5} - 4/\sqrt{3} + 4/\sqrt{15}} \left(e^{\sqrt{10}} \operatorname{sech}^4(2\rho) + 2 e^{1/\sqrt{2} + \sqrt{5/2}} \operatorname{sech}^2(2\rho) - 2 e^{\sqrt{10}} \operatorname{sech}^2(2\rho) + e^{\sqrt{10}} + e^{\sqrt{2}}\right) - 16 e^{\sqrt{\frac{5}{3}}/2 - 5/(2\sqrt{3})}$$

$$e^{-3\sqrt{2/5} - 4/\sqrt{3} + 4/\sqrt{15}} \left(e^{\sqrt{10}} \left(4 \operatorname{sech}^4(2\rho) + 4\right) - 8\left(e^{\sqrt{10}} - e^{1/\sqrt{2} + \sqrt{5/2}}\right) \operatorname{sech}^2(2\rho) - 16 e^{3\sqrt{2/5} - \sqrt{\frac{3}{5}}/2 + \sqrt{3}/2} + 4 e^{\sqrt{2}}\right)$$

$$4 e^{-3\sqrt{2/5} - 4/\sqrt{3} + 4/\sqrt{15}} \left(e^{\sqrt{2}} + e^{\sqrt{10}} - 4 e^{1/10\left(5\sqrt{3} + 6\sqrt{10} - \sqrt{15}\right)} + \frac{e^{\sqrt{10}}}{\cosh^4(2\rho)} + \frac{-2 e^{\sqrt{10}} + 2 e^{1/\sqrt{2} + \sqrt{5/2}}}{\cosh^2(2\rho)}\right)$$

$\cosh(x)$ is the hyperbolic cosine function

Expanded form

$$-16 \exp\left(-3\sqrt{\frac{2}{5}} - \frac{4}{\sqrt{3}} + \frac{4}{\sqrt{15}} + \frac{1}{10}\left(5\sqrt{3} + 6\sqrt{10} - \sqrt{15}\right)\right) + 4 e^{-3\sqrt{2/5} - 4/\sqrt{3} + \sqrt{10} + 4/\sqrt{15}} \operatorname{sech}^4(2\rho) - 8 e^{-3\sqrt{2/5} - 4/\sqrt{3} + \sqrt{10} + 4/\sqrt{15}} \operatorname{sech}^2(2\rho) + 8 e^{-3\sqrt{2/5} + 1/\sqrt{2} + \sqrt{5/2} - 4/\sqrt{3} + 4/\sqrt{15}} \operatorname{sech}^2(2\rho) + 4 e^{-3\sqrt{2/5} - 4/\sqrt{3} + \sqrt{10} + 4/\sqrt{15}} + 4 e^{-3\sqrt{2/5} + \sqrt{2} - 4/\sqrt{3} + 4/\sqrt{15}}$$

Alternate form assuming ρ is real

$$\frac{64\, e^{-3\sqrt{2/5} - 4/\sqrt{3} + \sqrt{10} + 4/\sqrt{15}} \cosh^4(2\rho)}{(\cosh(4\rho)+1)^4} - \frac{32\, e^{-3\sqrt{2/5} - 4/\sqrt{3} + \sqrt{10} + 4/\sqrt{15}} \cosh^2(2\rho)}{(\cosh(4\rho)+1)^2} + \frac{32\, e^{-3\sqrt{2/5} + 1/\sqrt{2} + \sqrt{5/2} - 4/\sqrt{3} + 4/\sqrt{15}} \cosh^2(2\rho)}{(\cosh(4\rho)+1)^2} + 4\, e^{-3\sqrt{2/5} - 4/\sqrt{3} + \sqrt{10} + 4/\sqrt{15}} - 16\, e^{-\sqrt{\frac{3}{5}}/2 - 4/\sqrt{3} + \sqrt{3}/2 + 4/\sqrt{15}} + 4\, e^{-3\sqrt{2/5} + \sqrt{2} - 4/\sqrt{3} + 4/\sqrt{15}}$$

Derivative

$$\frac{d}{d\rho}\left(4\, e^{-3\sqrt{2/5} - 4/\sqrt{3} + 4/\sqrt{15}} \left(e^{\sqrt{10}} \operatorname{sech}^4(2\rho) + \left(2\, e^{1/\sqrt{2} + \sqrt{5/2}} - 2\, e^{\sqrt{10}}\right) \operatorname{sech}^2(2\rho) - 4\, e^{1/10(5\sqrt{3} + 6\sqrt{10} - \sqrt{15})} + e^{\sqrt{10}} + e^{\sqrt{2}}\right)\right) = -32\, e^{-4/\sqrt{3} - 1/\sqrt{10} + 4/\sqrt{15}} \tanh(2\rho) \operatorname{sech}^2(2\rho) \left(e^{\sqrt{5/2}} \operatorname{sech}^2(2\rho) - e^{\sqrt{5/2}} + \sqrt[\sqrt{2}]{e}\right)$$

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

In conclusion, from the derivative result

$$\frac{d}{d\rho}\left(4\, e^{-3\sqrt{2/5} - 4/\sqrt{3} + 4/\sqrt{15}} \left(e^{\sqrt{10}} \operatorname{sech}^4(2\rho) + \left(2\, e^{1/\sqrt{2} + \sqrt{5/2}} - 2\, e^{\sqrt{10}}\right) \operatorname{sech}^2(2\rho) - 4\, e^{1/10(5\sqrt{3} + 6\sqrt{10} - \sqrt{15})} + e^{\sqrt{10}} + e^{\sqrt{2}}\right)\right) = -32\, e^{-4/\sqrt{3} - 1/\sqrt{10} + 4/\sqrt{15}} \tanh(2\rho) \operatorname{sech}^2(2\rho) \left(e^{\sqrt{5/2}} \operatorname{sech}^2(2\rho) - e^{\sqrt{5/2}} + \sqrt[\sqrt{2}]{e}\right)$$

