On some Ramanujan formulas: new possible mathematical connections with various parameters of Particle Physics and Cosmology IV.

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Abstract

In this research thesis, we have analyzed further Ramanujan formulas and described new possible mathematical connections with various parameters of Particle Physics and Cosmology

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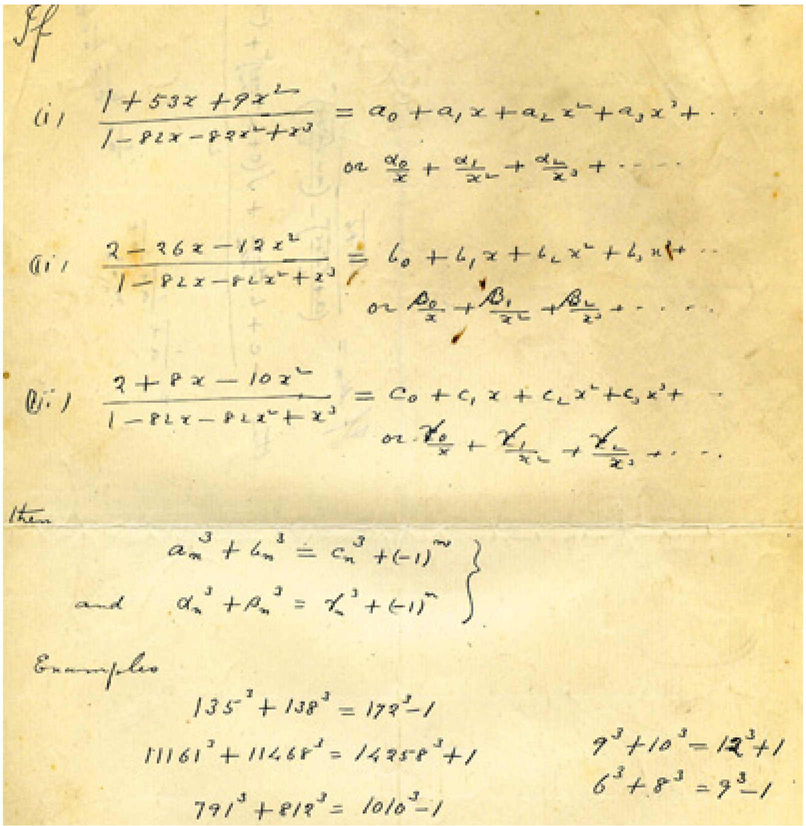


If

(i) $$\frac{1+53x+9x^2}{1-82x-82x^2+x^3} = a_0 + a_1 x + a_2 x^2 + a_3 x^3 + \cdots$$
or $$\frac{\alpha_0}{x} + \frac{\alpha_1}{x^2} + \frac{\alpha_2}{x^3} + \cdots$$

(ii) $$\frac{2-26x-12x^2}{1-82x-82x^2+x^3} = b_0 + b_1 x + b_2 x^2 + b_3 x^3 + \cdots$$
or $$\frac{\beta_0}{x} + \frac{\beta_1}{x^2} + \frac{\beta_2}{x^3} + \cdots$$

(iii) $$\frac{2+8x-10x^2}{1-82x-82x^2+x^3} = c_0 + c_1 x + c_2 x^2 + c_3 x^3 + \cdots$$
or $$\frac{\gamma_0}{x} + \frac{\gamma_1}{x^2} + \frac{\gamma_2}{x^3} + \cdots$$

then

$$a_n^3 + b_n^3 = c_n^3 + (-1)^n$$
and $$\alpha_n^3 + \beta_n^3 = \gamma_n^3 + (-1)^n$$

Examples

$$135^3 + 138^3 = 172^3 - 1$$
$$11161^3 + 11468^3 = 14258^3 + 1$$
$$791^3 + 812^3 = 1010^3 - 1$$
$$9^3 + 10^3 = 12^3 + 1$$
$$6^3 + 8^3 = 9^3 - 1$$

https://plus.maths.org/content/ramanujan

From:

RAMANUJAN'S UNPUBLISHED MANUSCRIPT ON THE PARTITION AND TAU FUNCTIONS WITH PROOFS AND COMMENTARY
Bruce C. Berndt and Ken Ono

We have that (page 45):

$$(q;q)_\infty^{19} = 1 - 19q + 152q^2 - 627q^3 + 1140q^4 + 988q^5 - 9063q^6 + 14212q^7 + 7410q^8 - 44270q^9 + 22781q^{10} + 38114q^{11} + 36176q^{12} - 137256q^{13} - 154850q^{14} + 480605q^{15} + \cdots$$

For q = 1, we obtain:

(1-19+152-627+1140+988-9063+14212+7410-44270+22781+38114+36176-137256-154850+480605)

Input:

$1 - 19 + 152 - 627 + 1140 + 988 - 9063 + 14\,212 + 7410 - 44\,270 + 22\,781 + 38\,114 + 36\,176 - 137\,256 - 154\,850 + 480\,605$

Result:

255 494

255494

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

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

for n = 404.1338, we obtain:

sqrt(golden ratio) * exp(Pi*sqrt(404.1338/15)) / (2*5^(1/4)*sqrt(404.1338))

Input interpretation:

$$\sqrt{\phi} \times \frac{\exp\left(\pi \sqrt{\frac{404.1338}{15}}\right)}{2 \sqrt[4]{5}\ \sqrt{404.1338}}$$

ϕ is the golden ratio

Result:

$2.55494\ldots \times 10^5$

255494

Series representations:

$$\frac{\sqrt{\phi}\,\exp\left(\pi\sqrt{\frac{404.134}{15}}\right)}{2\sqrt[4]{5}\,\sqrt{404.134}} = \frac{\exp\left(\pi\sqrt{z_0}\,\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(26.9423-z_0)^k z_0^{-k}}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(\phi-z_0)^k z_0^{-k}}{k!}}{2\sqrt[4]{5}\,\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(404.134-z_0)^k z_0^{-k}}{k!}}$$

for not $((z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0))$

$$\frac{\sqrt{\phi}\,\exp\left(\pi\sqrt{\frac{404.134}{15}}\right)}{2\sqrt[4]{5}\,\sqrt{404.134}} = \left(\exp\left(i\pi\left\lfloor\frac{\arg(\phi-x)}{2\pi}\right\rfloor\right)\exp\left(\pi\exp\left(i\pi\left\lfloor\frac{\arg(26.9423-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(26.9423-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k(\phi-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\Bigg/\left(2\sqrt[4]{5}\,\exp\left(i\pi\left\lfloor\frac{\arg(404.134-x)}{2\pi}\right\rfloor\right)\sum_{k=0}^{\infty}\frac{(-1)^k(404.134-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)$$

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

$$\frac{\sqrt{\phi}\,\exp\left(\pi\sqrt{\frac{404.134}{15}}\right)}{2\sqrt[4]{5}\,\sqrt{404.134}} = \left(\exp\left(\pi\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(26.9423-z_0)/(2\pi)\rfloor} z_0^{1/2(1+\lfloor\arg(26.9423-z_0)/(2\pi)\rfloor)}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(26.9423-z_0)^k z_0^{-k}}{k!}\right)\left(\frac{1}{z_0}\right)^{-1/2\lfloor\arg(404.134-z_0)/(2\pi)\rfloor+1/2\lfloor\arg(\phi-z_0)/(2\pi)\rfloor} z_0^{-1/2\lfloor\arg(404.134-z_0)/(2\pi)\rfloor+1/2\lfloor\arg(\phi-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(\phi-z_0)^k z_0^{-k}}{k!}\right)\Bigg/\left(2\sqrt[4]{5}\,\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(404.134-z_0)^k z_0^{-k}}{k!}\right)$$

From:

$$(q;q)_\infty^{23} = 1 - 23q + 230q^2 - 1265q^3 + 3795q^4 - 3519q^5 - 16445q^6 + 64285q^7 - 64515q^8 - 120175q^9 + 354706q^{10} - 123763q^{11} - 407560q^{12} - 48530q^{13} + 817190q^{14} + 1464341q^{15} + \cdots$$

For q = 1, we obtain:

1-23+230-1265+3795-3519-16445+64285-64515-120175+354706-123763-407560-48530+817190+1464341

Input:

1 − 23 + 230 − 1265 + 3795 − 3519 − 16 445 + 64 285 − 64 515 − 120 175 + 354 706 − 123 763 − 407 560 − 48 530 + 817 190 + 1 464 341

Result:

1 918 753

1918753

From the two results, we obtain:

(((1-23+230-1265+3795-3519-16445+64285-64515-120175+354706-123763-407560-48530+817190+1464341)/255494)))^1/4

Input:

$$\left(\frac{1}{255\,494}(1 - 23 + 230 - 1265 + 3795 - 3519 - 16\,445 + 64\,285 - 64\,515 - 120\,175 + 354\,706 - 123\,763 - 407\,560 - 48\,530 + 817\,190 + 1\,464\,341)\right) \wedge (1/4)$$

Result:

$$\sqrt[4]{\frac{1\,918\,753}{255\,494}}$$

Decimal approximation:

1.655425312490103995700782056787355389057278584659339282134...

1.65542531249….. is very near to the 14th root of the following Ramanujan's class invariant $Q = (G_{505}/G_{101/5})^3 = 1164,2696$ i.e. 1,65578...

Alternate form:

$$\frac{\sqrt[4]{1918753}\ 255494^{3/4}}{255494}$$

We have also:

1/10^52[((((((((1-23+230-1265+3795-3519-16445+64285-64515-120175+354706-123763-407560-48530+817190+1464341)/255494))))^1/4)))-55/10^2+2/10^4]

where 55 and 2 are Fibonacci numbers

Input:

$$\frac{1}{10^{52}}\left(\left(\frac{1}{255494}(1-23+230-1265+3795-3519-16445+64285-64515-120175+354706-123763-407560-48530+817190+1464341)\right)^{\wedge}(1/4)-\frac{55}{10^2}+\frac{2}{10^4}\right)$$

Result:

$$\frac{\sqrt[4]{\frac{1918753}{255494}}-\frac{2749}{5000}}{10000000000000000000000000000000000000000000000000000}$$

Decimal approximation:

$1.1056253124901039957007820567873553890572785846593392\ldots\times 10^{-52}$

1.10562531…*10^{-52} result practically equal to the value of Cosmological Constant 1.1056*10^{-52} m^{-2}

Alternate forms:

$$\frac{2500\times 255494^{3/4}\sqrt[4]{1918753}-351176503}{6387350000000000000000000000000000000000000000000000000000}$$

$$\frac{\sqrt[4]{\frac{1918753}{255494}}}{10000000000000000000000000000000000000000000000000} - \frac{2749}{50000000000000000000000000000000000000000000000000}$$

$$\frac{2500\times 2^{3/4}\sqrt[4]{\frac{1918753}{127747}}-2749}{50000000000000000000000000000000000000000000000000}$$

Page 42

$$\sum_{n=0}^{\infty} p(25n+24)q^n = 5^2\cdot 63\frac{(q^5;q^5)_\infty^6}{(q;q)_\infty^7} + 5^5\cdot 52q\frac{(q^5;q^5)_\infty^{12}}{(q;q)_\infty^{13}} + 5^7\cdot 63q^2\frac{(q^5;q^5)_\infty^{18}}{(q;q)_\infty^{19}}$$

$$+ 5^{10}\cdot 6q^3\frac{(q^5;q^5)_\infty^{24}}{(q;q)_\infty^{25}} + 5^{12}q^4\frac{(q^5;q^5)_\infty^{30}}{(q;q)_\infty^{31}}. \quad (21.1)$$

25*63+5^5*52*0.5+5^7*63*0.5^2+5^10*6*0.5^3+5^12*0.5^4

Input:

$25\times 63+5^5\times 52\times 0.5+5^7\times 63\times 0.5^2+5^{10}\times 6\times 0.5^3+5^{12}\times 0.5^4$

Result:

2.38963015625×10^7

2.38963015625*10^7

Decimal form:

23896301.5625

23896301.5625 ≈ 23896301

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

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

for n = 677

sqrt(golden ratio) * exp(Pi*sqrt(676.82/15)) / (2*5^(1/4)*sqrt(676.82)) +sqrt(729) where 729 is 9^3 (see Ramanujan cubes)

Input interpretation:

$$\sqrt{\phi}\times\frac{\exp\left(\pi\sqrt{\frac{676.82}{15}}\right)}{2\sqrt[4]{5}\sqrt{676.82}}+\sqrt{729}$$

ϕ is the golden ratio

Result:

$2.38963\ldots\times10^7$

$2.3896301232415502133188573770825916487258894354953686\ldots\times10^7$

$2.38963012324155\ldots*10^7$

Series representations:

$$\frac{\sqrt{\phi}\exp\left(\pi\sqrt{\frac{676.82}{15}}\right)}{2\sqrt[4]{5}\sqrt{676.82}}+\sqrt{729}=\left(5^{3/4}\exp\left(\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(45.1213-z_0)^k z_0^{-k}}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(\phi-z_0)^k z_0^{-k}}{k!}+10\sqrt{z_0}\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}\frac{(-1)^{k_1+k_2}\left(-\frac{1}{2}\right)_{k_1}\left(-\frac{1}{2}\right)_{k_2}(676.82-z_0)^{k_1}(729-z_0)^{k_2}z_0^{-k_1-k_2}}{k_1!\,k_2!}\right)\Bigg/\left(10\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(676.82-z_0)^k z_0^{-k}}{k!}\right)\quad\text{for not }((z_0\in\mathbb{R}\text{ and }-\infty<z_0\leq 0))$$

$$\frac{\sqrt{\phi}\,\exp\left(\pi\sqrt{\frac{676.82}{15}}\right)}{2\sqrt[4]{5}\,\sqrt{676.82}}+\sqrt{729}=$$
$$\left(5^{3/4}\exp\left(i\pi\left\lfloor\frac{\arg(\phi-x)}{2\pi}\right\rfloor\right)\exp\left(\pi\exp\left(i\pi\left\lfloor\frac{\arg(45.1213-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(45.1213-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k(\phi-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}+\right.$$
$$\left.10\exp\left(i\pi\left\lfloor\frac{\arg(676.82-x)}{2\pi}\right\rfloor\right)\exp\left(i\pi\left\lfloor\frac{\arg(729-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}\frac{(-1)^{k_1+k_2}(676.82-x)^{k_1}(729-x)^{k_2}x^{-k_1-k_2}\left(-\frac{1}{2}\right)_{k_1}\left(-\frac{1}{2}\right)_{k_2}}{k_1!\,k_2!}\right)\Big/$$
$$\left(10\exp\left(i\pi\left\lfloor\frac{\arg(676.82-x)}{2\pi}\right\rfloor\right)\sum_{k=0}^{\infty}\frac{(-1)^k(676.82-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)$$

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

$$\frac{\sqrt{\phi}\,\exp\left(\pi\sqrt{\frac{676.82}{15}}\right)}{2\sqrt[4]{5}\,\sqrt{676.82}}+\sqrt{729}=\left(\left(\frac{1}{z_0}\right)^{-1/2\lfloor\arg(676.82-z_0)/(2\pi)\rfloor}\right.$$
$$z_0^{-1/2\lfloor\arg(676.82-z_0)/(2\pi)\rfloor}\left(5^{3/4}\exp\left(\pi\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(45.1213-z_0)/(2\pi)\rfloor}\right.\right.$$
$$\left.z_0^{1/2(1+\lfloor\arg(45.1213-z_0)/(2\pi)\rfloor)}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(45.1213-z_0)^k z_0^{-k}}{k!}\right)$$
$$\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(\phi-z_0)/(2\pi)\rfloor}z_0^{1/2\lfloor\arg(\phi-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(\phi-z_0)^k z_0^{-k}}{k!}+$$
$$10\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(676.82-z_0)/(2\pi)\rfloor+1/2\lfloor\arg(729-z_0)/(2\pi)\rfloor}$$
$$z_0^{1/2+1/2\lfloor\arg(676.82-z_0)/(2\pi)\rfloor+1/2\lfloor\arg(729-z_0)/(2\pi)\rfloor}$$
$$\left.\left.\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}\frac{(-1)^{k_1+k_2}\left(-\frac{1}{2}\right)_{k_1}\left(-\frac{1}{2}\right)_{k_2}(676.82-z_0)^{k_1}(729-z_0)^{k_2}z_0^{-k_1-k_2}}{k_1!\,k_2!}\right)\right)\Big/$$
$$\left(10\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(676.82-z_0)^k z_0^{-k}}{k!}\right)$$

ln((25*63+5^5*52*0.5+5^7*63*0.5^2+5^10*6*0.5^3+5^12*0.5^4))

Input:

$$\log(25\times 63+5^5\times 52\times 0.5+5^7\times 63\times 0.5^2+5^{10}\times 6\times 0.5^3+5^{12}\times 0.5^4)$$

$\log(x)$ is the natural logarithm

Result:

16.98923...

16.98923… result very near to the mass of the hypothetical light particle, the boson m_X = 16.84 MeV

Alternative representations:

$$\log(25\times 63+5^5\times 52\times 0.5+5^7\times 63\times 0.5^2+5^{10}\times 6\times 0.5^3+5^{12}\times 0.5^4) = \log_e(1575+26\times 5^5+63\times 0.5^2\times 5^7+6\times 0.5^3\times 5^{10}+0.5^4\times 5^{12})$$

$$\log(25\times 63+5^5\times 52\times 0.5+5^7\times 63\times 0.5^2+5^{10}\times 6\times 0.5^3+5^{12}\times 0.5^4) = \log(a)\log_a(1575+26\times 5^5+63\times 0.5^2\times 5^7+6\times 0.5^3\times 5^{10}+0.5^4\times 5^{12})$$

$$\log(25\times 63+5^5\times 52\times 0.5+5^7\times 63\times 0.5^2+5^{10}\times 6\times 0.5^3+5^{12}\times 0.5^4) = -\text{Li}_1(-1574-26\times 5^5-63\times 0.5^2\times 5^7-6\times 0.5^3\times 5^{10}-0.5^4\times 5^{12})$$

Series representations:

$$\log(25\times 63+5^5\times 52\times 0.5+5^7\times 63\times 0.5^2+5^{10}\times 6\times 0.5^3+5^{12}\times 0.5^4) = \log(2.38963\times 10^7)-\sum_{k=1}^{\infty}\frac{(-1)^k e^{-16.9892\,k}}{k}$$

$$\log(25\times 63+5^5\times 52\times 0.5+5^7\times 63\times 0.5^2+5^{10}\times 6\times 0.5^3+5^{12}\times 0.5^4) = 2\,i\,\pi\left\lfloor\frac{\arg(2.38963\times 10^7-x)}{2\,\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k(2.38963\times 10^7-x)^k x^{-k}}{k} \quad \text{for } x<0$$

$$\log(25\times 63+5^5\times 52\times 0.5+5^7\times 63\times 0.5^2+5^{10}\times 6\times 0.5^3+5^{12}\times 0.5^4) = \left\lfloor\frac{\arg(2.38963\times 10^7-z_0)}{2\,\pi}\right\rfloor\log\left(\frac{1}{z_0}\right)+\log(z_0)+\left\lfloor\frac{\arg(2.38963\times 10^7-z_0)}{2\,\pi}\right\rfloor\log(z_0)-\sum_{k=1}^{\infty}\frac{(-1)^k(2.38963\times 10^7-z_0)^k z_0^{-k}}{k}$$

Integral representations:

$$\log(25\times 63+5^5\times 52\times 0.5+5^7\times 63\times 0.5^2+5^{10}\times 6\times 0.5^3+5^{12}\times 0.5^4) = \int_1^{2.38963\times 10^7} \frac{1}{t}\,dt$$

$$\log(25\times 63+5^5\times 52\times 0.5+5^7\times 63\times 0.5^2+5^{10}\times 6\times 0.5^3+5^{12}\times 0.5^4) = \frac{1}{2 i \pi}\int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{e^{-16.9892 s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds \quad \text{for } -1<\gamma<0$$

8* ln((25*63+5^5*52*0.5+5^7*63*0.5^2+5^10*6*0.5^3+5^12*0.5^4))+Pi+1/golden ratio

Input:

$$8\log(25\times 63+5^5\times 52\times 0.5+5^7\times 63\times 0.5^2+5^{10}\times 6\times 0.5^3+5^{12}\times 0.5^4)+\pi+\frac{1}{\phi}$$

$\log(x)$ is the natural logarithm

ϕ is the golden ratio

Result:

139.6735...

139.6735… result practically equal to the rest mass of Pion meson 139.57 MeV

Alternative representations:

$$8\log(25\times 63+5^5\times 52\times 0.5+5^7\times 63\times 0.5^2+5^{10}\times 6\times 0.5^3+5^{12}\times 0.5^4)+\pi+\frac{1}{\phi} = \pi+8\log_e(1575+26\times 5^5+63\times 0.5^2\times 5^7+6\times 0.5^3\times 5^{10}+0.5^4\times 5^{12})+\frac{1}{\phi}$$

$$8\log(25\times 63+5^5\times 52\times 0.5+5^7\times 63\times 0.5^2+5^{10}\times 6\times 0.5^3+5^{12}\times 0.5^4)+\pi+\frac{1}{\phi} = \pi+8\log(a)\log_a(1575+26\times 5^5+63\times 0.5^2\times 5^7+6\times 0.5^3\times 5^{10}+0.5^4\times 5^{12})+\frac{1}{\phi}$$

$$8\log(25\times 63+5^5\times 52\times 0.5+5^7\times 63\times 0.5^2+5^{10}\times 6\times 0.5^3+5^{12}\times 0.5^4)+\pi+\frac{1}{\phi} = \pi-8\,\mathrm{Li}_1(-1574-26\times 5^5-63\times 0.5^2\times 5^7-6\times 0.5^3\times 5^{10}-0.5^4\times 5^{12})+\frac{1}{\phi}$$

Series representations:

$$8 \log(25 \times 63 + 5^5 \times 52 \times 0.5 + 5^7 \times 63 \times 0.5^2 + 5^{10} \times 6 \times 0.5^3 + 5^{12} \times 0.5^4) + \pi + \frac{1}{\phi} = \frac{1}{\phi} + \pi + 8 \log(2.38963 \times 10^7) - 8 \sum_{k=1}^{\infty} \frac{(-1)^k e^{-16.9892 k}}{k}$$

$$8 \log(25 \times 63 + 5^5 \times 52 \times 0.5 + 5^7 \times 63 \times 0.5^2 + 5^{10} \times 6 \times 0.5^3 + 5^{12} \times 0.5^4) + \pi + \frac{1}{\phi} = \frac{1}{\phi} + \pi + 16 i \pi \left\lfloor \frac{\arg(2.38963 \times 10^7 - x)}{2 \pi} \right\rfloor + 8 \log(x) - 8 \sum_{k=1}^{\infty} \frac{(-1)^k (2.38963 \times 10^7 - x)^k x^{-k}}{k} \quad \text{for } x < 0$$

$$8 \log(25 \times 63 + 5^5 \times 52 \times 0.5 + 5^7 \times 63 \times 0.5^2 + 5^{10} \times 6 \times 0.5^3 + 5^{12} \times 0.5^4) + \pi + \frac{1}{\phi} = \frac{1}{\phi} + \pi + 8 \left\lfloor \frac{\arg(2.38963 \times 10^7 - z_0)}{2 \pi} \right\rfloor \log\left(\frac{1}{z_0}\right) + 8 \log(z_0) + 8 \left\lfloor \frac{\arg(2.38963 \times 10^7 - z_0)}{2 \pi} \right\rfloor \log(z_0) - 8 \sum_{k=1}^{\infty} \frac{(-1)^k (2.38963 \times 10^7 - z_0)^k z_0^{-k}}{k}$$

Integral representations:

$$8 \log(25 \times 63 + 5^5 \times 52 \times 0.5 + 5^7 \times 63 \times 0.5^2 + 5^{10} \times 6 \times 0.5^3 + 5^{12} \times 0.5^4) + \pi + \frac{1}{\phi} = \frac{1}{\phi} + \pi + 8 \int_1^{2.38963 \times 10^7} \frac{1}{t} \, dt$$

$$8 \log(25 \times 63 + 5^5 \times 52 \times 0.5 + 5^7 \times 63 \times 0.5^2 + 5^{10} \times 6 \times 0.5^3 + 5^{12} \times 0.5^4) + \pi + \frac{1}{\phi} = \frac{1}{\phi} + \pi + \frac{4}{i \pi} \int_{-i \infty + \gamma}^{i \infty + \gamma} \frac{e^{-16.9892 s} \Gamma(-s)^2 \Gamma(1 + s)}{\Gamma(1 - s)} \, ds \quad \text{for } -1 < \gamma < 0$$

8* ln((25*63+5^5*52*0.5+5^7*63*0.5^2+5^10*6*0.5^3+5^12*0.5^4))-11+1/golden ratio

where 11 is a Lucas number

Input:

$$8 \log(25 \times 63 + 5^5 \times 52 \times 0.5 + 5^7 \times 63 \times 0.5^2 + 5^{10} \times 6 \times 0.5^3 + 5^{12} \times 0.5^4) - 11 + \frac{1}{\phi}$$

$\log(x)$ is the natural logarithm

ϕ is the golden ratio

Result:

125.5319...

125.5319… result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0 and to the Higgs boson mass 125.18 GeV

Alternative representations:

$$8\log(25\times 63+5^5\times 52\times 0.5+5^7\times 63\times 0.5^2+5^{10}\times 6\times 0.5^3+5^{12}\times 0.5^4)-11+\frac{1}{\phi}=$$
$$-11+8\log_e(1575+26\times 5^5+63\times 0.5^2\times 5^7+6\times 0.5^3\times 5^{10}+0.5^4\times 5^{12})+\frac{1}{\phi}$$

$$8\log(25\times 63+5^5\times 52\times 0.5+5^7\times 63\times 0.5^2+5^{10}\times 6\times 0.5^3+5^{12}\times 0.5^4)-11+\frac{1}{\phi}=$$
$$-11+8\log(a)\log_a(1575+26\times 5^5+63\times 0.5^2\times 5^7+6\times 0.5^3\times 5^{10}+0.5^4\times 5^{12})+\frac{1}{\phi}$$

$$8\log(25\times 63+5^5\times 52\times 0.5+5^7\times 63\times 0.5^2+5^{10}\times 6\times 0.5^3+5^{12}\times 0.5^4)-11+\frac{1}{\phi}=$$
$$-11-8\,\mathrm{Li}_1(-1574-26\times 5^5-63\times 0.5^2\times 5^7-6\times 0.5^3\times 5^{10}-0.5^4\times 5^{12})+\frac{1}{\phi}$$

Series representations:

$$8\log(25\times 63+5^5\times 52\times 0.5+5^7\times 63\times 0.5^2+5^{10}\times 6\times 0.5^3+5^{12}\times 0.5^4)-11+\frac{1}{\phi}=$$
$$-11+\frac{1}{\phi}+8\log(2.38963\times 10^7)-8\sum_{k=1}^{\infty}\frac{(-1)^k e^{-16.9892\,k}}{k}$$

$$8\log(25\times 63+5^5\times 52\times 0.5+5^7\times 63\times 0.5^2+5^{10}\times 6\times 0.5^3+5^{12}\times 0.5^4)-11+\frac{1}{\phi}=$$
$$-11+\frac{1}{\phi}+16\,i\,\pi\left\lfloor\frac{\arg(2.38963\times 10^7-x)}{2\,\pi}\right\rfloor+8\log(x)-8\sum_{k=1}^{\infty}\frac{(-1)^k(2.38963\times 10^7-x)^k x^{-k}}{k}\quad\text{for } x<0$$

$$8\log(25\times 63+5^5\times 52\times 0.5+5^7\times 63\times 0.5^2+5^{10}\times 6\times 0.5^3+5^{12}\times 0.5^4)-11+\frac{1}{\phi}=$$
$$-11+\frac{1}{\phi}+8\left\lfloor\frac{\arg(2.38963\times 10^7-z_0)}{2\pi}\right\rfloor\log\left(\frac{1}{z_0}\right)+8\log(z_0)+$$
$$8\left\lfloor\frac{\arg(2.38963\times 10^7-z_0)}{2\pi}\right\rfloor\log(z_0)-8\sum_{k=1}^{\infty}\frac{(-1)^k(2.38963\times 10^7-z_0)^k z_0^{-k}}{k}$$

Integral representations:

$$8\log(25\times 63+5^5\times 52\times 0.5+5^7\times 63\times 0.5^2+5^{10}\times 6\times 0.5^3+5^{12}\times 0.5^4)-11+\frac{1}{\phi}=$$
$$-11+\frac{1}{\phi}+8\int_1^{2.38963\times 10^7}\frac{1}{t}\,dt$$

$$8\log(25\times 63+5^5\times 52\times 0.5+5^7\times 63\times 0.5^2+5^{10}\times 6\times 0.5^3+5^{12}\times 0.5^4)-11+\frac{1}{\phi}=$$
$$-11+\frac{1}{\phi}+\frac{4}{i\pi}\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{e^{-16.9892s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds \quad \text{for } -1<\gamma<0$$

1/2((((25*63+5^5*52*0.5+5^7*63*0.5^2+5^10*6*0.5^3+5^12*0.5^4))^1/3-29-3))-golden ratio^2

Input:

$$\frac{1}{2}\left(\sqrt[3]{25\times 63+5^5\times 52\times 0.5+5^7\times 63\times 0.5^2+5^{10}\times 6\times 0.5^3+5^{12}\times 0.5^4}-29-3\right)-\phi^2$$

ϕ is the golden ratio

Result:

125.399...

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

Alternative representations:

$$\frac{1}{2}\left(\sqrt[3]{25\times 63+5^5\times 52\times 0.5+5^7\times 63\times 0.5^2+5^{10}\times 6\times 0.5^3+5^{12}\times 0.5^4}-29-3\right)-\phi^2 = \frac{1}{2}\left(-32+\sqrt[3]{1575+26\times 5^5+63\times 0.5^2\times 5^7+6\times 0.5^3\times 5^{10}+0.5^4\times 5^{12}}\right)-(2\sin(54°))^2$$

$$\frac{1}{2}\left(\sqrt[3]{25\times 63+5^5\times 52\times 0.5+5^7\times 63\times 0.5^2+5^{10}\times 6\times 0.5^3+5^{12}\times 0.5^4}-29-3\right)-\phi^2 = -(-2\cos(216°))^2+\frac{1}{2}\left(-32+\sqrt[3]{1575+26\times 5^5+63\times 0.5^2\times 5^7+6\times 0.5^3\times 5^{10}+0.5^4\times 5^{12}}\right)$$

$$\frac{1}{2}\left(\sqrt[3]{25\times 63+5^5\times 52\times 0.5+5^7\times 63\times 0.5^2+5^{10}\times 6\times 0.5^3+5^{12}\times 0.5^4}-29-3\right)-\phi^2 = \frac{1}{2}\left(-32+\sqrt[3]{1575+26\times 5^5+63\times 0.5^2\times 5^7+6\times 0.5^3\times 5^{10}+0.5^4\times 5^{12}}\right)-(-2\sin(666°))^2$$

Now, we have that:

Now

$$(21.2)\qquad \frac{(q^5;q^5)_\infty^6}{(q;q)_\infty^7}=\sum_{n=0}^{\infty}(-1)^n(2n+1)q^{n(n+1)/2}(q^5;q^5)_\infty^4+5J$$

$p(199)$ is the coefficient of q^7 in (21.2).

$$\begin{aligned}p(199) =&5^2\cdot 63\cdot 12195+5^2\cdot 52\cdot 60541+5^7\cdot 63\cdot 66862+5^{10}\cdot 6\cdot 29575+5^{12}\cdot 6448\\ =&3646072432125.\end{aligned}$$

5^2 * 63 * 12195 + 5^2 * 52 * 60541 + 5^7 * 63 * 66862 + 5^10 * 6 * 29575 + 5^12 * 6448 = 3646072432125

(5^2 * 63 * 12195) + (5^2 * 52 * 60541) + (5^7 * 63 * 66862) + (5^10 * 6 * 29575) + (5^12 * 6448)

Input:

$5^2\times 63\times 12\,195+5^2\times 52\times 60\,541+5^7\times 63\times 66\,862+5^{10}\times 6\times 29\,575+5^{12}\times 6448$

Result:

3 636 313 222 925

$3.636313222925 \times 10^{12}$

We note that:

((((5^2 * 63 * 12195) + (5^2 * 52 * 60541) + (5^7 * 63 * 66862) + (5^10 * 6 * 29575) + (5^12 * 6448))))*196884*744

Where 196884 and 744 re fundamental numbers of the following j-invariant

$$j(\tau) = q^{-1} + 744 + 196884q + 21493760q^2 + 864299970q^3 + 20245856256q^4 + \cdots$$

(In mathematics, Felix Klein's j-invariant or j function, regarded as a function of a complex variable τ, is a modular function of weight zero for SL(2, Z) defined on the upper half plane of complex numbers.)

Input:

$$(5^2 \times 63 \times 12\,195 + 5^2 \times 52 \times 60541 + 5^7 \times 63 \times 66\,862 + 5^{10} \times 6 \times 29\,575 + 5^{12} \times 6448) \times 196\,884 \times 744$$

Result:

532 653 328 081 280 080 800

Scientific notation:

$5.326533280812800808 \times 10^{20}$

$5.326533280812800808 * 10^{20}$ result very near to the value of the following expression previously analyzed:

$$\Sigma_D(r)^2 = \frac{a_0}{8\pi G} \frac{\Sigma_B(r)}{d-1}.$$

$$\frac{1}{8\,\pi \times 6.67430 \times 10^{-11}} \times \frac{2.7481463494283 \times 10^{12}}{3}$$

$5.46101... \times 10^{20}$

$5.46101...*10^{20}$

We have also:

(55+5)* ln((((5^2 * 63 * 12195) + (5^2 * 52 * 60541) + (5^7 * 63 * 66862) + (5^10 * 6 * 29575) + (5^12 * 6448))))-7+1/golden ratio

Where 7 is a Lucas number

Input:

$$(55+5)\log(5^2\times 63\times 12\,195+5^2\times 52\times 60\,541+5^7\times 63\times 66\,862+5^{10}\times 6\times 29\,575+5^{12}\times 6448)-7+\frac{1}{\phi}$$

log(x) is the natural logarithm

ϕ is the golden ratio

Exact result:

$$\frac{1}{\phi}-7+60\log(3\,636\,313\,222\,925)$$

Decimal approximation:

1728.937519995893117883939542802148173745154501474787164794...

1728.937519….