-32 e^(-4/sqrt(3) - 1/sqrt(10) + 4/sqrt(15)) tanh(2 ρ) sech^2(2 ρ) (e^sqrt(5/2) sech^2(2 ρ) - e^sqrt(5/2) + e^(1/sqrt(2)))

for ρ = 16 :

-32 e^(-4/sqrt(3) - 1/sqrt(10) + 4/sqrt(15)) tanh(2*16) sech^2(2*16) (e^sqrt(5/2) sech^2(2*16) - e^sqrt(5/2) + e^(1/sqrt(2)))

Input

$$-32\, e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}} \tanh(2\times 16) \operatorname{sech}^2(2\times 16)\left(e^{\sqrt{5/2}} \operatorname{sech}^2(2\times 16) - e^{\sqrt{5/2}} + \sqrt[\sqrt{2}]{e}\right)$$

tanh(x) is the hyperbolic tangent function
sech(x) is the hyperbolic secant function

Exact result

$$-32\, e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}} \tanh(32) \operatorname{sech}^2(32)\left(\sqrt[\sqrt{2}]{e} - e^{\sqrt{5/2}} + e^{\sqrt{5/2}} \operatorname{sech}^2(32)\right)$$

Decimal approximation

1.1823739696174629924767157199722075696220700875528083047908... × 10^-26

1.1823739696...*10^-26

Alternate forms

$$-\frac{32\, e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}}\left(\sqrt[\sqrt{2}]{e} - e^{\sqrt{5/2}} + \frac{e^{\sqrt{5/2}}}{\cosh^2(32)}\right)\sinh(32)}{\cosh^3(32)}$$

$$\frac{128\, e^{64-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}}\left(e^{64}-1\right)\left(e^{\sqrt{5/2}}\left(1-2\,e^{64}+e^{128}\right) - \sqrt[\sqrt{2}]{e}\left(1+e^{64}\right)^2\right)}{\left(1+e^{64}\right)^5}$$

$$-32\, e^{1/\sqrt{2}-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}} \tanh(32)\operatorname{sech}^2(32) - 32\, e^{2\sqrt{2/5}-4/\sqrt{3}+4/\sqrt{15}} \tanh(32)\operatorname{sech}^2(32)\left(\operatorname{sech}^2(32)-1\right)$$

cosh(x) is the hyperbolic cosine function
sinh(x) is the hyperbolic sine function

Expanded form

$$-32\, e^{\sqrt{5/2}-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}} \tanh(32)\operatorname{sech}^4(32) - 32\, e^{1/\sqrt{2}-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}} \tanh(32)\operatorname{sech}^2(32) + 32\, e^{\sqrt{5/2}-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}} \tanh(32)\operatorname{sech}^2(32)$$

Alternative representations

$$-32\, e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}} \tanh(2\times 16)\operatorname{sech}^2(2\times 16)\left(e^{\sqrt{5/2}}\operatorname{sech}^2(2\times 16) - e^{\sqrt{5/2}} + \sqrt[\sqrt{2}]{e}\right) = -32\, e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}}\left(-1+\frac{2}{1+\frac{1}{e^{64}}}\right)\left(\frac{1}{\cos(-32\, i)}\right)^2\left(\sqrt[\sqrt{2}]{e} - e^{\sqrt{5/2}} + e^{\sqrt{5/2}}\left(\frac{1}{\cos(-32\, i)}\right)^2\right)$$

$$-32\, e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}} \tanh(2\times 16)\operatorname{sech}^2(2\times 16)\left(e^{\sqrt{5/2}}\operatorname{sech}^2(2\times 16) - e^{\sqrt{5/2}} + \sqrt[\sqrt{2}]{e}\right) = -32\, e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}}\left(-1+\frac{2}{1+\frac{1}{e^{64}}}\right)\left(\frac{2\, e^{32}}{1+e^{64}}\right)^2\left(\sqrt[\sqrt{2}]{e} - e^{\sqrt{5/2}} + e^{\sqrt{5/2}}\left(\frac{2\, e^{32}}{1+e^{64}}\right)^2\right)$$

$$-32\, e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}} \tanh(2\times 16)\operatorname{sech}^2(2\times 16)\left(e^{\sqrt{5/2}}\operatorname{sech}^2(2\times 16) - e^{\sqrt{5/2}} + \sqrt[\sqrt{2}]{e}\right) = -32\, e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}}\left(-1+\frac{2}{1+\frac{1}{e^{64}}}\right)\left(\frac{2}{\frac{1}{e^{32}}+e^{32}}\right)^2\left(\sqrt[\sqrt{2}]{e} - e^{\sqrt{5/2}} + e^{\sqrt{5/2}}\left(\frac{2}{\frac{1}{e^{32}}+e^{32}}\right)^2\right)$$