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

Property:

$-7+\frac{1}{\phi}+60\log(3\,636\,313\,222\,925)$ is a transcendental number

Alternate forms:

$$\frac{1}{\phi}-7+120\log(5)+60\log(145\,452\,528\,917)$$

$$\frac{1}{2}\left(\sqrt{5}-15\right)+60\log(3\,636\,313\,222\,925)$$

$$-7+\frac{2}{1+\sqrt{5}}+60\log(3\,636\,313\,222\,925)$$

Alternative representations:

$$(55+5)\log(5^2\times 63\times 12\,195+5^2\times 52\times 60\,541+5^7\times 63\times 66\,862+5^{10}\times 6\times 29\,575+5^{12}\times 6448)-7+\frac{1}{\phi}=$$
$$-7+60\log_e(3\,916\,417\times 5^2+4\,212\,306\times 5^7+177\,450\times 5^{10}+6448\times 5^{12})+\frac{1}{\phi}$$

$$(55+5)\log(5^2\times 63\times 12\,195+5^2\times 52\times 60\,541+5^7\times 63\times 66\,862+5^{10}\times 6\times 29\,575+5^{12}\times 6448)-7+\frac{1}{\phi}=$$
$$-7+60\log(a)\log_a(3\,916\,417\times 5^2+4\,212\,306\times 5^7+177\,450\times 5^{10}+6448\times 5^{12})+\frac{1}{\phi}$$

$$(55+5)\log(5^2\times 63\times 12\,195+5^2\times 52\times 60\,541+5^7\times 63\times 66\,862+5^{10}\times 6\times 29\,575+5^{12}\times 6448)-7+\frac{1}{\phi}=$$
$$-7-60\,\text{Li}_1(1-3\,916\,417\times 5^2-4\,212\,306\times 5^7-177\,450\times 5^{10}-6448\times 5^{12})+\frac{1}{\phi}$$

Series representations:

$$(55+5)\log(5^2\times 63\times 12\,195+5^2\times 52\times 60\,541+5^7\times 63\times 66\,862+5^{10}\times 6\times 29\,575+5^{12}\times 6448)-7+\frac{1}{\phi}=$$
$$-7+\frac{1}{\phi}+60\log(3\,636\,313\,222\,924)-60\sum_{k=1}^{\infty}\frac{\left(-\frac{1}{3\,636\,313\,222\,924}\right)^k}{k}$$

$$(55+5)\log(5^2\times 63\times 12\,195+5^2\times 52\times 60\,541+5^7\times 63\times 66\,862+5^{10}\times 6\times 29\,575+5^{12}\times 6448)-7+\frac{1}{\phi}=$$
$$-7+\frac{1}{\phi}+120\,i\,\pi\left\lfloor\frac{\arg(3\,636\,313\,222\,925-x)}{2\,\pi}\right\rfloor+60\log(x)-60\sum_{k=1}^{\infty}\frac{(-1)^k\,(3\,636\,313\,222\,925-x)^k\,x^{-k}}{k}\quad\text{for } x<0$$

$$(55+5)\log(5^2\times 63\times 12\,195+5^2\times 52\times 60\,541+5^7\times 63\times 66\,862+5^{10}\times 6\times 29\,575+5^{12}\times 6448)-7+\frac{1}{\phi}=$$
$$-7+\frac{1}{\phi}+60\left\lfloor\frac{\arg(3\,636\,313\,222\,925-z_0)}{2\,\pi}\right\rfloor\log\left(\frac{1}{z_0}\right)+60\log(z_0)+60\left\lfloor\frac{\arg(3\,636\,313\,222\,925-z_0)}{2\,\pi}\right\rfloor\log(z_0)-60\sum_{k=1}^{\infty}\frac{(-1)^k\,(3\,636\,313\,222\,925-z_0)^k\,z_0^{-k}}{k}$$

Integral representations:

$$(55+5)\log(5^2\times 63\times 12195+5^2\times 52\times 60541+5^7\times 63\times 66862+5^{10}\times 6\times 29575+5^{12}\times 6448)-7+\frac{1}{\phi}=-7+\frac{1}{\phi}+60\int_1^{3636313222925}\frac{1}{t}\,dt$$

$$(55+5)\log(5^2\times 63\times 12195+5^2\times 52\times 60541+5^7\times 63\times 66862+5^{10}\times 6\times 29575+5^{12}\times 6448)-7+\frac{1}{\phi}=$$
$$-7+\frac{1}{\phi}-\frac{30\,i}{\pi}\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{3636313222924^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\quad\text{for } -1<\gamma<0$$

We have that:

[where $\left(\frac{n}{7}\right)$ denotes the Legendre symbol]

$$q(q;q)_\infty^3(q^7;q^7)_\infty^3+8q^2\frac{(q^7;q^7)_\infty^7}{(q;q)_\infty}=\sum_{n=1}^{\infty}\left(\frac{n}{7}\right)q^n\frac{1+q^n}{(1-q^n)^3}$$

For n = 1 and q = $e^{-2\pi}$ = 0.0018674427317, we obtain:

0.0018674427317 * (1+0.0018674427317)/(1-0.0018674427317)^3

Input interpretation:

$$0.0018674427317\times\frac{1+0.0018674427317}{(1-0.0018674427317)^3}$$

Result:

0.00188145090798815391868799682263852353086103980157562674 6...

0.001881450907988....

1+(((0.0018674427317 * (1+0.0018674427317)/(1-0.0018674427317)^3)))

Input interpretation:

$$1+0.0018674427317\times\frac{1+0.0018674427317}{(1-0.0018674427317)^3}$$

Result:

1.00188145090798815391868799682263852353086103980157562674 6...

1.00188145090798..... result practically equal to the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{2\pi}{5}}}{\sqrt{\varphi\sqrt{5}-\varphi}} = 1+\frac{e^{-2\pi}}{1+\frac{e^{-4\pi}}{1+\frac{e^{-6\pi}}{1+\frac{e^{-8\pi}}{1+\dots}}}} \approx 1.0018674362$$

1/(((0.0018674427317 * (1+0.0018674427317)/(1-0.0018674427317)^3)))+16

Input interpretation:

$$\frac{1}{0.0018674427317\times\frac{1+0.0018674427317}{(1-0.0018674427317)^3}}+16$$

Result:

547.5046997794407760817850117840602469241136302765831254155...

547.50469..... result practically equal to the rest mass of Eta meson 547.853

For n = 3, we obtain:

-1*0.0018674427317^3 * (1+0.0018674427317^3) / (((1-0.0018674427317^3)^3))

Input interpretation:

$$-0.0018674427317^3\times\frac{1+0.0018674427317^3}{(1-0.0018674427317^3)^3}$$

Result:

$-6.512412305642371337497307682046322438129818287471539\ldots\times10^{-9}$

$-6.5124123056423\ldots*10^{-9}$

-ln((-(-1*0.0018674427317^3 * (1+0.0018674427317^3) / (((1-0.0018674427317^3)^3)))))

Input interpretation:

$$-\log\left(-\left(-0.0018674427317^3\times\frac{1+0.0018674427317^3}{(1-0.0018674427317^3)^3}\right)\right)$$

log(x) is the natural logarithm

Result:

18.8495558955...

18.84955… result very near to the black hole entropy 18.7328

Alternative representations:

$$-\log\left(-\frac{-(0.00186744273170000^3 (1+0.00186744273170000^3))}{(1-0.00186744273170000^3)^3}\right) = -\log_e\left(\frac{0.00186744273170000^3 (1+0.00186744273170000^3)}{(1-0.00186744273170000^3)^3}\right)$$

$$-\log\left(-\frac{-(0.00186744273170000^3 (1+0.00186744273170000^3))}{(1-0.00186744273170000^3)^3}\right) = -\log(a) \log_a\left(\frac{0.00186744273170000^3 (1+0.00186744273170000^3)}{(1-0.00186744273170000^3)^3}\right)$$

$$-\log\left(-\frac{-(0.00186744273170000^3 (1+0.00186744273170000^3))}{(1-0.00186744273170000^3)^3}\right) = \mathrm{Li}_1\left(1-\frac{0.00186744273170000^3 (1+0.00186744273170000^3)}{(1-0.00186744273170000^3)^3}\right)$$

Series representations:

$$-\log\left(-\frac{-(0.00186744273170000^3 (1+0.00186744273170000^3))}{(1-0.00186744273170000^3)^3}\right) = \sum_{k=1}^{\infty} \frac{(-1)^k (-0.99999999348758769435776)^k}{k}$$

$$-\log\left(-\frac{-(0.00186744273170000^3 (1+0.00186744273170000^3))}{(1-0.00186744273170000^3)^3}\right) = -2 i \pi \left\lfloor \frac{\arg(6.5124123056424\times 10^{-9} - x)}{2 \pi} \right\rfloor - \log(x) + \sum_{k=1}^{\infty} \frac{(-1)^k (6.5124123056424\times 10^{-9} - x)^k x^{-k}}{k} \quad \text{for } x < 0$$

$$-\log\left(-\frac{-(0.00186744273170000^3\,(1+0.00186744273170000^3))}{(1-0.00186744273170000^3)^3}\right) = -\left\lfloor\frac{\arg(6.5124123056424\times10^{-9}-z_0)}{2\pi}\right\rfloor \log\left(\frac{1}{z_0}\right) - \log(z_0) - \left\lfloor\frac{\arg(6.5124123056424\times10^{-9}-z_0)}{2\pi}\right\rfloor \log(z_0) + \sum_{k=1}^{\infty}\frac{(-1)^k\,(6.5124123056424\times10^{-9}-z_0)^k\,z_0^{-k}}{k}$$

Integral representation:

$$-\log\left(-\frac{-(0.00186744273170000^3\,(1+0.00186744273170000^3))}{(1-0.00186744273170000^3)^3}\right) = -\int_1^{6.5124123056424\times10^{-9}}\frac{1}{t}\,dt$$

7 * (((-ln((-(-1*0.0018674427317^3 * (1+0.0018674427317^3) / (((1-0.0018674427317^3)^3))))))))+11-Pi

where 7 and 11 are Lucas numbers

Input interpretation:

$$7\left(-\log\left(-\left(-0.0018674427317^3\times\frac{1+0.0018674427317^3}{(1-0.0018674427317^3)^3}\right)\right)\right)+11-\pi$$

log(x) is the natural logarithm

Result:

139.805298615...

139.805298615… result practically equal to the rest mass of Pion meson 139.57 MeV

Alternative representations:

$$7(-1)\log\left(-\frac{-0.00186744273170000^3\left(1+0.00186744273170000^3\right)}{\left(1-0.00186744273170000^3\right)^3}\right)+11-\pi = 11-\pi-7\log_e\left(\frac{0.00186744273170000^3\left(1+0.00186744273170000^3\right)}{\left(1-0.00186744273170000^3\right)^3}\right)$$

$$7(-1)\log\left(-\frac{-0.00186744273170000^3\left(1+0.00186744273170000^3\right)}{\left(1-0.00186744273170000^3\right)^3}\right)+11-\pi = 11-\pi-7\log(a)\log_a\left(\frac{0.00186744273170000^3\left(1+0.00186744273170000^3\right)}{\left(1-0.00186744273170000^3\right)^3}\right)$$

$$7(-1)\log\left(-\frac{-0.00186744273170000^3\left(1+0.00186744273170000^3\right)}{\left(1-0.00186744273170000^3\right)^3}\right)+11-\pi = 11-\pi+7\,\mathrm{Li}_1\left(1-\frac{0.00186744273170000^3\left(1+0.00186744273170000^3\right)}{\left(1-0.00186744273170000^3\right)^3}\right)$$

Series representations:

$$7(-1)\log\left(-\frac{-0.00186744273170000^3\left(1+0.00186744273170000^3\right)}{\left(1-0.00186744273170000^3\right)^3}\right)+11-\pi = 11-\pi+7\sum_{k=1}^{\infty}\frac{(-1)^k(-0.99999999348758769435576)^k}{k}$$

$$7(-1)\log\left(-\frac{-0.00186744273170000^3\left(1+0.00186744273170000^3\right)}{\left(1-0.00186744273170000^3\right)^3}\right)+11-\pi = 11-\pi-14\,i\,\pi\left\lfloor\frac{\arg(6.5124123056424\times10^{-9}-x)}{2\,\pi}\right\rfloor-7\log(x)+7\sum_{k=1}^{\infty}\frac{(-1)^k(6.5124123056424\times10^{-9}-x)^k x^{-k}}{k}\quad\text{for } x<0$$

$$7(-1)\log\left(-\frac{-0.00186744273170000^3\left(1+0.00186744273170000^3\right)}{\left(1-0.00186744273170000^3\right)^3}\right)+11-\pi = 11-\pi-7\left\lfloor\frac{\arg(6.5124123056424\times10^{-9}-z_0)}{2\,\pi}\right\rfloor\log\left(\frac{1}{z_0}\right)-7\log(z_0)-7\left\lfloor\frac{\arg(6.5124123056424\times10^{-9}-z_0)}{2\,\pi}\right\rfloor\log(z_0)+7\sum_{k=1}^{\infty}\frac{(-1)^k(6.5124123056424\times10^{-9}-z_0)^k z_0^{-k}}{k}$$

Integral representation:

$$7(-1)\log\left(-\frac{-0.00186744273170000^3\,(1+0.00186744273170000^3)}{(1-0.00186744273170000^3)^3}\right)+11-\pi =$$

$$11-\pi-7\int_1^{6.5124123056424\times 10^{-9}}\frac{1}{t}\,dt$$

Now, we have that:

$$-7q(q;q)_\infty^3(q^7;q^7)_\infty^3+8(q;q)_\infty^7\sum_{n=1}^{\infty}p(7n-2)q^n=49\sum_{n=1}^{\infty}\left(\frac{n}{7}\right)q^n\frac{1+q^n}{(1-q^n)^3},$$

For n =1 and n = 3, we obtain:

49*(0.0018674427317 * (1+0.0018674427317) / (((1-0.0018674427317)^3)))

Input interpretation:

$$49\left(0.0018674427317\times\frac{1+0.0018674427317}{(1-0.0018674427317)^3}\right)$$

Result:

0.09219109449141954201571184430928765301219095027720571057 9...

0.0921910944914....

From which:

(((49*(0.0018674427317 * (1+0.0018674427317) / (((1-0.0018674427317)^3))))))^1/256

Input interpretation:

$$\sqrt[256]{49\left(0.0018674427317\times\frac{1+0.0018674427317}{(1-0.0018674427317)^3}\right)}$$

Result:

0.9907311460028...

0.9907311460028... result very near to the value of the following Rogers-Ramanujan continued fraction:

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

and to the dilaton value **0.989117352243 = ϕ**

1/2 log base 0.9907311460028(((((49*(0.0018674427317 * (1+0.0018674427317) / (((1-0.0018674427317)^3))))))))-Pi+1/golden ratio

Input interpretation:

$$\frac{1}{2}\log_{0.9907311460028}\left(49\left(0.0018674427317\times\frac{1+0.0018674427317}{(1-0.0018674427317)^3}\right)\right)-\pi+\frac{1}{\phi}$$

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

ϕ is the golden ratio

Result:

125.47644134...

125.47644134... result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0 and to the Higgs boson mass 125.18 GeV

Alternative representation:

$$\frac{1}{2}\log_{0.990731146002800000}\left(\frac{49\,(0.00186744273170000\,(1+0.00186744273170000))}{(1-0.00186744273170000)^3}\right)-\pi+\frac{1}{\phi}=-\pi+\frac{1}{\phi}+\frac{\log\left(\frac{0.0916755736287528}{0.998132557268300000^3}\right)}{2\log(0.990731146002800000)}$$

Series representations:

$$\frac{1}{2}\log_{0.990731146002800000}\left(\frac{49\,(0.00186744273170000\,(1+0.00186744273170000))}{(1-0.00186744273170000)^3}\right)-\pi+\frac{1}{\phi}=\frac{1}{\phi}-\pi-\frac{\sum_{k=1}^{\infty}\frac{(-1)^k\,(-0.907808905508580 5)^k}{k}}{2\log(0.990731146002800000)}$$

$$\frac{1}{2}\log_{0.990731146002800000}\left(\frac{49\,(0.00186744273170000\,(1+0.00186744273170000))}{(1-0.00186744273170000)^3}\right)-\pi+\frac{1}{\phi}=\frac{1}{\phi}-\pi-53.6941014122181\log(0.0921910944914195)-\frac{1}{2}\log(0.0921910944914195)\sum_{k=0}^{\infty}(-0.00926885399720000)^k\,G(k)$$

$$\text{for}\left(G(0)=0\text{ and }G(k)=\frac{(-1)^{1+k}\,k}{2\,(1+k)\,(2+k)}+\sum_{j=1}^{k}\frac{(-1)^{1+j}\,G(-j+k)}{1+j}\right)$$

1/2 log base 0.9907311460028(((((49*(0.0018674427317 * (1+0.0018674427317) / (((1-0.0018674427317)^3))))))))+11+1/golden ratio

Where 11 is a Lucas number

Input interpretation:

$$\frac{1}{2}\log_{0.9907311460028}\left(49\left(0.0018674427317\times\frac{1+0.0018674427317}{(1-0.0018674427317)^3}\right)\right)+11+\frac{1}{\phi}$$

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

ϕ is the golden ratio

Result:

139.61803399...

139.61803399… result practically equal to the rest mass of Pion meson 139.57 MeV

Alternative representation:

$$\frac{1}{2}\log_{0.99073114600280000}\left(\frac{49\,(0.00186744273170000\,(1+0.00186744273170000))}{(1-0.00186744273170000)^3}\right)+$$
$$11+\frac{1}{\phi}=11+\frac{1}{\phi}+\frac{\log\left(\frac{0.0916755736287528}{0.99813255726830000^3}\right)}{2\log(0.99073114600280000)}$$

Series representations:

$$\frac{1}{2}\log_{0.99073114600280000}\left(\frac{49\,(0.00186744273170000\,(1+0.00186744273170000))}{(1-0.00186744273170000)^3}\right)+$$
$$11+\frac{1}{\phi}=11+\frac{1}{\phi}-\frac{\sum_{k=1}^{\infty}\frac{(-1)^k\,(-0.9078089055085805)^k}{k}}{2\log(0.99073114600280000)}$$

$$\frac{1}{2}\log_{0.99073114600280000}\left(\frac{49\,(0.00186744273170000\,(1+0.00186744273170000))}{(1-0.00186744273170000)^3}\right)+$$
$$11+\frac{1}{\phi}=11+\frac{1}{\phi}-53.6941014122181\log(0.0921910944914195)-$$
$$\frac{1}{2}\log(0.0921910944914195)\sum_{k=0}^{\infty}(-0.00926885399720000)^k\,G(k)$$
$$\text{for}\left(G(0)=0\text{ and }G(k)=\frac{(-1)^{1+k}\,k}{2\,(1+k)\,(2+k)}+\sum_{j=1}^{k}\frac{(-1)^{1+j}\,G(-j+k)}{1+j}\right)$$

49*(-1*0.0018674427317^3 * (1+0.0018674427317^3) / (((1-0.0018674427317^3)^3)))

Input interpretation:

$$49\left(-0.0018674427317^3\times\frac{1+0.0018674427317^3}{(1-0.0018674427317^3)^3}\right)$$

Result:

$$-3.1910820297647619553736807642026979946836109608610 54\ldots\times10^{-7}$$

-3.19108202976476...*10^{-7}

-ln(((-49*(-1*0.0018674427317^3 * (1+0.0018674427317^3) / (((1-0.0018674427317^3)^3))))))+golden ratio

Input interpretation:

$$-\log\left(-49\left(-0.0018674427317^3\times\frac{1+0.0018674427317^3}{(1-0.0018674427317^3)^3}\right)\right)+\phi$$

log(x) is the natural logarithm

ϕ is the golden ratio

Result:

16.5757695861...

16.57576… result very near to the mass of the hypothetical light particle, the boson m_X = 16.84 MeV

Alternative representations:

$$-\log\left(-\frac{49(-1)\left(0.00186744273170000^3\left(1+0.00186744273170000^3\right)\right)}{\left(1-0.00186744273170000^3\right)^3}\right)+\phi = \phi-\log_e\left(\frac{49\times 0.00186744273170000^3\left(1+0.00186744273170000^3\right)}{\left(1-0.00186744273170000^3\right)^3}\right)$$

$$-\log\left(-\frac{49(-1)\left(0.00186744273170000^3\left(1+0.00186744273170000^3\right)\right)}{\left(1-0.00186744273170000^3\right)^3}\right)+\phi = \phi-\log(a)\log_a\left(\frac{49\times 0.00186744273170000^3\left(1+0.00186744273170000^3\right)}{\left(1-0.00186744273170000^3\right)^3}\right)$$

$$-\log\left(-\frac{49(-1)\left(0.00186744273170000^3\left(1+0.00186744273170000^3\right)\right)}{\left(1-0.00186744273170000^3\right)^3}\right)+\phi = \phi+\mathrm{Li}_1\left(1-\frac{49\times 0.00186744273170000^3\left(1+0.00186744273170000^3\right)}{\left(1-0.00186744273170000^3\right)^3}\right)$$

Series representations:

$$-\log\left(-\frac{49(-1)\left(0.00186744273170000^3\left(1+0.00186744273170000^3\right)\right)}{\left(1-0.00186744273170000^3\right)^3}\right)+\phi = \phi+\sum_{k=1}^{\infty}\frac{(-1)^k(-0.99999968089179702352 4)^k}{k}$$

$$-\log\left(-\frac{49(-1)\left(0.00186744273170000^3\left(1+0.00186744273170000^3\right)\right)}{\left(1-0.00186744273170000^3\right)^3}\right)+\phi = \phi-2 i \pi\left\lfloor\frac{\arg\left(3.19108202976476\times 10^{-7}-x\right)}{2\pi}\right\rfloor-\log(x)+\sum_{k=1}^{\infty}\frac{(-1)^k\left(3.19108202976476\times 10^{-7}-x\right)^k x^{-k}}{k} \quad \text{for } x<0$$

$$-\log\left(-\frac{49(-1)\left(0.00186744273170000^3\left(1+0.00186744273170000^3\right)\right)}{\left(1-0.00186744273170000^3\right)^3}\right)+\phi =$$
$$\phi - \left\lfloor \frac{\arg(3.19108202976476\times 10^{-7}-z_0)}{2\pi} \right\rfloor \log\left(\frac{1}{z_0}\right) - \log(z_0) - \left\lfloor \frac{\arg(3.19108202976476\times 10^{-7}-z_0)}{2\pi} \right\rfloor \log(z_0) + \sum_{k=1}^{\infty} \frac{(-1)^k \left(3.19108202976476\times 10^{-7}-z_0\right)^k z_0^{-k}}{k}$$

Integral representation:

$$-\log\left(-\frac{49(-1)\left(0.00186744273170000^3\left(1+0.00186744273170000^3\right)\right)}{\left(1-0.00186744273170000^3\right)^3}\right)+\phi = \phi - \int_1^{3.19108202976476\times 10^{-7}} \frac{1}{t}\,dt$$

11 (-ln(((-49*(-1*0.0018674427317^3 * (1+0.0018674427317^3) / (((1-0.0018674427317^3)^3)))))))-29+4

Where 11, 29 and 4 are Lucas numbers

Input interpretation:

$$11\left(-\log\left(-49\left(-0.0018674427317^3\times\frac{1+0.0018674427317^3}{\left(1-0.0018674427317^3\right)^3}\right)\right)\right)-29+4$$

log(x) is the natural logarithm

Result:

139.535091571...

139.535091571… result practically equal to the rest mass of Pion meson 139.57 MeV

Alternative representations:

$$11(-1)\log\left(-\frac{49\left(-0.00186744273170000^3\left(1+0.00186744273170000^3\right)\right)}{\left(1-0.00186744273170000^3\right)^3}\right)-29+4 = -25-11\log_e\left(\frac{49\times 0.00186744273170000^3\left(1+0.00186744273170000^3\right)}{\left(1-0.00186744273170000^3\right)^3}\right)$$

$$11(-1)\log\left(-\frac{49\left(-0.00186744273170000^3\left(1+0.00186744273170000^3\right)\right)}{\left(1-0.00186744273170000^3\right)^3}\right)-29+4 = -25-11\log(a)\log_a\left(\frac{49\times 0.00186744273170000^3\left(1+0.00186744273170000^3\right)}{\left(1-0.00186744273170000^3\right)^3}\right)$$

$$11(-1)\log\left(-\frac{49\left(-0.00186744273170000^3\left(1+0.00186744273170000^3\right)\right)}{\left(1-0.00186744273170000^3\right)^3}\right)-29+4 = -25+11\,\mathrm{Li}_1\left(1-\frac{49\times 0.00186744273170000^3\left(1+0.00186744273170000^3\right)}{\left(1-0.00186744273170000^3\right)^3}\right)$$

Series representations:

$$11(-1)\log\left(-\frac{49\left(-0.00186744273170000^3\left(1+0.00186744273170000^3\right)\right)}{\left(1-0.00186744273170000^3\right)^3}\right)-29+4 = -25+11\sum_{k=1}^{\infty}\frac{(-1)^k(-0.9999996808917970235 24)^k}{k}$$

$$11(-1)\log\left(-\frac{49\left(-0.00186744273170000^3\left(1+0.00186744273170000^3\right)\right)}{\left(1-0.00186744273170000^3\right)^3}\right)-29+4 = -25-22i\pi\left\lfloor\frac{\arg(3.19108202976476\times10^{-7}-x)}{2\pi}\right\rfloor-11\log(x)+11\sum_{k=1}^{\infty}\frac{(-1)^k(3.19108202976476\times10^{-7}-x)^k x^{-k}}{k}\quad\text{for } x<0$$

$$11(-1)\log\left(-\frac{49\left(-0.00186744273170000^3\left(1+0.00186744273170000^3\right)\right)}{\left(1-0.00186744273170000^3\right)^3}\right)-29+4 = -25-11\left\lfloor\frac{\arg(3.19108202976476\times10^{-7}-z_0)}{2\pi}\right\rfloor\log\left(\frac{1}{z_0}\right)-11\log(z_0)-11\left\lfloor\frac{\arg(3.19108202976476\times10^{-7}-z_0)}{2\pi}\right\rfloor\log(z_0)+11\sum_{k=1}^{\infty}\frac{(-1)^k(3.19108202976476\times10^{-7}-z_0)^k z_0^{-k}}{k}$$

Integral representation:

$$11(-1)\log\left(-\frac{49\left(-0.00186744273170000^3\left(1+0.00186744273170000^3\right)\right)}{\left(1-0.00186744273170000^3\right)^3}\right)-29+4 = -25-11\int_1^{3.19108202976476\times10^{-7}}\frac{1}{t}\,dt$$

11 (-ln(((-49*(-1*0.0018674427317^3 * (1+0.0018674427317^3) / (((1-0.0018674427317^3)^3)))))))-29-7-Pi

Where 11, 29 and 7 are Lucas numbers

Input interpretation:

$$11\left(-\log\left(-49\left(-0.0018674427317^3\times\frac{1+0.0018674427317^3}{(1-0.0018674427317^3)^3}\right)\right)\right)-29-7-\pi$$

log(x) is the natural logarithm

Result:

125.393498918...

125.393498918…. result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0 and to the Higgs boson mass 125.18 GeV

Alternative representations:

$$11(-1)\log\left(-\frac{49\left(-0.00186744273170000^3\left(1+0.00186744273170000^3\right)\right)}{(1-0.00186744273170000^3)^3}\right)-29-7-\pi=-36-\pi-11\log_e\left(\frac{49\times0.00186744273170000^3\left(1+0.00186744273170000^3\right)}{(1-0.00186744273170000^3)^3}\right)$$

$$11(-1)\log\left(-\frac{49\left(-0.00186744273170000^3\left(1+0.00186744273170000^3\right)\right)}{(1-0.00186744273170000^3)^3}\right)-29-7-\pi=-36-\pi-11\log(a)\log_a\left(\frac{49\times0.00186744273170000^3\left(1+0.00186744273170000^3\right)}{(1-0.00186744273170000^3)^3}\right)$$

$$11(-1)\log\left(-\frac{49\left(-0.00186744273170000^3\left(1+0.00186744273170000^3\right)\right)}{(1-0.00186744273170000^3)^3}\right)-29-7-\pi=-36-\pi+11\,\mathrm{Li}_1\left(1-\frac{49\times0.00186744273170000^3\left(1+0.00186744273170000^3\right)}{(1-0.00186744273170000^3)^3}\right)$$

Series representations:

$$11(-1)\log\left(-\frac{49\left(-0.00186744273170000^3\left(1+0.00186744273170000^3\right)\right)}{\left(1-0.00186744273170000^3\right)^3}\right)-29-7-\pi=-36-\pi+11\sum_{k=1}^{\infty}\frac{(-1)^k(-0.99999968089179702352 4)^k}{k}$$

$$11(-1)\log\left(-\frac{49\left(-0.00186744273170000^3\left(1+0.00186744273170000^3\right)\right)}{\left(1-0.00186744273170000^3\right)^3}\right)-29-7-\pi=-36-\pi-22\,i\,\pi\left\lfloor\frac{\arg(3.19108202976476\times10^{-7}-x)}{2\pi}\right\rfloor-11\log(x)+11\sum_{k=1}^{\infty}\frac{(-1)^k(3.19108202976476\times10^{-7}-x)^k x^{-k}}{k}\quad\text{for } x<0$$

$$11(-1)\log\left(-\frac{49\left(-0.00186744273170000^3\left(1+0.00186744273170000^3\right)\right)}{\left(1-0.00186744273170000^3\right)^3}\right)-29-7-\pi=-36-\pi-11\left\lfloor\frac{\arg(3.19108202976476\times10^{-7}-z_0)}{2\pi}\right\rfloor\log\left(\frac{1}{z_0}\right)-11\log(z_0)-11\left\lfloor\frac{\arg(3.19108202976476\times10^{-7}-z_0)}{2\pi}\right\rfloor\log(z_0)+11\sum_{k=1}^{\infty}\frac{(-1)^k(3.19108202976476\times10^{-7}-z_0)^k z_0^{-k}}{k}$$

Integral representation:

$$11(-1)\log\left(-\frac{49\left(-0.00186744273170000^3\left(1+0.00186744273170000^3\right)\right)}{\left(1-0.00186744273170000^3\right)^3}\right)-29-7-\pi=-36-\pi-11\int_1^{3.19108202976476\times10^{-7}}\frac{1}{t}\,dt$$

Now, we have that:

$$\begin{cases} 1-264\sum_{n=1}^{\infty}\frac{n^9q^n}{1-q^n}=QR, \\ 691+65520\sum_{n=1}^{\infty}\frac{n^{11}q^n}{1-q^n}=441Q^3+250R^2. \end{cases}$$

For q = 0.0018674427317, we obtain:

1-264 sum (((n^9*0.0018674427317^n)/(1-0.0018674427317^n))), n=1 to infinity

Input interpretation:

$$1-264\sum_{n=1}^{\infty}\frac{n^9\times 0.0018674427317^n}{1-0.0018674427317^n}$$

Result:

6.59894×10^{-12}

6.59894*10^{-12}

((((1-264 sum (((n^9*0.0018674427317^n)/(1-0.0018674427317^n))), n=1 to infinity)))) = xy

Input interpretation:

$$1-264\sum_{n=1}^{\infty}\frac{n^9\times 0.0018674427317^n}{1-0.0018674427317^n}=x\,y$$

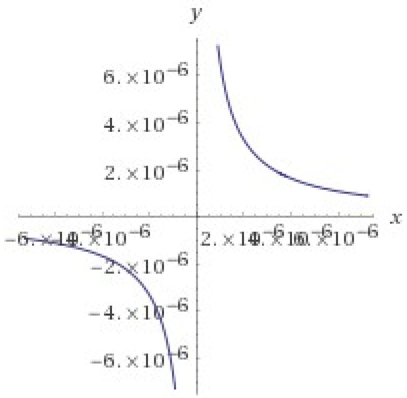
Result:

$6.59894\times 10^{-12}=x\,y$

Geometric figure:

pair of intersecting lines

Implicit plot:



Alternate form:

$6.59894\times 10^{-12}-x\,y=0$

Solution:

$x\neq 0\,,\quad y\approx\frac{6.59894\times 10^{-12}}{x}$

Solution for the variable y:

$$y \approx \frac{6.59894 \times 10^{-12}}{x}$$

x(((6.59894×10^-12)/x))

Input interpretation:

$$x \times \frac{6.59894 \times 10^{-12}}{x}$$

Result:

6.59894×10^{-12} (for $x \neq 0$)

$6.59894*10^{-12}$

691+65520 sum (((n^11*0.0018674427317^n)/(1-0.0018674427317^n))), n=1 to infinity

Input interpretation:

$$691 + 65520 \sum_{n=1}^{\infty} \frac{n^{11} \times 0.0018674427317^n}{1 - 0.0018674427317^n}$$

Result:

1360.54

1360.54

((((691+65520 sum (((n^11*0.0018674427317^n)/(1-0.0018674427317^n))), n=1 to infinity)))) = 441x^3+250y^2

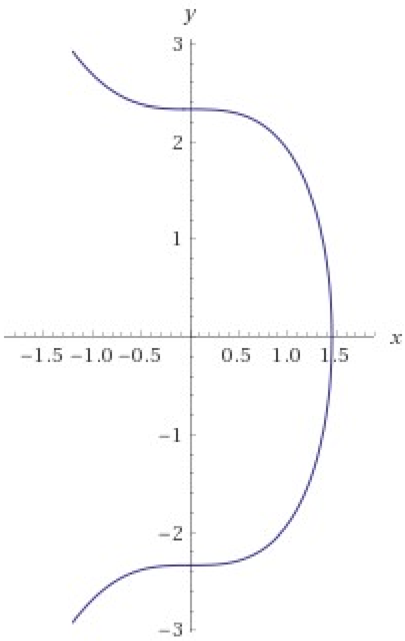
Input interpretation:

$$691 + 65520 \sum_{n=1}^{\infty} \frac{n^{11} \times 0.0018674427317^n}{1 - 0.0018674427317^n} = 441\, x^3 + 250\, y^2$$

Result:

$$1360.54 = 441\, x^3 + 250\, y^2$$

Implicit plot:



Alternate forms:

$x^3 + 0.566893\, y^2 = 3.08512$

$-441\, x^3 - 250\, y^2 + 1360.54 = 0$

Solutions:

$y \approx -0.000245494 \sqrt{90\,299\,946 - 29\,269\,517\, x^3}$

$y \approx 0.000245494 \sqrt{90\,299\,946 - 29\,269\,517\, x^3}$

Solutions for the variable y:

$y \approx -0.0000206694 \sqrt{12\,738\,382\,226 - 4\,128\,975\,837\, x^3}$

$y \approx 0.0000206694 \sqrt{12\,738\,382\,226 - 4\,128\,975\,837\, x^3}$

Implicit derivatives:

$$\frac{\partial x(y)}{\partial y} = -\frac{500\, y}{1323\, x^2}$$

$$\frac{\partial y(x)}{\partial x} = -\frac{1323\, x^2}{500\, y}$$

((((691+65520 sum (((n^11*0.0018674427317^n)/(1-0.0018674427317^n))), n=1 to infinity)))) = 441x^3+250(-0.000245494 sqrt(90299946 - 29269517 x^3))^2

Input interpretation:

$$691 + 65520 \sum_{n=1}^{\infty} \frac{n^{11} \times 0.0018674427317^n}{1 - 0.0018674427317^n} = 441\, x^3 + 250 \left(-0.000245494 \sqrt{90\,299\,946 - 29\,269\,517\, x^3}\right)^2$$

Result:

$$1360.54 = 441\, x^3 + 0.0000150668\,(90\,299\,946 - 29\,269\,517\, x^3)$$

Alternate forms:

$$1360.54 = 0.00127999\, x^3 + 1360.53$$

$$0.00394893 - 0.00127999\, x^3 = 0$$

$$1360.54 = 0.00127999\,(x + 102.055)\,(x^2 - 102.055\, x + 10\,415.2)$$

Real solution:

$$x \approx 1.45576$$

1.45576

Complex solutions:

$$x = -0.727881 - 1.26073\, i$$

$$x = -0.727881 + 1.26073\, i$$

441*1.45576^3+250(-0.000245494 sqrt(90299946 - 29269517*1.45576^3))^2

Input interpretation:

$$441 \times 1.45576^3 + 250 \left(-0.000245494 \sqrt{90\,299\,946 - 29\,269\,517 \times 1.45576^3}\right)^2$$

Result:

1360.537523913055641723255512284672

1360.5375239...

Thence, we have that:

((6.59894e-12)) + (((441*1.45576^3+250(-0.000245494 sqrt(90299946 - 29269517*1.45576^3))^2)))

Input interpretation:

$$6.59894\times 10^{-12} + \left(441\times 1.45576^3 + 250\left(-0.000245494\sqrt{90\,299\,946 - 29\,269\,517\times 1.45576^3}\right)^2\right)$$

Result:

1360.53752391306224066325551228467 2

1360.5375239

((6.59894e-12)) + (((441*1.45576^3+250(-0.000245494 sqrt(90299946 - 29269517*1.45576^3))^2))) + 8Pi + golden ratio

Input interpretation:

$$6.59894\times 10^{-12} + \left(441\times 1.45576^3 + 250\left(-0.000245494\sqrt{90\,299\,946 - 29\,269\,517\times 1.45576^3}\right)^2\right) + 8\pi + \phi$$

ϕ is the golden ratio

Result:

1387.288299130530481419161246185273661191297664374806609429...