Series representations

$$-32\, e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}} \tanh(2\times 16) \operatorname{sech}^2(2\times 16)\left(e^{\sqrt{5/2}} \operatorname{sech}^2(2\times 16)-e^{\sqrt{5/2}}+\sqrt[\sqrt{2}]{e}\right)= 128\, e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}} \left(1+2\sum_{k=1}^{\infty}(-1)^k q^{2k}\right)\left(\sum_{k=1}^{\infty}(-1)^k q^{-1+2k}\right)^2 \left(\sqrt[\sqrt{2}]{e}-e^{\sqrt{5/2}}+4\, e^{\sqrt{5/2}}\left(\sum_{k=1}^{\infty}(-1)^k q^{-1+2k}\right)^2\right) \text{ for } q=e^{32}$$

$$-32\, e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}} \tanh(2\times 16) \operatorname{sech}^2(2\times 16)\left(e^{\sqrt{5/2}} \operatorname{sech}^2(2\times 16)-e^{\sqrt{5/2}}+\sqrt[\sqrt{2}]{e}\right)= 32\, e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}} \left(\sum_{k=-\infty}^{\infty}\frac{1}{\left(32+i\left(\frac{1}{2}+k\right)\pi\right)^2}\right)\left(-\sqrt[\sqrt{2}]{e}+e^{\sqrt{5/2}}+e^{\sqrt{5/2}}\sum_{k=-\infty}^{\infty}\frac{1}{\left(32+i\left(\frac{1}{2}+k\right)\pi\right)^2}\right)\left(1+2\sum_{k=1}^{\infty}(-1)^k q^{2k}\right) \text{ for } q=e^{32}$$

$$-32\, e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}} \tanh(2\times 16) \operatorname{sech}^2(2\times 16)\left(e^{\sqrt{5/2}} \operatorname{sech}^2(2\times 16)-e^{\sqrt{5/2}}+\sqrt[\sqrt{2}]{e}\right)= -8192\, e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}} \left(-\sqrt[\sqrt{2}]{e}+e^{\sqrt{5/2}}+e^{\sqrt{5/2}}\sum_{k=-\infty}^{\infty}\frac{1}{\left(32+i\left(\frac{1}{2}+k\right)\pi\right)^2}\right) \sum_{k_1=-\infty}^{\infty}\sum_{k_2=1}^{\infty}\frac{1}{\left(32+i\pi\left(\frac{1}{2}+k_1\right)\right)^2\left(4096+\pi^2(1-2k_2)^2\right)}$$

Integral representation

$$-32\, e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}} \tanh(2\times 16)\, \operatorname{sech}^2(2\times 16)\left(e^{\sqrt{5/2}} \operatorname{sech}^2(2\times 16) - e^{\sqrt{5/2}} + \sqrt[\sqrt{2}]{e}\right) = \frac{1}{\pi^4} 128\, e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}} \left(\int_0^\infty \frac{t^{(64 i)/\pi}}{1+t^2}\, dt\right)^2 \left(-\sqrt[\sqrt{2}]{e}\,\pi^2 + e^{\sqrt{5/2}}\,\pi^2 - 4\, e^{\sqrt{5/2}} \left(\int_0^\infty \frac{t^{(64 i)/\pi}}{1+t^2}\, dt\right)^2\right) \int_0^{32} \operatorname{sech}^2(t)\, dt$$

From which, after some calculations, we obtain:

(3 - 1/sqrt(π))*(1/299792458*(1/(-32 e^(-4/sqrt(3) - 1/sqrt(10) + 4/sqrt(15)) tanh(2*16) sech^2(2*16) (e^sqrt(5/2) sech^2(2*16) - e^sqrt(5/2) + e^(1/sqrt(2))))))^5)

Input

$$\left(3-\frac{1}{\sqrt{\pi}}\right)\left(\frac{1}{299\,792\,458}\left(-\left(1\middle/\left(32\, e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}} \tanh(2\times 16)\operatorname{sech}^2(2\times 16)\left(e^{\sqrt{5/2}} \operatorname{sech}^2(2\times 16) - e^{\sqrt{5/2}} + \sqrt[\sqrt{2}]{e}\right)\right)\right)\right)^5\right)$$

tanh(x) is the hyperbolic tangent function
sech(x) is the hyperbolic secant function

Exact result

$$-\frac{e^{-4\sqrt{5/3}+\sqrt{5/2}+20/\sqrt{3}}\left(3-\frac{1}{\sqrt{\pi}}\right)\cosh^{10}(32)\coth^5(32)}{10\,059\,365\,646\,073\,856\left(\sqrt[\sqrt{2}]{e} - e^{\sqrt{5/2}} + e^{\sqrt{5/2}} \operatorname{sech}^2(32)\right)^5}$$

cosh(x) is the hyperbolic cosine function
coth(x) is the hyperbolic cotangent function

Decimal approximation

3.515996874778703533398697621070172466750576257672857835957 6… × 10^{121}

3.5159968747787...*10^{121} ≈ Λ_Q

The observed value of ρ_Λ or Λ today is precisely the classical dual of its quantum precursor values ρ_Q , Λ_Q in the quantum very early precursor vacuum U_Q as determined by our dual equations. With regard the Cosmological constant, fundamental are the following results: Λ = 2.846 * 10^{-122} and Λ_Q = 0.3516 * 10^{122}

(**New Quantum Structure of the Space-Time -** *Norma G. SANCHEZ* - arXiv:1910.13382v1 [physics.gen-ph] 28 Oct 2019)