1387.28829….. result practically equal to the rest mass of Sigma baryon 1387.2

We have also that:

-((6.59894e-12))/(((441*1.45576^3+250(-0.000245494 sqrt(90299946 - 29269517*1.45576^3))^2))) * (89+golden ratio)

Where 89 is a Fibonacci number

Input interpretation:

$$-\frac{6.59894\times 10^{-12}}{441\times 1.45576^3 + 250\left(-0.000245494\sqrt{90\,299\,946 - 29\,269\,517\times 1.45576^3}\right)^2}(89+\phi)$$

ϕ is the golden ratio

Result:

$-4.39520... \times 10^{-13}$

$-4.39520...*10^{-13}$

That is connected with:

$$\beta_B(r) = -\frac{d\log \overline{\rho}_B(r)}{d\log r}$$

$$\overline{\rho}_D^2(r) - \left(4 - \overline{\beta}_B(r)\right)\frac{a_0}{8\pi G}\frac{\overline{\rho}_B(r)}{r}.$$

$$\frac{4 + 4\log(0.367879)}{4\log(1.94973\times 10^{13})} \times \frac{1}{8\pi\times 6.67430\times 10^{-11}} \times \frac{0.367879}{1.94973\times 10^{13}}$$

$\log(x)$ is the natural logarithm

$-4.40806\ldots \times 10^{-13}$

$-4.40806\ldots*10^{-13}$

And:

(((441*1.45576^3+250(-0.000245494 sqrt(90299946 - 29269517*1.45576^3))^2))) *1/((6.59894e-12)) * 1729*728* (1/2+golden ratio)

Where 1729 and 728 are Ramanujan cubes

Input interpretation:

$$\left(441\times 1.45576^3 + 250\left(-0.000245494\sqrt{90\,299\,946 - 29\,269\,517\times 1.45576^3}\right)^2\right)\times \frac{1}{6.59894\times 10^{-12}}\times 1729\times 728\left(\frac{1}{2}+\phi\right)$$

ϕ is the golden ratio

Result:

$5.49662\ldots \times 10^{20}$

$5.49662\ldots*10^{20}$

That is connected with:

$$\Sigma_D(r)^2 = \frac{a_0}{8\pi G}\frac{\Sigma_B(r)}{d-1}.$$

$$\frac{1}{8\pi\times 6.67430\times 10^{-11}} \times \frac{2.7481463494283\times 10^{12}}{3}$$

$5.46101... \times 10^{20}$

$5.46101...*10^{20}$

Now, we have that:

$$q\frac{(q^9;q^9)_\infty^3}{(q^3;q^3)_\infty} = \sum_{n=1}^{\infty} \chi_0(n) \frac{q^n}{1+q^n+q^{2n}} \tag{11.4}$$

the right hand side of (11.4) is of the form

$$\sum_{n=1}^{\infty} \frac{n^2 q^n}{(1-q^n)^2} + 3J.$$

Thence, we have:

$$q\frac{(q^9;q^9)_\infty^3}{(q^3;q^3)_\infty} = \sum_{n=1}^{\infty} \chi_0(n) \frac{q^n}{1+q^n+q^{2n}}$$

$$= \sum_{n=1}^{\infty} \frac{n^2 q^n}{(1-q^n)^2} + 3J.$$

We observe that:

3x + sum (((n^2*0.0018674427317^n)/(1-0.0018674427317^n)^2)), n=1 to infinity)))) = 0

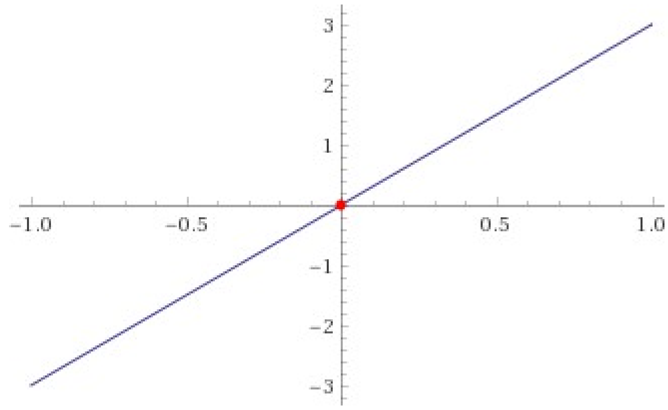
Input interpretation:

$$3x + \sum_{n=1}^{\infty} \frac{n^2 \times 0.0018674427317^n}{(1-0.0018674427317^n)^2} = 0$$

Result:

$$3x + 0.00188845 = 0$$

Root plot:



Alternate form:

$3(x + 0.000629482) = 0$

Solution:

$x \approx -0.000629482$

-0.000629482

and:

((((sum (((n^2*0.0018674427317^n)/(1-0.0018674427317^n)^2)), n=1 to infinity)))) + 3(-0.000629482)

Input interpretation:

$$\sum_{n=1}^{\infty} \frac{n^2 \times 0.0018674427317^n}{(1-0.0018674427317^n)^2} + 3\times(-0.000629482)$$

Result:

-7.24009×10^{-10}

$-7.24009*10^{-10}$

ln ((((((sum (((n^2*0.0018674427317^n)/(1-0.0018674427317^n)^2)), n=1 to infinity)))) + 3(-0.000629482)))

Input interpretation:

$$\log\left(\sum_{n=1}^{\infty} \frac{n^2 \times 0.0018674427317^n}{(1-0.0018674427317^n)^2} + 3\times(-0.000629482)\right)$$

$\log(x)$ is the natural logarithm

Result:

$-21.0462 + 3.14159\, i$

Input interpretation:

$-21.0462 + 3.14159\, i$

i is the imaginary unit

Result:

$-21.0462\ldots +$
$3.14159\ldots\, i$

Polar coordinates:

$r = 21.2794$ (radius), $\theta = 171.51°$ (angle)

21.2794

Possible closed forms:

π (root of $x^4 + 7x^3 + 3x^2 + 6x - 4$ near $x = -6.69918$) $+ \frac{i\pi^2}{\sqrt[3]{31}} \approx -21.046098434 + 3.141804669\, i$

$e^{2+1/e-2/\pi-\pi}\, \pi^{1+e} \tan(e\pi) + \frac{i\pi^2}{\sqrt[3]{31}} \approx -21.046177579 + 3.141804669\, i$

$-4B_1 + i\left(-4\zeta(3) + 7\zeta(5) + \frac{7\pi^2}{6} - \frac{\pi^4}{9}\right) - 20 \approx -21.045988851 + 3.141572804\, i$

2Pi*i (((-21.0462 + 3.14159 i))) + 7i + (golden ratio)i

Input interpretation:

$2\pi i \times (-21.0462 + 3.14159\, i) + 7i + \phi\, i$

i is the imaginary unit

ϕ is the golden ratio

Result:

$-19.7392\ldots -$
$123.619\ldots\, i$

Polar coordinates:

$r = 125.185$ (radius), $\theta = -99.0723°$ (angle)

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

2Pi*i (((-21.0462 + 3.14159 i))) - 11i + (3*golden ratio)i

Input interpretation:

$2\pi i \times (-21.0462 + 3.14159\, i) - 11\, i + (3\,\phi)\, i$

i is the imaginary unit

ϕ is the golden ratio

Result:

$-19.7392... - 138.383...\, i$

Polar coordinates:

$r = 139.784$ (radius), $\theta = -98.118°$ (angle)

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

And:

1/10^52((((((((-21.0462 + 3.14159 i)))*(1/18)i))) + (76/10^3)i + (((11+4)/10^4))i)))

Input interpretation:

$$\frac{1}{10^{52}}\left((-21.0462 + 3.14159\, i) \times \frac{1}{18}\, i + \frac{76}{10^3}\, i + \frac{11+4}{10^4}\, i\right)$$

i is the imaginary unit

Result:

$-1.74533... \times 10^{-53} - 1.09173... \times 10^{-52}\, i$

Polar coordinates:

$r = 1.1056 \times 10^{-52}$ (radius), $\theta = -99.0829°$ (angle)

$1.1056*10^{-52}$ result equal to the value of Cosmological Constant $1.1056*10^{-52}$ m^{-2}

Now, we have that:

$$q\psi^4(q^2)\varphi^2(-q) = \sum_{n=1}^{\infty}(-1)^{n-1}\frac{n^2q^n}{1+q^{2n}}$$
$$= \sum_{n=0}^{\infty}(-1)^n\frac{(2n+1)^2q^{2n+1}}{1-q^{4n+2}} - \sum_{n=1}^{\infty}\frac{(2n)^2q^{2n}}{1+q^{4n}} + 16J.$$

sum ((-1)^n * (2n+1)^2*0.0018674427317^(2n+1))/((1-0.0018674427317^(4n+2))), n=0 to 1729

Approximated sum:

$$\sum_{n=0}^{1729}\frac{(-1)^n\,(2\,n+1)^2\,0.00186744273170000^{2\,n+1}}{1-0.00186744273170000^{4\,n+2}} \approx 0.00186739$$

0.00186739

sum (2n)^2*0.0018674427317^(2n))/((1+0.0018674427317^(4n))), n=1 to infinity

Input interpretation:

$$\sum_{n=1}^{\infty}\frac{(2\,n)^2\,0.00186744273170000^{2\,n}}{1+0.00186744273170000^{4\,n}}$$

Infinite sum:

$$\sum_{n=1}^{\infty}\frac{(2\,n)^2\,0.00186744273170000^{2\,n}}{0.00186744273170000^{4\,n}+1} = 0.0000139496$$

0.0000139496

We obtain:

0.00186739-0.0000139496+16J

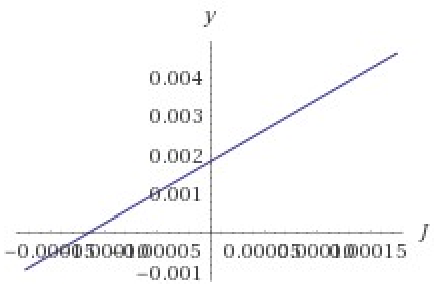
Input interpretation:

$0.00186739 - 0.0000139496 + 16\,J$

Result:

$16\,J + 0.00185344$

Plot:



$(J \text{ from } -1.7\times10^{-4} \text{ to } 1.7\times10^{-4})$

Geometric figure:

line

Alternate forms:

$16\,(J + 0.00011584)$

$16\,(J + 0.00011584)$

$4\times10^{-10}\left(4\times10^{10}\,J + 4.6336\times10^{6}\right)$

Root:

$J \approx -0.00011584$

-0.00011584

Derivative:

$$\frac{d}{dJ}(16\,J + 0.00185344) = 16$$

Indefinite integral:

$$\int (0.00186739 - 0.0000139496 + 16\,J)\,dJ = 8\,J^2 + 0.00185344\,J + \text{constant}$$

Definite integral after subtraction of diverging parts:

$$\int_0^\infty ((0.00185344 + 16\,J) - (0.00185344 + 16\,J))\,dJ = 0$$

0.00186739-0.0000139496+16(-0.00011584)

Input interpretation:

$0.00186739 - 0.0000139496 + 16\times(-0.00011584)$

Result:

4×10^{-10}

$4*10^{-10}$

ln(((0.00186739-0.0000139496+16(-0.00011584))))^2 – Pi

Input interpretation:

$$\log^2(0.00186739 - 0.0000139496 + 16 \times (-0.00011584)) - \pi$$

log(x) is the natural logarithm

Result:

465.12881584159552371540044738286837080375907303772586250 30...

465.12881584….

Alternative representations:

$$\log^2(0.00186739 - 0.0000139496 + 16(-0.00011584)) - \pi = -\pi + \log_e^2(4.\times 10^{-10})$$

$$\log^2(0.00186739 - 0.0000139496 + 16(-0.00011584)) - \pi = -\pi + (\log(a)\log_a(4.\times 10^{-10}))^2$$

$$\log^2(0.00186739 - 0.0000139496 + 16(-0.00011584)) - \pi = -\pi + (-\text{Li}_1(1.))^2$$

Series representations:

$$\log^2(0.00186739 - 0.0000139496 + 16(-0.00011584)) - \pi = -\pi + \left(\sum_{k=1}^{\infty} \frac{(-1)^k (-1.)^k}{k}\right)^2$$

$$\log^2(0.00186739 - 0.0000139496 + 16(-0.00011584)) - \pi = -\pi + \left(2 i \pi \left\lfloor \frac{\arg(4.\times 10^{-10} - x)}{2\pi} \right\rfloor + \log(x) - \sum_{k=1}^{\infty} \frac{(-1)^k (4.\times 10^{-10} - x)^k x^{-k}}{k}\right)^2 \quad \text{for } x < 0$$

$$\log^2(0.00186739 - 0.0000139496 + 16(-0.00011584)) - \pi = -\pi + \left(\log(z_0) + \left\lfloor \frac{\arg(4.\times 10^{-10} - z_0)}{2\pi} \right\rfloor \left(\log\left(\frac{1}{z_0}\right) + \log(z_0)\right) - \sum_{k=1}^{\infty} \frac{(-1)^k (4.\times 10^{-10} - z_0)^k z_0^{-k}}{k}\right)^2$$

Integral representation:

$$\log^2(0.00186739 - 0.0000139496 + 16(-0.00011584)) - \pi = -\pi + \left(\int_1^{4.\times 10^{-10}} \frac{1}{t}\, dt\right)^2$$

ln(((0.00186739-0.0000139496+16(-0.00011584))))^2 +29

where 29 is a Lucas number

Input interpretation:

$$\log^2(0.00186739 - 0.0000139496 + 16\times(-0.00011584)) + 29$$

log(x) is the natural logarithm

Result:

497.27040849518531695386309076614787368795624243710096832 40...

497.270408495…. result practically equal to the rest mass of Kaon meson 497.614

Alternative representations:

$$\log^2(0.00186739 - 0.0000139496 + 16(-0.00011584)) + 29 = 29 + \log_e^2(4.\times 10^{-10})$$

$$\log^2(0.00186739 - 0.0000139496 + 16(-0.00011584)) + 29 = 29 + (\log(a)\log_a(4.\times 10^{-10}))^2$$

$$\log^2(0.00186739 - 0.0000139496 + 16(-0.00011584)) + 29 = 29 + (-\text{Li}_1(1.))^2$$

Series representations:

$$\log^2(0.00186739 - 0.0000139496 + 16(-0.00011584)) + 29 = 29 + \left(\sum_{k=1}^{\infty} \frac{(-1)^k (-1.)^k}{k}\right)^2$$

$$\log^2(0.00186739 - 0.0000139496 + 16(-0.00011584)) + 29 = 29 + \left(2 i \pi \left\lfloor \frac{\arg(4.\times 10^{-10} - x)}{2\pi} \right\rfloor + \log(x) - \sum_{k=1}^{\infty} \frac{(-1)^k (4.\times 10^{-10} - x)^k x^{-k}}{k}\right)^2 \quad \text{for } x < 0$$

$$\log^2(0.00186739 - 0.0000139496 + 16(-0.00011584)) + 29 = 29 + \left(\log(z_0) + \left\lfloor \frac{\arg(4.\times 10^{-10} - z_0)}{2\pi} \right\rfloor \left(\log\left(\frac{1}{z_0}\right) + \log(z_0)\right) - \sum_{k=1}^{\infty} \frac{(-1)^k (4.\times 10^{-10} - z_0)^k z_0^{-k}}{k}\right)^2$$

Integral representation:

$$\log^2(0.00186739 - 0.0000139496 + 16(-0.00011584)) + 29 = 29 + \left(\int_1^{4.\times 10^{-10}} \frac{1}{t}\, dt\right)^2$$

Now, we have that:

$$\begin{aligned}
\sum_{n=1}^{\infty}(-1)^{n-1}\frac{n^3q^n}{1-q^{2n}} &= \sum_{n=1}^{\infty}(-1)^{n-1}n^3\left(\frac{q^n}{1+q^n}+\frac{q^{2n}}{1-q^{2n}}\right)\\
&= \frac{1}{16}\left(1+\sum_{n-1}^{\infty}(-1)^{n-1}\frac{n^3q^n}{1+q^n}-1+16\sum_{n-1}^{\infty}(-1)^{n-1}\frac{n^3q^{2n}}{1-q^{2n}}\right)\\
(12.8\text{h}) \qquad &= \tfrac{1}{16}z^4x(1-x).
\end{aligned}$$

sum ((-1)^(n-1) * (n^3*0.0018674427317^n)/((1+0.0018674427317^n))), n=1 to infinity

Input interpretation:

$$\sum_{n=1}^{\infty}\frac{(-1)^{n-1}\left(n^3\, 0.00186744273170000^n\right)}{1+0.00186744273170000^n}$$

Infinite sum:

$$\sum_{n=1}^{\infty}\frac{(-1)^{n-1}\left(n^3\, 0.00186744273170000^n\right)}{0.00186744273170000^n+1} = 0.00183624$$

0.00183624

sum ((-1)^(n-1) * (n^3*0.0018674427317^(2n))/((1-0.0018674427317^(2n)))), n=1 to infinity

Input interpretation:

$$\sum_{n=1}^{\infty}\frac{(-1)^{n-1}\left(n^3\, 0.00186744273170000^{2n}\right)}{1-0.00186744273170000^{2n}}$$

Infinite sum:

$$\sum_{n=1}^{\infty}\frac{(-1)^{n-1}\left(n^3\, 0.00186744273170000^{2n}\right)}{1-0.00186744273170000^{2n}} = 3.48726\times 10^{-6}$$

1/16(1+0.00183624-1+16*3.48726e-6)

Input interpretation:

$$\frac{1}{16}\left(1+0.00183624-1+16\times 3.48726\times 10^{-6}\right)$$

Result:

0.00011825226

0.00011825226

1/12 *1/(((1/16(1+0.00183624-1+16*3.48726e-6))))+76+golden ratio

Where 76 is a Lucas number

Input interpretation:

$$\frac{1}{12}\times\frac{1}{\frac{1}{16}\left(1+0.00183624-1+16\times 3.48726\times 10^{-6}\right)}+76+\phi$$

ϕ is the golden ratio

Result:

782.326...

782.326 result practically equal to the rest mass of Omega meson 782.65

1/10^52 * (((1+(((1/16(1+0.00183624-1+16*3.48726e-6)))) + (76+29)/10^3+5/10^4)))

Where 76 and 29 are Lucas numbers, while 5 is a Fibonacci number

Input interpretation:

$$\frac{1}{10^{52}}\left(1+\frac{1}{16}\left(1+0.00183624-1+16\times 3.48726\times 10^{-6}\right)+\frac{76+29}{10^3}+\frac{5}{10^4}\right)$$

Result:

$1.10561825226\times 10^{-52}$

$1.10561825226*10^{-52}$ result practically equal to the value of Cosmological Constant $1.1056*10^{-52}$ m^{-2}

Now, we have that:

$$\sum_{n=0}^{\infty} \tau(2n+1)q^{2n+1} = -3\sum_{n=0}^{\infty} \frac{(2n+1)^3 q^{2n+1}}{1-q^{4n+2}} + 16\sum_{n=0}^{\infty}(-1)^n \frac{(2n+1)^2 q^{2n+1}}{1-q^{4n+2}} - 12\sum_{n=0}^{\infty} \frac{(2n+1)q^{2n+1}}{1-q^{4n+2}} + 256J.$$

-3 * sum ((2n+1)^3*0.0018674427317^(2n+1))/((1-0.0018674427317^(4n+2))), n=0 to 1729

Input interpretation:

$$-3\sum_{n=0}^{1729} \frac{(2\,n+1)^3 \times 0.0018674427317^{2\,n+1}}{1-0.0018674427317^{4\,n+2}}$$

Result:

−0.0056028752463

-0.0056028752463

16 * sum (-1)^n * ((2n+1)^2*0.0018674427317^(2n+1))/((1-0.0018674427317^(4n+2))), n=0 to 1729

Input interpretation:

$$16\sum_{n=0}^{1729} (-1)^n \times \frac{(2\,n+1)^2 \times 0.0018674427317^{2\,n+1}}{1-0.0018674427317^{4\,n+2}}$$

Result:

0.029878250128

0.029878250128

-12 * sum ((2n+1)*0.0018674427317^(2n+1))/((1-0.0018674427317^(4n+2))), n=0 to 1729

Input interpretation:

$$-12 \sum_{n=0}^{1729} \frac{(2n+1) \times 0.0018674427317^{2n+1}}{1-0.0018674427317^{4n+2}}$$

Result:

-0.022409625378

-0.022409625378

We note that:

1+(-0.0056028752463+0.029878250128-0.022409625378)

Input interpretation:

1 + (-0.0056028752463 + 0.029878250128 - 0.022409625378)

Result:

1.0018657495037

Repeating decimal:

1.0018657495037

1.0018657495037 result very near to the following Rogres-Ramanujan continued fraction

$$\frac{e^{-\frac{2\pi}{5}}}{\sqrt{\varphi\sqrt{5}-\varphi}} = 1+\frac{e^{-2\pi}}{1+\frac{e^{-4\pi}}{1+\frac{e^{-6\pi}}{1+\frac{e^{-8\pi}}{1+\dots}}}} \approx 1.0018674362$$

-0.0056028752463+0.029878250128-0.022409625378+256J

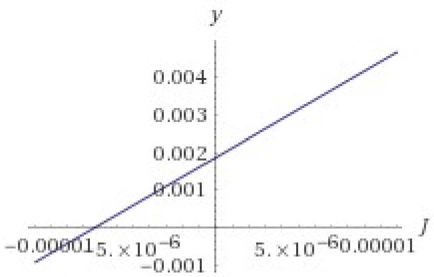
Input interpretation:

-0.0056028752463 + 0.029878250128 - 0.022409625378 + 256 J

Result:

256 J + 0.001865749504

Plot:



(J from -1.1×10^{-5} to 1.1×10^{-5})

Geometric figure:

line

Alternate forms:

$256\left(J+7.28808400\times10^{-6}\right)$

$0.0000196395\,(1.3035\times10^{7}\,J+95)$

$256.0000000\left(1.000000000\,J+7.28808400\times10^{-6}\right)$

Root:

$J\approx-7.28808400\times10^{-6}$

Derivative:

$$\frac{d}{dJ}(256\,J+0.001865749504)=256$$

Indefinite integral:

$$\int(-0.0056028752463+0.029878250128-0.022409625378+256\,J)\,dJ=$$
$$128.0000000\,J^{2}+0.001865749504\,J+\text{constant}$$

-0.0056028752463+0.029878250128-0.022409625378+256(-7.28808400×10^-6)

Input interpretation:

$-0.0056028752463+0.029878250128-0.022409625378+256\left(-7.28808400\times10^{-6}\right)$

Result:

-3×10^{-13}

$-3 * 10^{-13}$

-ln(-(-0.0056028752463+0.029878250128-0.022409625378+256(-7.28808400×10^-6))) – 13

Where 13 is a Fibonacci number

Input interpretation:

$$-\log\left(-\left(-0.0056028752463 + 0.029878250128 - 0.022409625378 + 256\left(-7.28808400 \times 10^{-6}\right)\right)\right) - 13$$

log(x) is the natural logarithm

Result:

15.834993920254484200838643673974208994166828794351299236 69...

15.83499392... result practically equal to the black hole entropy 15.8174

-ln(-(-0.0056028752463+0.029878250128-0.022409625378+256(-7.28808400×10^-6)))*5-5+1/golden ratio

Where 5 is a Fibonacci number

Input interpretation:

$$-\log\left(-\left(-0.0056028752463 + 0.029878250128 - 0.022409625378 + 256\left(-7.28808400 \times 10^{-6}\right)\right)\right) \times 5 - 5 + \frac{1}{\phi}$$

log(x) is the natural logarithm

ϕ is the golden ratio

Result:

139.79300359002231585239780520423668308855445315156225904 56...

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

-ln(-(-0.0056028752463+0.029878250128-0.022409625378+256(-7.28808400×10^-6)))*5-18-1/golden ratio

Where 5 is a Fibonacci number, while 18 is a Lucas number

Input interpretation:

$$-\log\left(-\left(-0.0056028752463+0.029878250128-0.022409625378+256\left(-7.28808400\times 10^{-6}\right)\right)\right)\times 5-18-\frac{1}{\phi}$$

log(x) is the natural logarithm

ϕ is the golden ratio

Result:

125.556935612522526155988631535505406853113834791950733321 3...

125.5569356... result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0 and to the Higgs boson mass 125.18 GeV

We have also that:

-0.0056028752463+0.029878250128-0.022409625378+x(-7.28808400×10^-6) = -3*10^-13

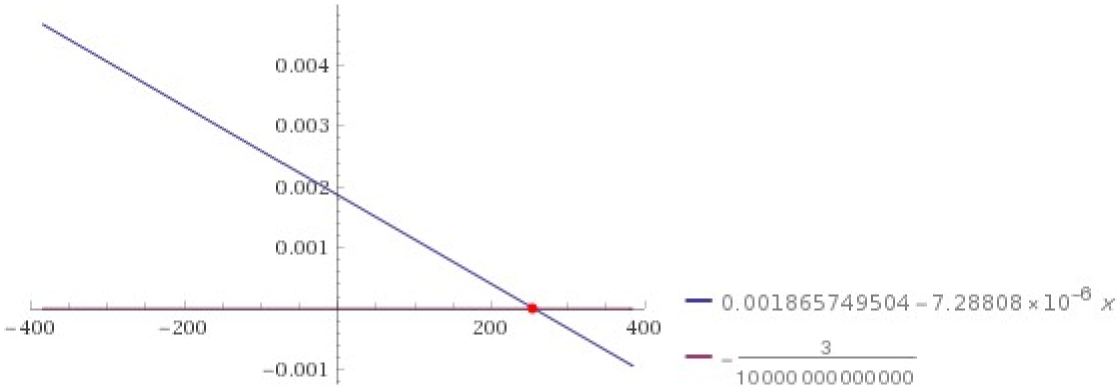
Input interpretation:

$$-0.0056028752463+0.029878250128-0.022409625378+x\left(-7.28808400\times 10^{-6}\right)=-3\times 10^{-13}$$

Result:

$$0.001865749504-7.28808\times 10^{-6}\,x=-\frac{3}{10\,000\,000\,000\,000}$$

Plot:



Alternate forms:

$$-7.28808\times 10^{-6}\,(x-256.)=-\frac{3}{10\,000\,000\,000\,000}$$

$$0.001865749504-7.28808\times 10^{-6}\,x=0$$

Solution:

$x \approx 256.$

256

And:

-0.0056028752463+0.029878250128-0.022409625378+4x(-7.28808400×10^-6) = -3*10^-13

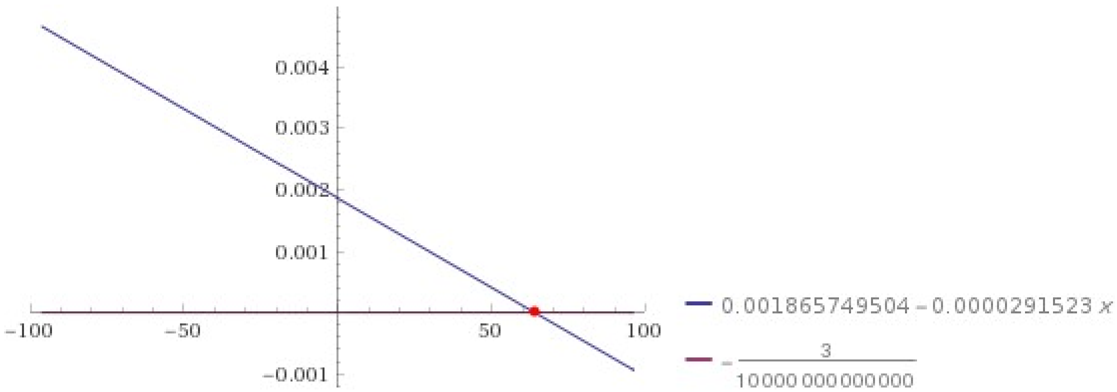
Input interpretation:

$$-0.0056028752463 + 0.029878250128 - 0.022409625378 + 4\,x\left(-7.28808400\times 10^{-6}\right) = -3\times 10^{-13}$$

Result:

$$0.001865749504 - 0.0000291523\,x = -\frac{3}{10\,000\,000\,000\,000}$$

Plot:



Alternate forms:

$$-0.0000291523\,(x - 64.) = -\frac{3}{10\,000\,000\,000\,000}$$

$$0.001865749504 - 0.0000291523\,x = 0$$

Solution:

$x \approx 64.$

64

From:

Ramanujan's "Lost" Notebook VI: The Mock Theta Conjectures
GEORGE E. ANDREWS* - The Pennsylvania State University, - University Park, Pennsylvania 16802 AND F. G. GARVAN - The University of Wisconsin, Madison, Wisconsin 53706

Hence if $q = e^{-\alpha}$, then

$$q^{1/15}\Phi(q^{1/5})(q;q)_\infty = \frac{1}{2}\sum_{n=-\infty}^{\infty} \frac{(-1)^n q^{(3/2)(n+1/3)^2}}{\sinh((\alpha/2)(n+1/5))}.$$

For α = π, we obtain:

1/2 * sum ((-1)^n*0.0018674427317^(((3/2)(n+1/3)^2))/((sinh((Pi/2)(n+1/5)))), n= -1 to 1729

Input interpretation:

$$\frac{1}{2}\sum_{n=-1}^{1729} \frac{(-1)^n \times 0.0018674427317^{3/2\,(n+1/3)^2}}{\sinh\left(\frac{\pi}{2}\left(n+\frac{1}{5}\right)\right)}$$

sinh(x) is the hyperbolic sine function

Result:

0.554120264543

0.554120264543

(((1/2*1/ (((1/2 * sum ((-1)^n*0.0018674427317^(((3/2)(n+1/3)^2))/((sinh((Pi/2)(n+1/5)))), n= -1 to 1729))))))^1/64

Input interpretation:

$$\sqrt[64]{\frac{1}{2} \times \frac{1}{\frac{1}{2}\sum_{n=-1}^{1729} \frac{(-1)^n \times 0.0018674427317^{3/2\,(n+1/3)^2}}{\sinh\left(\frac{\pi}{2}\left(n+\frac{1}{5}\right)\right)}}}$$

sinh(x) is the hyperbolic sine function

Result:

0.9983954504062

0.9983954504062 result very near to the value of the following Rogers-Ramanujan continued fraction:

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

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

Ramanujan mathematics applied to Physics

From:

https://www.quora.com/What-is-partition-formula-by-Ramanujan-used-for

Ramanujan's Partition Formula

$$p(n) = \frac{1}{2\pi\sqrt{2}} \sum_{k=1}^{v} A_k(n)\sqrt{k} \cdot \frac{d}{dn}\left(\frac{1}{\sqrt{n-\frac{1}{24}}} \exp\left[\frac{\pi}{k}\sqrt{\frac{2}{3}\left(n-\frac{1}{24}\right)}\right]\right)$$

where

$$A_k(n) = \sum_{0\leq m<k,\ (m,k)=1} e^{\pi i(s(m,k)-2nm/k)}$$

We calculation the Ramanujan's partition formula for n = 12, 24, 36, 48, 60, 72, 84 and 264 and 276

We have:

-((1/(2Pi*sqrt2) * -4.04426)/(12))*(1/(sqrt(12-1/12))exp(Pi*((sqrt(2/3(12-1/12)))))

Input interpretation:

$$-\left(\frac{1}{12}\left(\frac{1}{2\pi\sqrt{2}}\times(-4.04426)\right)\right)\times\frac{1}{\sqrt{12-\frac{1}{12}}}\exp\left(\pi\sqrt{\frac{2}{3}\left(12-\frac{1}{12}\right)}\right)$$

Result:

77.0020...

77.0020... (77)

Series representations:

$$-\frac{\exp\left(\pi\sqrt{\frac{2}{3}\left(12-\frac{1}{12}\right)}\right)(-4.04426)}{\left(12\sqrt{12-\frac{1}{12}}\right)(2\pi\sqrt{2})}=\frac{0.168511\exp\left(\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{143}{18}-z_0\right)^k z_0^{-k}}{k!}\right)}{\pi\sqrt{z_0}^2\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{143}{12}-z_0\right)^k z_0^{-k}}{k!}}$$

for not $((z_0\in\mathbb{R}$ and $-\infty<z_0\leq 0))$

$$-\frac{\exp\left(\pi\sqrt{\frac{2}{3}\left(12-\frac{1}{12}\right)}\right)(-4.04426)}{\left(12\sqrt{12-\frac{1}{12}}\right)(2\pi\sqrt{2})} = \left(0.168511\exp\left(\pi\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{143}{18}-x\right)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{143}{18}-x\right)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\right) \Big/ \left(\pi\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{143}{12}-x\right)}{2\pi}\right\rfloor\right)\sqrt{x}^2\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{143}{12}-x\right)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right) \text{ for } (x\in\mathbb{R} \text{ and } x<0)$$

$$-\frac{\exp\left(\pi\sqrt{\frac{2}{3}\left(12-\frac{1}{12}\right)}\right)(-4.04426)}{\left(12\sqrt{12-\frac{1}{12}}\right)(2\pi\sqrt{2})} = \left(0.168511\exp\left(\pi\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(\frac{143}{18}-z_0\right)/(2\pi)\right\rfloor} z_0^{1/2\left(1+\left\lfloor\arg\left(\frac{143}{18}-z_0\right)/(2\pi)\right\rfloor\right)}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{143}{18}-z_0\right)^k z_0^{-k}}{k!}\right)\left(\frac{1}{z_0}\right)^{-1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor-1/2\left\lfloor\arg\left(\frac{143}{12}-z_0\right)/(2\pi)\right\rfloor} z_0^{-1-1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor-1/2\left\lfloor\arg\left(\frac{143}{12}-z_0\right)/(2\pi)\right\rfloor}\right) \Big/ \left(\pi\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{143}{12}-z_0\right)^k z_0^{-k}}{k!}\right)$$

-((1/(2Pi*sqrt2) * -5.7964)/(24))*(1/(sqrt(24-1/24))exp(Pi*((sqrt(2/3(24-1/24)))))

Input interpretation:

$$-\left(\frac{1}{24}\left(\frac{1}{2\pi\sqrt{2}}\times(-5.7964)\right)\right)\times\frac{1}{\sqrt{24-\frac{1}{24}}}\exp\left(\pi\sqrt{\frac{2}{3}\left(24-\frac{1}{24}\right)}\right)$$

Result:

1575.03...

1575.03… (1575)

Series representations:

$$-\frac{\exp\left(\pi\sqrt{\frac{2}{3}\left(24-\frac{1}{24}\right)}\right)(-5.7964)}{\left(24\sqrt{24-\frac{1}{24}}\right)\left(2\pi\sqrt{2}\right)} = \frac{0.120758\exp\left(\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{575}{36}-z_0\right)^k z_0^{-k}}{k!}\right)}{\pi\sqrt{z_0}^2\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{575}{24}-z_0\right)^k z_0^{-k}}{k!}}$$

for not $((z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0))$

$$-\frac{\exp\left(\pi\sqrt{\frac{2}{3}\left(24-\frac{1}{24}\right)}\right)(-5.7964)}{\left(24\sqrt{24-\frac{1}{24}}\right)\left(2\pi\sqrt{2}\right)} = \left(0.120758\exp\left(\pi\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{575}{36}-x\right)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{575}{36}-x\right)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\right)\Big/ \left(\pi\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{575}{24}-x\right)}{2\pi}\right\rfloor\right)\sqrt{x}^2\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{575}{24}-x\right)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)$$

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

$$-\frac{\exp\left(\pi\sqrt{\frac{2}{3}\left(24-\frac{1}{24}\right)}\right)(-5.7964)}{\left(24\sqrt{24-\frac{1}{24}}\right)(2\pi\sqrt{2})} = \left(0.120758\exp\left(\pi\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(\frac{575}{36}-z_0\right)/(2\pi)\right\rfloor} z_0^{1/2\left(1+\left\lfloor\arg\left(\frac{575}{36}-z_0\right)/(2\pi)\right\rfloor\right)} \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{575}{36}-z_0\right)^k z_0^{-k}}{k!}\right)\left(\frac{1}{z_0}\right)^{-1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor-1/2\left\lfloor\arg\left(\frac{575}{24}-z_0\right)/(2\pi)\right\rfloor} z_0^{-1-1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor-1/2\left\lfloor\arg\left(\frac{575}{24}-z_0\right)/(2\pi)\right\rfloor}\right) \Big/ \left(\pi\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{575}{24}-z_0\right)^k z_0^{-k}}{k!}\right)$$

Pi*ln(((-((1/(2Pi*sqrt2) * -5.7964)/(24))*(1/(sqrt(24-1/24))exp(Pi*((sqrt(2/3(24-1/24))))))))

Input interpretation:

$$\pi\log\left(-\left(\frac{1}{24}\left(\frac{1}{2\pi\sqrt{2}}\times(-5.7964)\right)\right)\times\frac{1}{\sqrt{24-\frac{1}{24}}}\exp\left(\pi\sqrt{\frac{2}{3}\left(24-\frac{1}{24}\right)}\right)\right)$$

log(x) is the natural logarithm

Result:

23.1285...

23.1285… result very near to the black hole entropy 23.3621

Alternative representations:

$$\pi\log\left(-\frac{\exp\left(\pi\sqrt{\frac{2}{3}\left(24-\frac{1}{24}\right)}\right)(-5.7964)}{\left(24\sqrt{24-\frac{1}{24}}\right)(2\pi\sqrt{2})}\right) = \pi\log_e\left(\frac{5.7964\exp\left(\pi\sqrt{\frac{2}{3}\left(24-\frac{1}{24}\right)}\right)}{24(2\pi\sqrt{2})\sqrt{24-\frac{1}{24}}}\right)$$

$$\pi \log\left(-\frac{\exp\left(\pi\sqrt{\frac{2}{3}\left(24-\frac{1}{24}\right)}\right)(-5.7964)}{\left(24\sqrt{24-\frac{1}{24}}\right)\left(2\pi\sqrt{2}\right)}\right) = \pi \log(a)\log_a\left(\frac{5.7964\exp\left(\pi\sqrt{\frac{2}{3}\left(24-\frac{1}{24}\right)}\right)}{24\left(2\pi\sqrt{2}\right)\sqrt{24-\frac{1}{24}}}\right)$$

Series representation:

$$\pi \log\left(-\frac{\exp\left(\pi\sqrt{\frac{2}{3}\left(24-\frac{1}{24}\right)}\right)(-5.7964)}{\left(24\sqrt{24-\frac{1}{24}}\right)\left(2\pi\sqrt{2}\right)}\right) =$$

$$\pi \log\left(-1+\frac{0.120758\exp\left(\pi\sqrt{\frac{575}{36}}\right)}{\pi\sqrt{2}\sqrt{\frac{575}{24}}}\right) - \pi\sum_{k=1}^{\infty}\frac{(-1)^k\left(-1+\frac{0.120758\exp\left(\pi\sqrt{\frac{575}{36}}\right)}{\pi\sqrt{2}\sqrt{\frac{575}{24}}}\right)^{-k}}{k}$$

Integral representations:

$$\pi \log\left(-\frac{\exp\left(\pi\sqrt{\frac{2}{3}\left(24-\frac{1}{24}\right)}\right)(-5.7964)}{\left(24\sqrt{24-\frac{1}{24}}\right)\left(2\pi\sqrt{2}\right)}\right) = \pi\int_1^{\frac{0.120758\exp\left(\pi\sqrt{\frac{575}{36}}\right)}{\pi\sqrt{2}\sqrt{\frac{575}{24}}}}\frac{1}{t}\,dt$$

$$\pi \log\left(-\frac{\exp\left(\pi\sqrt{\frac{2}{3}\left(24-\frac{1}{24}\right)}\right)(-5.7964)}{\left(24\sqrt{24-\frac{1}{24}}\right)\left(2\pi\sqrt{2}\right)}\right) =$$

$$\frac{1}{2i}\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{\Gamma(-s)^2\,\Gamma(1+s)\left(-1+\frac{0.120758\exp\left(\pi\sqrt{\frac{575}{36}}\right)}{\pi\sqrt{2}\sqrt{\frac{575}{24}}}\right)^{-s}}{\Gamma(1-s)}\,ds \quad \text{for } -1<\gamma<0$$

We have that:

Input interpretation:

$$\frac{1575.03}{77.0020}$$

Result:

20.45440378171995532583569257941352172670839718448871457884...