Alternate forms

$$-\frac{e^{-4\sqrt{5/3}+\sqrt{5/2}+20/\sqrt{3}}\left(3-\frac{1}{\sqrt{\pi}}\right)\cosh^{15}(32)}{10059365646073856\left(\sqrt[\sqrt{2}]{e}-e^{\sqrt{5/2}}+\frac{e^{\sqrt{5/2}}}{\cosh^2(32)}\right)^5\sinh^5(32)}$$

$$\frac{e^{-4\sqrt{5/3}+\sqrt{5/2}+20/\sqrt{3}}\left(3\sqrt{\pi}-1\right)\cosh^{20}(32)\coth^5(32)}{10059365646073856\sqrt{\pi}\left(-e^{\sqrt{5/2}}-\sqrt[\sqrt{2}]{e}\cosh^2(32)+e^{\sqrt{5/2}}\cosh^2(32)\right)^5}$$

$$-\frac{e^{-4\sqrt{5/3}+\sqrt{5/2}+20/\sqrt{3}}\left(\frac{1}{e^{32}}+e^{32}\right)^{15}\left(3-\frac{1}{\sqrt{\pi}}\right)}{10300790421579628544\left(e^{32}-\frac{1}{e^{32}}\right)^5\left(\sqrt[\sqrt{2}]{e}-e^{\sqrt{5/2}}+\frac{4e^{\sqrt{5/2}}}{\left(\frac{1}{e^{32}}+e^{32}\right)^2}\right)^5}$$

sinh(*x*) is the hyperbolic sine function

Expanded form

$$\frac{e^{-4\sqrt{5/3}+\sqrt{5/2}+20/\sqrt{3}}\cosh^{10}(32)\coth^5(32)}{10059365646073856\sqrt{\pi}\left(\sqrt[\sqrt{2}]{e}-e^{\sqrt{5/2}}+e^{\sqrt{5/2}}\operatorname{sech}^2(32)\right)^5}-\frac{3e^{-4\sqrt{5/3}+\sqrt{5/2}+20/\sqrt{3}}\cosh^{10}(32)\coth^5(32)}{10059365646073856\left(\sqrt[\sqrt{2}]{e}-e^{\sqrt{5/2}}+e^{\sqrt{5/2}}\operatorname{sech}^2(32)\right)^5}$$

Alternative representations

$$\frac{1}{299792458}\left(3-\frac{1}{\sqrt{\pi}}\right)\left(-\left(1\Big/\left(32\,e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}}\tanh(2\times 16)\,\text{sech}^2(2\times 16)\left(e^{\sqrt{5/2}}\,\text{sech}^2(2\times 16)-e^{\sqrt{5/2}}+\sqrt[\sqrt{2}]{e}\right)\right)\right)\right)^5 = \frac{1}{299792458}\left(-\left(1\Big/\left(32\,e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}}\left(-1+\frac{2}{1+\frac{1}{e^{64}}}\right)\left(\frac{1}{\cos(-32\,i)}\right)^2\left(\sqrt[\sqrt{2}]{e}-e^{\sqrt{5/2}}+e^{\sqrt{5/2}}\left(\frac{1}{\cos(-32\,i)}\right)^2\right)\right)\right)\right)^5\left(3-\frac{1}{\sqrt{\pi}}\right)$$

$$\frac{1}{299792458}\left(3-\frac{1}{\sqrt{\pi}}\right)\left(-\left(1\Big/\left(32\,e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}}\tanh(2\times 16)\,\text{sech}^2(2\times 16)\left(e^{\sqrt{5/2}}\,\text{sech}^2(2\times 16)-e^{\sqrt{5/2}}+\sqrt[\sqrt{2}]{e}\right)\right)\right)\right)^5 = \frac{1}{299792458}\left(-\left(1\Big/\frac{1}{\frac{1}{e^{32}}+e^{32}}\,32\left(-\frac{1}{e^{32}}+e^{32}\right)e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}}\left(\frac{1}{\cos(-32\,i)}\right)^2\left(\sqrt[\sqrt{2}]{e}-e^{\sqrt{5/2}}+e^{\sqrt{5/2}}\left(\frac{1}{\cos(-32\,i)}\right)^2\right)\right)\right)^5\left(3-\frac{1}{\sqrt{\pi}}\right)$$

$$\frac{1}{299792458}\left(3-\frac{1}{\sqrt{\pi}}\right)\left(-\left(1\Big/\left(32\,e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}}\tanh(2\times 16)\,\text{sech}^2(2\times 16)\left(e^{\sqrt{5/2}}\,\text{sech}^2(2\times 16)-e^{\sqrt{5/2}}+\sqrt[\sqrt{2}]{e}\right)\right)\right)\right)^5 = \frac{1}{299792458}\left(-\left(1\Big/\left(32\,e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}}\left(-1+\frac{2}{1+\frac{1}{e^{64}}}\right)\left(\frac{2}{\frac{1}{e^{32}}+e^{32}}\right)^2\left(\sqrt[\sqrt{2}]{e}-e^{\sqrt{5/2}}+e^{\sqrt{5/2}}\left(\frac{2}{\frac{1}{e^{32}}+e^{32}}\right)^2\right)\right)\right)\right)^5\left(3-\frac{1}{\sqrt{\pi}}\right)$$

Series representations

$$\frac{1}{299792458}\left(3-\frac{1}{\sqrt{\pi}}\right)\left(-\left(1\Big/\left(32\,e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}}\tanh(2\times16)\,\mathrm{sech}^2(2\times16)\left(e^{\sqrt{5/2}}\,\mathrm{sech}^2(2\times16)-e^{\sqrt{5/2}}+\sqrt[\sqrt{2}]{e}\right)\right)\right)\right)^5 = \frac{e^{-4\sqrt{5/3}+\sqrt{5/2}+20/\sqrt{3}}\left(-1+3\sqrt{\pi}\right)\left(1+2\sum_{k=1}^{\infty}q^{2k}\right)^5\left(\sum_{k=0}^{\infty}\frac{1024^k}{(2k)!}\right)^{10}}{10059365646073856\sqrt{\pi}\left(\sqrt[\sqrt{2}]{e}-e^{\sqrt{5/2}}+4\,e^{\sqrt{5/2}}\left(\sum_{k=1}^{\infty}(-1)^k q^{-1+2k}\right)^2\right)^5}$$

for $q = e^{32}$

$$\frac{1}{299792458}\left(3-\frac{1}{\sqrt{\pi}}\right)\left(-\left(1\Big/\left(32\,e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}}\tanh(2\times16)\,\mathrm{sech}^2(2\times16)\left(e^{\sqrt{5/2}}\,\mathrm{sech}^2(2\times16)-e^{\sqrt{5/2}}+\sqrt[\sqrt{2}]{e}\right)\right)\right)\right)^5 = -\frac{e^{-4\sqrt{5/3}+\sqrt{5/2}+20/\sqrt{3}}\left(-1+3\sqrt{\pi}\right)\left(\sum_{k=-\infty}^{\infty}\frac{1}{1024+k^2\pi^2}\right)^5\left(\sum_{k=0}^{\infty}\frac{1024^k}{(2k)!}\right)^{10}}{299792458\sqrt{\pi}\left(\sqrt[\sqrt{2}]{e}-e^{\sqrt{5/2}}+4\,e^{\sqrt{5/2}}\left(\sum_{k=1}^{\infty}(-1)^k q^{-1+2k}\right)^2\right)^5}$$

for $q = e^{32}$

$$\frac{1}{299792458}\left(3-\frac{1}{\sqrt{\pi}}\right)\left(-\left(1\Big/\left(32\,e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}}\tanh(2\times16)\,\mathrm{sech}^2(2\times16)\left(e^{\sqrt{5/2}}\,\mathrm{sech}^2(2\times16)-e^{\sqrt{5/2}}+\sqrt[\sqrt{2}]{e}\right)\right)\right)\right)^5 = -\frac{e^{-4\sqrt{5/3}+\sqrt{5/2}+20/\sqrt{3}}\left(-1+3\sqrt{\pi}\right)\left(1+2\sum_{k=1}^{\infty}q^{2k}\right)^5\left(\sum_{k=0}^{\infty}\frac{\left(32-\frac{i\pi}{2}\right)^{1+2k}}{(1+2k)!}\right)^{10}}{10059365646073856\sqrt{\pi}\left(\sqrt[\sqrt{2}]{e}-e^{\sqrt{5/2}}+4\,e^{\sqrt{5/2}}\left(\sum_{k=1}^{\infty}(-1)^k q^{-1+2k}\right)^2\right)^5}$$

for $q = e^{32}$

$n!$ is the factorial function

Integral representations

$$\frac{1}{299792458}\left(3-\frac{1}{\sqrt{\pi}}\right)\left(-\left(1\Big/\left(32\,e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}}\tanh(2\times 16)\operatorname{sech}^2(2\times 16)\left(e^{\sqrt{5/2}}\operatorname{sech}^2(2\times 16)-e^{\sqrt{5/2}}+\sqrt[\sqrt{2}]{e}\right)\right)\right)\right)^5 =$$

$$\left(e^{-4\sqrt{5/3}+\sqrt{5/2}+20/\sqrt{3}}\left(-1+3\sqrt{\pi}\right)\pi^{19/2}\left(\int_{\frac{i\pi}{2}}^{32}\operatorname{csch}^2(t)\,dt\right)^5\left(1+32\int_0^1\sinh(32\,t)\,dt\right)^{10}\right)\Big/\left(10059365646073856\left(\sqrt[\sqrt{2}]{e}\,\pi^2-e^{\sqrt{5/2}}\,\pi^2+4\,e^{\sqrt{5/2}}\left(\int_0^\infty\frac{t^{(64\,i)/\pi}}{1+t^2}\,dt\right)^2\right)^5\right)$$

$$\frac{1}{299792458}\left(3-\frac{1}{\sqrt{\pi}}\right)\left(-\left(1\Big/\left(32\,e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}}\tanh(2\times 16)\operatorname{sech}^2(2\times 16)\left(e^{\sqrt{5/2}}\operatorname{sech}^2(2\times 16)-e^{\sqrt{5/2}}+\sqrt[\sqrt{2}]{e}\right)\right)\right)\right)^5 =$$

$$\frac{e^{-4\sqrt{5/3}+\sqrt{5/2}+20/\sqrt{3}}\left(-1+3\sqrt{\pi}\right)\pi^{19/2}\left(\int_{\frac{i\pi}{2}}^{32}\operatorname{csch}^2(t)\,dt\right)^5\left(\int_{\frac{i\pi}{2}}^{32}\sinh(t)\,dt\right)^{10}}{10059365646073856\left(\sqrt[\sqrt{2}]{e}\,\pi^2-e^{\sqrt{5/2}}\,\pi^2+4\,e^{\sqrt{5/2}}\left(\int_0^\infty\frac{t^{(64\,i)/\pi}}{1+t^2}\,dt\right)^2\right)^5}$$