20.45440378... result very near to the black hole entropy 20.5520

-((1/(2Pi*sqrt2) * -7.1818)/(36))*(1/(sqrt(36-1/36)))exp(Pi*((sqrt(2/3(36-1/36)))))

Input interpretation:

$$-\left(\frac{1}{36}\left(\frac{1}{2\pi\sqrt{2}}\times(-7.1818)\right)\right)\times\frac{1}{\sqrt{36-\frac{1}{36}}}\exp\left(\pi\sqrt{\frac{2}{3}\left(36-\frac{1}{36}\right)}\right)$$

Result:

17977.3...

17977.3... (17977)

Series representations:

$$-\frac{\exp\left(\pi\sqrt{\frac{2}{3}\left(36-\frac{1}{36}\right)}\right)(-7.1818)}{\left(36\sqrt{36-\frac{1}{36}}\right)\left(2\pi\sqrt{2}\right)}=$$

$$\frac{0.0997472\exp\left(\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{1295}{54}-z_0\right)^k z_0^{-k}}{k!}\right)}{\pi\sqrt{z_0}^2\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{1295}{36}-z_0\right)^k z_0^{-k}}{k!}}$$

for not $((z_0\in\mathbb{R}$ and $-\infty<z_0\leq 0))$

$$-\frac{\exp\left(\pi\sqrt{\frac{2}{3}\left(36-\frac{1}{36}\right)}\right)(-7.1818)}{\left(36\sqrt{36-\frac{1}{36}}\right)(2\pi\sqrt{2})} = \left(0.0997472\exp\left(\pi\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{1295}{54}-x\right)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{1295}{54}-x\right)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\right) \Big/ \left(\pi\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{1295}{36}-x\right)}{2\pi}\right\rfloor\right)\sqrt{x}^2\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{1295}{36}-x\right)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right) \quad \text{for } (x \in \mathbb{R} \text{ and } x < 0)$$

$$-\frac{\exp\left(\pi\sqrt{\frac{2}{3}\left(36-\frac{1}{36}\right)}\right)(-7.1818)}{\left(36\sqrt{36-\frac{1}{36}}\right)(2\pi\sqrt{2})} = \left(0.0997472\exp\left(\pi\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(\frac{1295}{54}-z_0\right)/(2\pi)\right\rfloor} z_0^{1/2\left(1+\left\lfloor\arg\left(\frac{1295}{54}-z_0\right)/(2\pi)\right\rfloor\right)}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{1295}{54}-z_0\right)^k z_0^{-k}}{k!}\right)\left(\frac{1}{z_0}\right)^{-1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor-1/2\left\lfloor\arg\left(\frac{1295}{36}-z_0\right)/(2\pi)\right\rfloor} z_0^{-1-1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor-1/2\left\lfloor\arg\left(\frac{1295}{36}-z_0\right)/(2\pi)\right\rfloor}\right) \Big/ \left(\pi\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{1295}{36}-z_0\right)^k z_0^{-k}}{k!}\right)$$

-((1/(2Pi*sqrt2) * -8.35955)/(48))*(1/(sqrt(48-1/48))exp(Pi*((sqrt(2/3(48-1/48)))))

Input interpretation:

$$-\left(\frac{1}{48}\left(\frac{1}{2\pi\sqrt{2}}\times(-8.35955)\right)\right)\times\frac{1}{\sqrt{48-\frac{1}{48}}}\exp\left(\pi\sqrt{\frac{2}{3}\left(48-\frac{1}{48}\right)}\right)$$

Result:

$1.47273\ldots \times 10^5$

147273 (147273)

We have that:

Input interpretation:

$$\frac{147273}{17977.3}$$

Result:

8.192164563087894177657379027996417704549626473385881083366...

8.192164563…

Series representations:

$$-\frac{\exp\left(\pi\sqrt{\frac{2}{3}\left(48-\frac{1}{48}\right)}\right)(-8.35955)}{\left(48\sqrt{48-\frac{1}{48}}\right)\left(2\pi\sqrt{2}\right)}=\frac{0.0870786\exp\left(\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{2303}{72}-z_0\right)^k z_0^{-k}}{k!}\right)}{\pi\sqrt{z_0}^2\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{2303}{48}-z_0\right)^k z_0^{-k}}{k!}}$$

for not $((z_0\in\mathbb{R}$ and $-\infty<z_0\leq 0))$

$$-\frac{\exp\left(\pi\sqrt{\frac{2}{3}\left(48-\frac{1}{48}\right)}\right)(-8.35955)}{\left(48\sqrt{48-\frac{1}{48}}\right)\left(2\pi\sqrt{2}\right)}=\left(0.0870786\exp\left(\pi\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{2303}{72}-x\right)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{2303}{72}-x\right)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\right)\Bigg/\left(\pi\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{2303}{48}-x\right)}{2\pi}\right\rfloor\right)\sqrt{x}^2\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{2303}{48}-x\right)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)$$

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

$$-\frac{\exp\left(\pi\sqrt{\frac{2}{3}\left(48-\frac{1}{48}\right)}\right)(-8.35955)}{\left(48\sqrt{48-\frac{1}{48}}\right)\left(2\pi\sqrt{2}\right)} =$$

$$\left(0.0870786 \exp\left(\pi\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(\frac{2303}{72}-z_0\right)/(2\pi)\right\rfloor} z_0^{1/2\left(1+\left\lfloor\arg\left(\frac{2303}{72}-z_0\right)/(2\pi)\right\rfloor\right)} \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{2303}{72}-z_0\right)^k z_0^{-k}}{k!}\right)\left(\frac{1}{z_0}\right)^{-1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor-1/2\left\lfloor\arg\left(\frac{2303}{48}-z_0\right)/(2\pi)\right\rfloor} z_0^{-1-1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor-1/2\left\lfloor\arg\left(\frac{2303}{48}-z_0\right)/(2\pi)\right\rfloor}\right) \Big/ \left(\pi\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{2303}{48}-z_0\right)^k z_0^{-k}}{k!}\right)$$

-((1/(2Pi*sqrt2) * (-9.40098)*1/(60)))*(1/(sqrt(60-1/60))exp(Pi*((sqrt(2/3(60-1/60)))))

Input interpretation:

$$-\left(\frac{1}{2\pi\sqrt{2}}\times(-9.40098)\times\frac{1}{60}\right)\times\frac{1}{\sqrt{60-\frac{1}{60}}}\exp\left(\pi\sqrt{\frac{2}{3}\left(60-\frac{1}{60}\right)}\right)$$

Result:

$9.66467... \times 10^5$

966467 (966467)

Series representations:

$$-\frac{-9.40098 \exp\left(\pi \sqrt{\frac{2}{3}\left(60-\frac{1}{60}\right)}\right)}{\left(60\sqrt{60-\frac{1}{60}}\right)(2\pi\sqrt{2})} = \frac{0.0783415 \exp\left(\pi \sqrt{z_0}\ \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k \left(\frac{3599}{90}-z_0\right)^k z_0^{-k}}{k!}\right)}{\pi \sqrt{z_0}^2 \left(\sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k z_0^{-k}}{k!}\right) \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k \left(\frac{3599}{60}-z_0\right)^k z_0^{-k}}{k!}}$$

for not $((z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0))$

$$-\frac{-9.40098 \exp\left(\pi \sqrt{\frac{2}{3}\left(60-\frac{1}{60}\right)}\right)}{\left(60\sqrt{60-\frac{1}{60}}\right)(2\pi\sqrt{2})} =$$

$$\left(0.0783415 \exp\left(\pi \exp\left(i\pi \left\lfloor \frac{\arg\left(\frac{3599}{90}-x\right)}{2\pi} \right\rfloor\right) \sqrt{x} \sum_{k=0}^{\infty} \frac{(-1)^k \left(\frac{3599}{90}-x\right)^k x^{-k} \left(-\frac{1}{2}\right)_k}{k!}\right)\right) \Big/ \left(\pi \exp\left(i\pi \left\lfloor \frac{\arg(2-x)}{2\pi} \right\rfloor\right) \exp\left(i\pi \left\lfloor \frac{\arg\left(\frac{3599}{60}-x\right)}{2\pi} \right\rfloor\right) \sqrt{x}^2 \left(\sum_{k=0}^{\infty} \frac{(-1)^k (2-x)^k x^{-k} \left(-\frac{1}{2}\right)_k}{k!}\right) \sum_{k=0}^{\infty} \frac{(-1)^k \left(\frac{3599}{60}-x\right)^k x^{-k} \left(-\frac{1}{2}\right)_k}{k!}\right)$$

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

$$-\frac{-9.40098 \exp\left(\pi \sqrt{\frac{2}{3}\left(60-\frac{1}{60}\right)}\right)}{\left(60\sqrt{60-\frac{1}{60}}\right)(2\pi\sqrt{2})} =$$

$$\left(0.0783415 \exp\left(\pi \left(\frac{1}{z_0}\right)^{1/2 \left\lfloor \arg\left(\frac{3599}{90}-z_0\right)/(2\pi) \right\rfloor} z_0^{1/2 \left(1+\left\lfloor \arg\left(\frac{3599}{90}-z_0\right)/(2\pi) \right\rfloor\right)} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k \left(\frac{3599}{90}-z_0\right)^k z_0^{-k}}{k!}\right) \left(\frac{1}{z_0}\right)^{-1/2 \lfloor \arg(2-z_0)/(2\pi) \rfloor - 1/2 \left\lfloor \arg\left(\frac{3599}{60}-z_0\right)/(2\pi) \right\rfloor} z_0^{-1-1/2 \lfloor \arg(2-z_0)/(2\pi) \rfloor - 1/2 \left\lfloor \arg\left(\frac{3599}{60}-z_0\right)/(2\pi) \right\rfloor}\right) \Big/ \left(\pi \left(\sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k z_0^{-k}}{k!}\right) \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k \left(\frac{3599}{60}-z_0\right)^k z_0^{-k}}{k!}\right)$$

-((1/(2Pi*sqrt2) * (-10.344268)*1/(72)))*(1/(sqrt(72-1/72)))exp(Pi*((sqrt(2/3(72-1/72)))))

Input interpretation:

$$-\left(\frac{1}{2\pi\sqrt{2}}\times(-10.344268)\times\frac{1}{72}\right)\times\frac{1}{\sqrt{72-\frac{1}{72}}}\exp\left(\pi\sqrt{\frac{2}{3}\left(72-\frac{1}{72}\right)}\right)$$

Result:

$5.3927830\ldots\times10^6$

$5.3927830\ldots*10^6$ (5392783)

We have that:

Input:

$$\frac{5\,392\,783}{966\,467}$$

Exact result:

$$\frac{38\,797}{6953}$$

Decimal approximation:

5.579893571120379692219185962893714943189989932403279160074...

5.57989357112….

Series representations:

$$-\frac{-10.3443\exp\left(\pi\sqrt{\frac{2}{3}\left(72-\frac{1}{72}\right)}\right)}{\left(72\sqrt{72-\frac{1}{72}}\right)\left(2\pi\sqrt{2}\right)}=\frac{0.0718352\exp\left(\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{5183}{108}-z_0\right)^k z_0^{-k}}{k!}\right)}{\pi\sqrt{z_0}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{5183}{72}-z_0\right)^k z_0^{-k}}{k!}}$$

for not $((z_0\in\mathbb{R}$ and $-\infty<z_0\le0))$

$$-\frac{-10.3443 \exp\left(\pi \sqrt{\frac{2}{3}\left(72-\frac{1}{72}\right)}\right)}{\left(72 \sqrt{72-\frac{1}{72}}\right)(2 \pi \sqrt{2})} =$$

$$\left(0.0718352 \exp\left(\pi \exp\left(i \pi \left\lfloor \frac{\arg\left(\frac{5183}{108}-x\right)}{2 \pi} \right\rfloor\right) \sqrt{x} \sum_{k=0}^{\infty} \frac{(-1)^k \left(\frac{5183}{108}-x\right)^k x^{-k} \left(-\frac{1}{2}\right)_k}{k!}\right)\right) \Big/$$
$$\left(\pi \exp\left(i \pi \left\lfloor \frac{\arg(2-x)}{2 \pi} \right\rfloor\right) \exp\left(i \pi \left\lfloor \frac{\arg\left(\frac{5183}{72}-x\right)}{2 \pi} \right\rfloor\right) \sqrt{x}^2 \left(\sum_{k=0}^{\infty} \frac{(-1)^k (2-x)^k x^{-k} \left(-\frac{1}{2}\right)_k}{k!}\right)\right.$$
$$\left.\sum_{k=0}^{\infty} \frac{(-1)^k \left(\frac{5183}{72}-x\right)^k x^{-k} \left(-\frac{1}{2}\right)_k}{k!}\right) \text{ for } (x \in \mathbb{R} \text{ and } x < 0)$$

$$-\frac{-10.3443 \exp\left(\pi \sqrt{\frac{2}{3}\left(72-\frac{1}{72}\right)}\right)}{\left(72 \sqrt{72-\frac{1}{72}}\right)(2 \pi \sqrt{2})} =$$

$$\left(0.0718352 \exp\left(\pi \left(\frac{1}{z_0}\right)^{1/2 \left\lfloor \arg\left(\frac{5183}{108}-z_0\right)/(2 \pi)\right\rfloor} z_0^{1/2 \left(1+\left\lfloor \arg\left(\frac{5183}{108}-z_0\right)/(2 \pi)\right\rfloor\right)}\right.\right.$$
$$\left.\sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k \left(\frac{5183}{108}-z_0\right)^k z_0^{-k}}{k!}\right) \left(\frac{1}{z_0}\right)^{-1/2 \lfloor \arg(2-z_0)/(2 \pi)\rfloor - 1/2 \left\lfloor \arg\left(\frac{5183}{72}-z_0\right)/(2 \pi)\right\rfloor}$$
$$\left. z_0^{-1-1/2 \lfloor \arg(2-z_0)/(2 \pi)\rfloor - 1/2 \left\lfloor \arg\left(\frac{5183}{72}-z_0\right)/(2 \pi)\right\rfloor}\right) \Big/$$
$$\left(\pi \left(\sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k z_0^{-k}}{k!}\right) \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k \left(\frac{5183}{72}-z_0\right)^k z_0^{-k}}{k!}\right)$$

-((1/(2Pi*sqrt2) * (-11.212685)*1/(84)))*(1/(sqrt(84-1/84))exp(Pi*((sqrt(2/3(84-1/84)))))

Input interpretation:

$$-\left(\frac{1}{2 \pi \sqrt{2}} \times (-11.212685) \times \frac{1}{84}\right) \times \frac{1}{\sqrt{84-\frac{1}{84}}} \exp\left(\pi \sqrt{\frac{2}{3}\left(84-\frac{1}{84}\right)}\right)$$

Result:

$2.6543660\ldots \times 10^7$

26543660 (26543660)

We have that:

Input:

$$\frac{26\,543\,660}{5\,392\,783}$$

Exact result:

$$\frac{2\,413\,060}{490\,253}$$

Decimal approximation:

4.922070849132998676193720385188871868198664771046786047204...