$$\frac{1}{299792458}\left(3-\frac{1}{\sqrt{\pi}}\right)\left(-\left(1\Big/\left(32\,e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}}\tanh(2\times 16)\operatorname{sech}^2(2\times 16)\left(e^{\sqrt{5/2}}\operatorname{sech}^2(2\times 16)-e^{\sqrt{5/2}}+\sqrt[\sqrt{2}]{e}\right)\right)\right)\right)^5 =$$

$$-\frac{e^{-4\sqrt{5/3}+\sqrt{5/2}+20/\sqrt{3}}\left(-1+3\sqrt{\pi}\right)\pi^{9/2}\left(\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{e^{256/s+s}}{\sqrt{s}}\,ds\right)^{10}\left(\int_{\frac{i\pi}{2}}^{32}\operatorname{csch}^2(t)\,dt\right)^5}{10300790421579628544\left(\sqrt[\sqrt{2}]{e}\,\pi^2-e^{\sqrt{5/2}}\,\pi^2+4\,e^{\sqrt{5/2}}\left(\int_0^\infty\frac{t^{(64\,i)/\pi}}{1+t^2}\,dt\right)^2\right)^5}$$

for

$\gamma > 0$

$\operatorname{csch}(x)$ is the hyperbolic cosecant function

We obtain also:

(-ln(-32 e^(-4/sqrt(3) - 1/sqrt(10) + 4/sqrt(15)) tanh(2*16) sech^2(2*16) (e^sqrt(5/2) sech^2(2*16) - e^sqrt(5/2) + e^(1/sqrt(2))))+Pi+e-3/2)^2-7-Φ

Input

$$\left(-\log\left(-32\, e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}} \tanh(2\times 16)\,\text{sech}^2(2\times 16)\left(e^{\sqrt{5/2}}\,\text{sech}^2(2\times 16)-e^{\sqrt{5/2}}+\sqrt[\sqrt{2}]{e}\right)\right)+\pi+e-\frac{3}{2}\right)^2-7-\Phi$$

$\tanh(x)$ is the hyperbolic tangent function
$\text{sech}(x)$ is the hyperbolic secant function
$\log(x)$ is the natural logarithm
Φ is the golden ratio conjugate

Exact result

$$-\Phi-7+\left(-\frac{3}{2}+e+\pi-\log\left(-32\, e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}} \tanh(32)\,\text{sech}^2(32)\left(\sqrt[\sqrt{2}]{e}-e^{\sqrt{5/2}}+e^{\sqrt{5/2}}\,\text{sech}^2(32)\right)\right)\right)^2$$

Exact form

$$-\phi-6+\frac{1}{4}\left(3-2e-2\pi+2\log\left(-32\, e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}} \tanh(32)\,\text{sech}^2(32)\left(\sqrt[\sqrt{2}]{e}+e^{\sqrt{5/2}}\left(\text{sech}^2(32)-1\right)\right)\right)\right)^2$$

ϕ is the golden ratio

Decimal approximation

4096.0095321255161533194322972196089619337976598697296308599431828
...

4096.0095321255….≈ 4096 = 64^2 , that multiplied by 2 give 8192, indeed:

The total amplitude vanishes for gauge group SO(8192), while the vacuum energy is negative and independent of the gauge group.
The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, SO(2^{13}) i.e. SO(8192). (From: "Dilaton Tadpole for the Open Bosonic String " Michael R. Douglas and Benjamin Grinstein - September 2,1986)

Alternate forms

$$-7-\Phi+\left(-\frac{3}{2}+e+\pi-\log\left(-\frac{32\,e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}}\left(\sqrt[\sqrt{2}]{\sqrt{e}}-e^{\sqrt{5/2}}+\frac{e^{\sqrt{5/2}}}{\cosh^2(32)}\right)\sinh(32)}{\cosh^3(32)}\right)\right)^2$$

$$-\Phi-7+\left(-\frac{3}{2}+e+\pi-\log\left(-\frac{128\,e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}}\left(e^{32}-\frac{1}{e^{32}}\right)\left(\sqrt[\sqrt{2}]{\sqrt{e}}-e^{\sqrt{5/2}}+\frac{4\,e^{\sqrt{5/2}}}{\left(\frac{1}{e^{32}}+e^{32}\right)^2}\right)}{\left(\frac{1}{e^{32}}+e^{32}\right)^3}\right)\right)^2$$

$$\frac{1}{4}\left(-4\,\Phi - 19 - 12\,e + 4\,e^2 - 12\,\pi + 8\,e\,\pi + 4\,\pi^2\right) + \log^2\left(-32\,e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}}\tanh(32)\operatorname{sech}^2(32)\left(\sqrt[\sqrt{2}]{e} - e^{\sqrt{5/2}} + e^{\sqrt{5/2}}\operatorname{sech}^2(32)\right)\right) - (-3 + 2\,e + 2\,\pi)\log\left(-32\,e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}}\tanh(32)\operatorname{sech}^2(32)\left(\sqrt[\sqrt{2}]{e} - e^{\sqrt{5/2}} + e^{\sqrt{5/2}}\operatorname{sech}^2(32)\right)\right)$$

$$-\Phi - 7 + \left(-\frac{3}{2} + \frac{4}{\sqrt{3}} + \frac{1}{\sqrt{10}} - \frac{4}{\sqrt{15}} + e + \pi - 5\log(2) - \log(\tanh(32)) - \log\left(-\sqrt[\sqrt{2}]{e} + e^{\sqrt{5/2}} - e^{\sqrt{5/2}}\operatorname{sech}^2(32)\right) - 2\log(\operatorname{sech}(32))\right)^2$$

$\cosh(x)$ is the hyperbolic cosine function

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

Expanded form

$$-\Phi - \frac{19}{4} - 3\,e + e^2 - 3\,\pi + 2\,e\,\pi + \pi^2 + \log^2\left(-32\,e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}}\tanh(32)\operatorname{sech}^2(32)\left(\sqrt[\sqrt{2}]{e} - e^{\sqrt{5/2}} + e^{\sqrt{5/2}}\operatorname{sech}^2(32)\right)\right) + 3\log\left(-32\,e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}}\tanh(32)\operatorname{sech}^2(32)\left(\sqrt[\sqrt{2}]{e} - e^{\sqrt{5/2}} + e^{\sqrt{5/2}}\operatorname{sech}^2(32)\right)\right) - 2\,e\log\left(-32\,e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}}\tanh(32)\operatorname{sech}^2(32)\left(\sqrt[\sqrt{2}]{e} - e^{\sqrt{5/2}} + e^{\sqrt{5/2}}\operatorname{sech}^2(32)\right)\right) - 2\,\pi\log\left(-32\,e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}}\tanh(32)\operatorname{sech}^2(32)\left(\sqrt[\sqrt{2}]{e} - e^{\sqrt{5/2}} + e^{\sqrt{5/2}}\operatorname{sech}^2(32)\right)\right)$$

27sqrt((-ln(-32 e^(-4/sqrt(3) - 1/sqrt(10) + 4/sqrt(15)) tanh(2*16) sech^2(2*16) (e^sqrt(5/2) sech^2(2*16) - e^sqrt(5/2) + e^(1/sqrt(2)))))+Pi+e-3/2)^2-7-Φ)+1

Input

$$27\sqrt{\left(\left(-\log\left(-32\, e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}}\tanh(2\times 16)\operatorname{sech}^2(2\times 16)\left(e^{\sqrt{5/2}}\operatorname{sech}^2(2\times 16)-e^{\sqrt{5/2}}+\sqrt[\sqrt{2}]{e}\right)\right)+\pi+e-\frac{3}{2}\right)^2-7-\Phi\right)}+1$$

tanh(x) is the hyperbolic tangent function
sech(x) is the hyperbolic secant function
log(x) is the natural logarithm
Φ is the golden ratio conjugate

Exact result

$$27\sqrt{\left(-\Phi-7+\left(-\frac{3}{2}+e+\pi-\log\left(-32\, e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}}\tanh(32)\operatorname{sech}^2(32)\left(\sqrt[\sqrt{2}]{e}-e^{\sqrt{5/2}}+e^{\sqrt{5/2}}\operatorname{sech}^2(32)\right)\right)\right)^2\right)}+1$$

Exact form

$$27\sqrt{\left(-\phi-6+\frac{1}{4}\left(3-2\,e-2\,\pi+2\log\left(-32\, e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}}\tanh(32)\operatorname{sech}^2(32)\left(\sqrt[\sqrt{2}]{e}+e^{\sqrt{5/2}}\left(\operatorname{sech}^2(32)-1\right)\right)\right)\right)^2\right)}+1$$

ϕ is the golden ratio

Decimal approximation

1729.0020106815562602572861615991978345803349310980375734885323803
…

1729.0020106815….

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve ($1728 = 8^2 * 3^3$). The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number)

Alternate forms

$$1+27\sqrt{\left(-7-\Phi+\left(-\frac{3}{2}+e+\pi-\log\left(-\frac{32\,e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}}\left(\sqrt[\sqrt{2}]{e}-e^{\sqrt{5/2}}+\frac{e^{\sqrt{5/2}}}{\cosh^2(32)}\right)\sinh(32)}{\cosh^3(32)}\right)\right)^2\right)}$$

$$27\sqrt{\left(-\Phi-7+\left(-\frac{3}{2}+e+\pi-\log\left(-\frac{1}{\left(\frac{1}{e^{32}}+e^{32}\right)^3}128\,e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}}\left(e^{32}-\frac{1}{e^{32}}\right)\left(\sqrt[\sqrt{2}]{e}-e^{\sqrt{5/2}}+\frac{4\,e^{\sqrt{5/2}}}{\left(\frac{1}{e^{32}}+e^{32}\right)^2}\right)\right)\right)^2\right)}+1$$

$$\frac{1}{2}\left(27\sqrt{\left(-4\,\Phi-19-12\,e+4\,e^2-12\,\pi+8\,e\,\pi+4\,\pi^2+4\log^2\left(-32\,e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}}\tanh(32)\operatorname{sech}^2(32)\left(\sqrt[\sqrt{2}]{e}-e^{\sqrt{5/2}}+e^{\sqrt{5/2}}\operatorname{sech}^2(32)\right)\right)+12\log\left(-32\,e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}}\tanh(32)\operatorname{sech}^2(32)\left(\sqrt[\sqrt{2}]{e}-e^{\sqrt{5/2}}+e^{\sqrt{5/2}}\operatorname{sech}^2(32)\right)\right)-8\,e\log\left(-32\,e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}}\tanh(32)\operatorname{sech}^2(32)\left(\sqrt[\sqrt{2}]{e}-e^{\sqrt{5/2}}+e^{\sqrt{5/2}}\operatorname{sech}^2(32)\right)\right)-8\,\pi\log\left(-32\,e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}}\tanh(32)\operatorname{sech}^2(32)\left(\sqrt[\sqrt{2}]{e}-e^{\sqrt{5/2}}+e^{\sqrt{5/2}}\operatorname{sech}^2(32)\right)\right)\right)}+2\right)$$

$$27\sqrt{\left(-\Phi-7+\left(-\frac{3}{2}+\frac{4}{\sqrt{3}}+\frac{1}{\sqrt{10}}-\frac{4}{\sqrt{15}}+e+\pi-5\log(2)-\log(\tanh(32))-\log\left(-\sqrt[\sqrt{2}]{e}+e^{\sqrt{5/2}}-e^{\sqrt{5/2}}\operatorname{sech}^2(32)\right)-2\log(\operatorname{sech}(32))\right)^2\right)}+1$$

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

(27sqrt((-ln(-32 e^(-4/sqrt(3) - 1/sqrt(10) + 4/sqrt(15)) tanh(2*16) sech^2(2*16) (e^sqrt(5/2) sech^2(2*16) - e^sqrt(5/2) + e^(1/sqrt(2))))+Pi+e-3/2)^2-7-Φ)+1)^1/15+ (MRB const)^(1-1/(4π)+π)

Input

$$\left(27\sqrt{\left(\left(-\log\left(-32\,e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}}\tanh(2\times16)\operatorname{sech}^2(2\times16)\left(e^{\sqrt{5/2}}\operatorname{sech}^2(2\times16)-e^{\sqrt{5/2}}+\sqrt[\sqrt{2}]{e}\right)\right)+\pi+e-\frac{3}{2}\right)^2-7-\Phi\right)}+1\right)\wedge(1/15)+C_{\text{MRB}}^{1-1/(4\pi)+\pi}$$

$\tanh(x)$ is the hyperbolic tangent function
$\operatorname{sech}(x)$ is the hyperbolic secant function
$\log(x)$ is the natural logarithm
Φ is the golden ratio conjugate
C_{MRB} is the MRB constant

Exact result

$$C_{\text{MRB}}^{1-1/(4\pi)+\pi}+\left(27\sqrt{\left(-\Phi-7+\left(-\frac{3}{2}+e+\pi-\log\left(-32\,e^{-4/\sqrt{3}-1/\sqrt{10}+4/\sqrt{15}}\tanh(32)\operatorname{sech}^2(32)\left(\sqrt[\sqrt{2}]{e}-e^{\sqrt{5/2}}+e^{\sqrt{5/2}}\operatorname{sech}^2(32)\right)\right)\right)^2\right)}+1\right)\wedge(1/15)$$

Decimal approximation

1.6449381515714466330978413612806793981542082701106622205654732721
…

1.64493815157144….≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape)

Alternate forms

$$C_{\text{MRB}}^{1-1/(4\pi)+\pi} + \left(1 + 27\sqrt{\left(-7 - \Phi + \left(-\frac{3}{2} + e + \pi - \log\left(-\frac{1}{\cosh^3(32)} 32\, e^{-4/\sqrt{3} - 1/\sqrt{10} + 4/\sqrt{15}} \left(\sqrt[\sqrt{2}]{e} - e^{\sqrt{5/2}} + \frac{e^{\sqrt{5/2}}}{\cosh^2(32)}\right)\sinh(32)\right)\right)^2\right)}\right)\text{^}(1/15)$$

$$C_{\text{MRB}}^{1-1/(4\pi)+\pi} + \left(27\sqrt{\left(-\Phi - 7 + \left(-\frac{3}{2} + e + \pi - \log\left(-32\, e^{-1/\sqrt{\frac{30}{195-64\sqrt{5}+16\sqrt{3(3-\sqrt{5})}}}} \tanh(32)\,\text{sech}^2(32) \left(\sqrt[\sqrt{2}]{e} - e^{\sqrt{5/2}} + e^{\sqrt{5/2}}\,\text{sech}^2(32)\right)\right)\right)^2\right)} + 1\right)\text{^}(1/15)$$

$$C_{\text{MRB}}^{1-1/(4\pi)+\pi} + \left(27\sqrt{\left(-\Phi - 7 + \left(-\frac{3}{2} + e + \pi - \log\left(-\frac{1}{\left(\frac{1}{e^{32}} + e^{32}\right)^3} 128\, e^{-4/\sqrt{3} - 1/\sqrt{10} + 4/\sqrt{15}} \left(e^{32} - \frac{1}{e^{32}}\right)\left(\sqrt[\sqrt{2}]{e} - e^{\sqrt{5/2}} + \frac{4\, e^{\sqrt{5/2}}}{\left(\frac{1}{e^{32}} + e^{32}\right)^2}\right)\right)\right)^2\right)} + 1\right)\text{^}(1/15)$$

$$C_{\mathrm{MRB}}^{1-1/(4\pi)+\pi} + \left(27\sqrt{\left(-\Phi - 7 + \left(-\frac{3}{2} + \frac{4}{\sqrt{3}} + \frac{1}{\sqrt{10}} - \frac{4}{\sqrt{15}} + e + \pi - 5\log(2) - \log(\tanh(32)) - \log\left(-\sqrt[\sqrt{2}]{e} + e^{\sqrt{5/2}} - e^{\sqrt{5/2}}\operatorname{sech}^2(32)\right) - 2\log(\operatorname{sech}(32))\right)^2\right) + 1}\right)\hat{}\,(1/15)$$

cosh(x) is the hyperbolic cosine function
sinh(x) is the hyperbolic sine function

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References

[1] Localizing Gravity and Supergravity on Braneworlds – K. S. Stelle – Imperial College London – “Quantum Gravity and All of That”- Seminar 19 May 2022