4.9220708491329……

Series representations:

$$-\frac{-11.2127 \exp\left(\pi \sqrt{\frac{2}{3}\left(84-\frac{1}{84}\right)}\right)}{\left(84 \sqrt{84-\frac{1}{84}}\right)\left(2 \pi \sqrt{2}\right)} = \frac{0.0667422 \exp\left(\pi \sqrt{z_0} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k \left(\frac{7055}{126}-z_0\right)^k z_0^{-k}}{k!}\right)}{\pi \sqrt{z_0}^2 \left(\sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k z_0^{-k}}{k!}\right) \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k \left(\frac{7055}{84}-z_0\right)^k z_0^{-k}}{k!}}$$

for not $((z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \leq 0))$

$$-\frac{-11.2127\exp\left(\pi\sqrt{\frac{2}{3}\left(84-\frac{1}{84}\right)}\right)}{\left(84\sqrt{84-\frac{1}{84}}\right)\left(2\pi\sqrt{2}\right)} =$$

$$\left(0.0667422\exp\left(\pi\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{7055}{126}-x\right)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{7055}{126}-x\right)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\right)\Bigg/$$

$$\left(\pi\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{7055}{84}-x\right)}{2\pi}\right\rfloor\right)\sqrt{x}^2\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\right.$$

$$\left.\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{7055}{84}-x\right)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right) \quad \text{for } (x\in\mathbb{R} \text{ and } x<0)$$

$$-\frac{-11.2127\exp\left(\pi\sqrt{\frac{2}{3}\left(84-\frac{1}{84}\right)}\right)}{\left(84\sqrt{84-\frac{1}{84}}\right)\left(2\pi\sqrt{2}\right)} =$$

$$\left(0.0667422\exp\left(\pi\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(\frac{7055}{126}-z_0\right)/(2\pi)\right\rfloor} z_0^{1/2\left(1+\left\lfloor\arg\left(\frac{7055}{126}-z_0\right)/(2\pi)\right\rfloor\right)}\right.\right.$$

$$\left.\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{7055}{126}-z_0\right)^k z_0^{-k}}{k!}\right)\left(\frac{1}{z_0}\right)^{-1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor-1/2\left\lfloor\arg\left(\frac{7055}{84}-z_0\right)/(2\pi)\right\rfloor}$$

$$\left.z_0^{-1-1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor-1/2\left\lfloor\arg\left(\frac{7055}{84}-z_0\right)/(2\pi)\right\rfloor}\right)\Bigg/$$

$$\left(\pi\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{7055}{84}-z_0\right)^k z_0^{-k}}{k!}\right)$$

For n = 264 and 276, we obtain:

-((1/(2Pi*sqrt2) * (-20.28126*1/(264)))*(1/(sqrt(264-1/264))exp(Pi*((sqrt(2/3(264-1/264)))))

Input interpretation:

$$-\left(\left(\frac{1}{2\pi\sqrt{2}}\left(-20.28126\times\frac{1}{264}\right)\right)\times\frac{1}{\sqrt{264-\frac{1}{264}}}\exp\left(\pi\sqrt{\frac{2}{3}\left(264-\frac{1}{264}\right)}\right)\right)$$

Result:

$6.704481\ldots\times 10^{14}$

6.704481…*10^14 (670448123060170)

Series representations:

$$-\frac{-20.2813\exp\left(\pi\sqrt{\frac{2}{3}\left(264-\frac{1}{264}\right)}\right)}{\left(\left(2\pi\sqrt{2}\right)264\right)\sqrt{264-\frac{1}{264}}}=\frac{0.0384115\exp\left(\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{69695}{396}-z_0\right)^k z_0^{-k}}{k!}\right)}{\pi\sqrt{z_0}^2\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{69695}{264}-z_0\right)^k z_0^{-k}}{k!}}$$

for not $((z_0\in\mathbb{R}$ and $-\infty<z_0\leq 0))$

$$-\frac{-20.2813\exp\left(\pi\sqrt{\frac{2}{3}\left(264-\frac{1}{264}\right)}\right)}{\left(\left(2\pi\sqrt{2}\right)264\right)\sqrt{264-\frac{1}{264}}}=\left(0.0384115\exp\left(\pi\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{69695}{396}-x\right)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{69695}{396}-x\right)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\right)\Big/\left(\pi\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{69695}{264}-x\right)}{2\pi}\right\rfloor\right)\sqrt{x}^2\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{69695}{264}-x\right)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)$$

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

$$-\frac{-20.2813\exp\left(\pi\sqrt{\frac{2}{3}\left(264-\frac{1}{264}\right)}\right)}{\left(\left(2\pi\sqrt{2}\right)264\right)\sqrt{264-\frac{1}{264}}}=$$

$$\left(0.0384115\exp\left(\pi\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(\frac{69695}{396}-z_0\right)/(2\pi)\right\rfloor} z_0^{1/2\left(1+\left\lfloor\arg\left(\frac{69695}{396}-z_0\right)/(2\pi)\right\rfloor\right)} \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{69695}{396}-z_0\right)^k z_0^{-k}}{k!}\right)\left(\frac{1}{z_0}\right)^{-1/2\left\lfloor\arg(2-z_0)/(2\pi)\right\rfloor-1/2\left\lfloor\arg\left(\frac{69695}{264}-z_0\right)/(2\pi)\right\rfloor} z_0^{-1-1/2\left\lfloor\arg(2-z_0)/(2\pi)\right\rfloor-1/2\left\lfloor\arg\left(\frac{69695}{264}-z_0\right)/(2\pi)\right\rfloor}\right)\Bigg/\left(\pi\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{69695}{264}-z_0\right)^k z_0^{-k}}{k!}\right)$$

-((1/(2Pi*sqrt2) * (-20.7492*1/(276)))*(1/(sqrt(276-1/276)))exp(Pi*((sqrt(2/3(276-1/276)))))

Input interpretation:

$$-\left(\left(\frac{1}{2\pi\sqrt{2}}\left(-20.7492\times\frac{1}{276}\right)\right)\times\frac{1}{\sqrt{276-\frac{1}{276}}}\exp\left(\pi\sqrt{\frac{2}{3}\left(276-\frac{1}{276}\right)}\right)\right)$$

Result:

$1.63729... \times 10^{15}$

$1.63729...*10^{15}$ (1637293969337171)

We have that:

Input interpretation:

$$\frac{1.63729\times10^{15}}{6.704481\times10^{14}}$$

Result:

2.442083138128066885415888269352989440942557671503580963239...

2.4420831381…..

Series representations:

$$-\frac{-20.7492 \exp\left(\pi \sqrt{\frac{2}{3}\left(276-\frac{1}{276}\right)}\right)}{\left(\left(2\pi\sqrt{2}\right)276\right)\sqrt{276-\frac{1}{276}}} = \frac{0.0375891 \exp\left(\pi \sqrt{z_0} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k \left(\frac{76175}{414}-z_0\right)^k z_0^{-k}}{k!}\right)}{\pi \sqrt{z_0}^2 \left(\sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k z_0^{-k}}{k!}\right) \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k \left(\frac{76175}{276}-z_0\right)^k z_0^{-k}}{k!}}$$

for not $((z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0))$

$$-\frac{-20.7492 \exp\left(\pi \sqrt{\frac{2}{3}\left(276-\frac{1}{276}\right)}\right)}{\left(\left(2\pi\sqrt{2}\right)276\right)\sqrt{276-\frac{1}{276}}} = \left(0.0375891 \exp\left(\pi \exp\left(i\pi \left\lfloor \frac{\arg\left(\frac{76175}{414}-x\right)}{2\pi} \right\rfloor\right) \sqrt{x} \sum_{k=0}^{\infty} \frac{(-1)^k \left(\frac{76175}{414}-x\right)^k x^{-k} \left(-\frac{1}{2}\right)_k}{k!}\right)\right) \Big/ \left(\pi \exp\left(i\pi \left\lfloor \frac{\arg(2-x)}{2\pi} \right\rfloor\right) \exp\left(i\pi \left\lfloor \frac{\arg\left(\frac{76175}{276}-x\right)}{2\pi} \right\rfloor\right) \sqrt{x}^2 \left(\sum_{k=0}^{\infty} \frac{(-1)^k (2-x)^k x^{-k} \left(-\frac{1}{2}\right)_k}{k!}\right) \sum_{k=0}^{\infty} \frac{(-1)^k \left(\frac{76175}{276}-x\right)^k x^{-k} \left(-\frac{1}{2}\right)_k}{k!}\right)$$

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

$$-\frac{-20.7492 \exp\left(\pi \sqrt{\frac{2}{3}\left(276 - \frac{1}{276}\right)}\right)}{\left(\left(2\pi\sqrt{2}\right) 276\right)\sqrt{276 - \frac{1}{276}}} =$$

$$\left(0.0375891 \exp\left(\pi \left(\frac{1}{z_0}\right)^{1/2 \left\lfloor \arg\left(\frac{76175}{414} - z_0\right)/(2\pi)\right\rfloor} z_0^{1/2 \left(1 + \left\lfloor \arg\left(\frac{76175}{414} - z_0\right)/(2\pi)\right\rfloor\right)} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k \left(\frac{76175}{414} - z_0\right)^k z_0^{-k}}{k!}\right) \left(\frac{1}{z_0}\right)^{-1/2 \lfloor \arg(2 - z_0)/(2\pi)\rfloor - 1/2 \left\lfloor \arg\left(\frac{76175}{276} - z_0\right)/(2\pi)\right\rfloor} z_0^{-1 - 1/2 \lfloor \arg(2 - z_0)/(2\pi)\rfloor - 1/2 \left\lfloor \arg\left(\frac{76175}{276} - z_0\right)/(2\pi)\right\rfloor}\right) \Bigg/ \left(\pi \left(\sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2 - z_0)^k z_0^{-k}}{k!}\right) \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k \left(\frac{76175}{276} - z_0\right)^k z_0^{-k}}{k!}\right)$$

With regard n = 264 and n = 276, we have also that:

1/e ln ((((-((1/(2Pi*sqrt2) * (-20.28126*1/(264))))*(1/(sqrt(264-1/264))exp(Pi*((sqrt(2/3(264-1/264))))))))

Input interpretation:

$$\frac{1}{e} \log\left(-\left(\frac{1}{2\pi\sqrt{2}}\left(-20.28126 \times \frac{1}{264}\right)\right) \times \frac{1}{\sqrt{264 - \frac{1}{264}}} \exp\left(\pi \sqrt{\frac{2}{3}\left(264 - \frac{1}{264}\right)}\right)\right)$$

log(x) is the natural logarithm

Result:

12.5590243...

12.5590243… result very near to the black hole entropy 12.5664

Alternative representations:

$$\frac{\log\left(-\frac{-20.2813\exp\left(\pi\sqrt{\frac{2}{3}\left(264-\frac{1}{264}\right)}\right)}{\left(2\pi\sqrt{2}\right)264\sqrt{264-\frac{1}{264}}}\right)}{e} = \frac{\log_e\left(\frac{20.2813\exp\left(\pi\sqrt{\frac{2}{3}\left(264-\frac{1}{264}\right)}\right)}{264\left(2\pi\sqrt{2}\right)\sqrt{264-\frac{1}{264}}}\right)}{e}$$

$$\frac{\log\left(-\frac{-20.2813\exp\left(\pi\sqrt{\frac{2}{3}\left(264-\frac{1}{264}\right)}\right)}{\left(2\pi\sqrt{2}\right)264\sqrt{264-\frac{1}{264}}}\right)}{e} = \frac{\log(a)\log_a\left(\frac{20.2813\exp\left(\pi\sqrt{\frac{2}{3}\left(264-\frac{1}{264}\right)}\right)}{264\left(2\pi\sqrt{2}\right)\sqrt{264-\frac{1}{264}}}\right)}{e}$$

$$\frac{\log\left(-\frac{-20.2813\exp\left(\pi\sqrt{\frac{2}{3}\left(264-\frac{1}{264}\right)}\right)}{\left(2\pi\sqrt{2}\right)264\sqrt{264-\frac{1}{264}}}\right)}{e} = \frac{\log\left(-\frac{-20.2813\exp\left(\pi\sqrt{\frac{2}{3}\left(264-\frac{1}{264}\right)}\right)}{\left(2\pi\sqrt{2}\right)264\sqrt{264-\frac{1}{264}}}\right)}{z} \quad \text{for } z = e$$

Series representations:

$$\frac{\log\left(-\frac{-20.2813\exp\left(\pi\sqrt{\frac{2}{3}\left(264-\frac{1}{264}\right)}\right)}{\left(2\pi\sqrt{2}\right)264\sqrt{264-\frac{1}{264}}}\right)}{e} = \left(\sum_{k=0}^{\infty}\frac{(-1)^k}{k!}\right)\left(\log\left(-1+\frac{0.0384115\exp\left(\pi\sqrt{\frac{69695}{396}}\right)}{\pi\sqrt{2}\sqrt{\frac{69695}{264}}}\right)-\sum_{k=1}^{\infty}\frac{(-1)^k\left(-1+\frac{0.0384115\exp\left(\pi\sqrt{\frac{69695}{396}}\right)}{\pi\sqrt{2}\sqrt{\frac{69695}{264}}}\right)^{-k}}{k}\right)$$

$$\frac{\log\left(-\frac{-20.2813\exp\left(\pi\sqrt{\frac{2}{3}\left(264-\frac{1}{264}\right)}\right)}{\left(2\pi\sqrt{2}\right)264\sqrt{264-\frac{1}{264}}}\right)}{e} = \left(\sum_{k=-\infty}^{\infty} I_k(-1)\right) \left(\log\left(-1+\frac{0.0384115\exp\left(\pi\sqrt{\frac{69695}{396}}\right)}{\pi\sqrt{2}\sqrt{\frac{69695}{264}}}\right) - \sum_{k=1}^{\infty}\frac{(-1)^k\left(-1+\frac{0.0384115\exp\left(\pi\sqrt{\frac{69695}{396}}\right)}{\pi\sqrt{2}\sqrt{\frac{69695}{264}}}\right)^{-k}}{k}\right)$$

$$\frac{\log\left(-\frac{-20.2813\exp\left(\pi\sqrt{\frac{2}{3}\left(264-\frac{1}{264}\right)}\right)}{\left(2\pi\sqrt{2}\right)264\sqrt{264-\frac{1}{264}}}\right)}{e} = \left(I_0(-1)+2\sum_{k=1}^{\infty} I_k(-1)\right) \left(\log\left(-1+\frac{0.0384115\exp\left(\pi\sqrt{\frac{69695}{396}}\right)}{\pi\sqrt{2}\sqrt{\frac{69695}{264}}}\right) - \sum_{k=1}^{\infty}\frac{(-1)^k\left(-1+\frac{0.0384115\exp\left(\pi\sqrt{\frac{69695}{396}}\right)}{\pi\sqrt{2}\sqrt{\frac{69695}{264}}}\right)^{-k}}{k}\right)$$

Integral representations:

$$\frac{\log\left(-\frac{-20.2813\exp\left(\pi\sqrt{\frac{2}{3}\left(264-\frac{1}{264}\right)}\right)}{\left(2\pi\sqrt{2}\right)264\sqrt{264-\frac{1}{264}}}\right)}{e} = \frac{1}{e}\int_1^{\frac{0.0384115\exp\left(\pi\sqrt{\frac{69695}{396}}\right)}{\pi\sqrt{2}\sqrt{\frac{69695}{264}}}} \frac{1}{t}\,dt$$

$$\frac{\log\left(-\frac{-20.2813\exp\left(\pi\sqrt{\frac{2}{3}\left(264-\frac{1}{264}\right)}\right)}{\left(2\pi\sqrt{2}\right)264\sqrt{264-\frac{1}{264}}}\right)}{e} = \frac{1}{2 e i \pi}\int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{\Gamma(-s)^2\,\Gamma(1+s)\left(-1+\frac{0.0384115\exp\left(\pi\sqrt{\frac{69695}{396}}\right)}{\pi\sqrt{2}\sqrt{\frac{69695}{264}}}\right)^{-s}}{\Gamma(1-s)}\,ds \quad \text{for } -1<\gamma<0$$

1/3 ln -((1/(2Pi*sqrt2) * (-20.7492*1/(276)))*(1/(sqrt(276-1/276))exp(Pi*((sqrt(2/3(276-1/276)))))

Input interpretation:

$$\frac{1}{3}\log\left(-\left(\left(\frac{1}{2\pi\sqrt{2}}\left(-20.7492\times\frac{1}{276}\right)\right)\times\frac{1}{\sqrt{276-\frac{1}{276}}}\exp\left(\pi\sqrt{\frac{2}{3}\left(276-\frac{1}{276}\right)}\right)\right)\right)$$

log(x) is the natural logarithm

Result:

11.677273...

11.677273… result very near to the black hole entropy 11.8458

Alternative representations:

$$\frac{1}{3}\log\left(-\frac{-20.7492\exp\left(\pi\sqrt{\frac{2}{3}\left(276-\frac{1}{276}\right)}\right)}{\left(\left(2\pi\sqrt{2}\right)276\right)\sqrt{276-\frac{1}{276}}}\right)=\frac{1}{3}\log_e\left(\frac{20.7492\exp\left(\pi\sqrt{\frac{2}{3}\left(276-\frac{1}{276}\right)}\right)}{276\left(2\pi\sqrt{2}\right)\sqrt{276-\frac{1}{276}}}\right)$$

$$\frac{1}{3}\log\left(-\frac{-20.7492\exp\left(\pi\sqrt{\frac{2}{3}\left(276-\frac{1}{276}\right)}\right)}{\left(\left(2\pi\sqrt{2}\right)276\right)\sqrt{276-\frac{1}{276}}}\right)=$$

$$\frac{1}{3}\log(a)\log_a\left(\frac{20.7492\exp\left(\pi\sqrt{\frac{2}{3}\left(276-\frac{1}{276}\right)}\right)}{276\left(2\pi\sqrt{2}\right)\sqrt{276-\frac{1}{276}}}\right)$$

Series representation:

$$\frac{1}{3}\log\left(-\frac{-20.7492\exp\left(\pi\sqrt{\frac{2}{3}\left(276-\frac{1}{276}\right)}\right)}{\left(\left(2\pi\sqrt{2}\right)276\right)\sqrt{276-\frac{1}{276}}}\right)=$$

$$\frac{1}{3}\log\left(-1+\frac{0.0375891\exp\left(\pi\sqrt{\frac{76175}{414}}\right)}{\pi\sqrt{2}\sqrt{\frac{76175}{276}}}\right)-\frac{1}{3}\sum_{k=1}^{\infty}\frac{(-1)^k\left(-1+\frac{0.0375891\exp\left(\pi\sqrt{\frac{76175}{414}}\right)}{\pi\sqrt{2}\sqrt{\frac{76175}{276}}}\right)^{-k}}{k}$$

Integral representations:

$$\frac{1}{3}\log\left(-\frac{-20.7492\exp\left(\pi\sqrt{\frac{2}{3}\left(276-\frac{1}{276}\right)}\right)}{\left(\left(2\pi\sqrt{2}\right)276\right)\sqrt{276-\frac{1}{276}}}\right)=\frac{1}{3}\int_1^{\frac{0.0375891\exp\left(\pi\sqrt{\frac{76175}{414}}\right)}{\pi\sqrt{2}\sqrt{\frac{76175}{276}}}}\frac{1}{t}\,dt$$

$$\frac{1}{3}\log\left(-\frac{-20.7492\exp\left(\pi\sqrt{\frac{2}{3}\left(276-\frac{1}{276}\right)}\right)}{\left(\left(2\pi\sqrt{2}\right)276\right)\sqrt{276-\frac{1}{276}}}\right)=$$

$$\frac{1}{6i\pi}\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{\Gamma(-s)^2\,\Gamma(1+s)\left(-1+\frac{0.0375891\exp\left(\pi\sqrt{\frac{76175}{414}}\right)}{\pi\sqrt{2}\sqrt{\frac{76175}{276}}}\right)^{-s}}{\Gamma(1-s)}\,ds \quad \text{for } -1<\gamma<0$$

We note that:

Input interpretation:

5.7964 – 4.04426   12 - 24

Result:

1.75214

1.75214

Input interpretation:

8.35955 – 7.1818 36 - 48

Result:

1.17775

1.17775

Input interpretation:

10.344268 – 9.40098 60 - 72

Result:

0.943288

0.943288

Input interpretation:

11.212685 – 10.344268 72 - 84

Result:

0.868417

0.868417

....

Input interpretation:

20.7492 – 20.28126 264 - 276

Result:

0.46794

0.46794

From 12 to 276, we obtain the above differences that tend to decrease for n that tends to infinity. Also the divisions between a result and the previous one, tend to decrease for n that tends to infinity.

We have that:

$$p(n) \sim \frac{1}{2\pi\sqrt{2}} \sum_{k=1}^{v} A_k(n)\sqrt{k} \frac{d}{dn} \left(\frac{1}{\sqrt{n-\frac{1}{24}}} \exp\left[\frac{\pi}{k} \sqrt{\frac{2}{3}\left(n - \frac{1}{24}\right)} \right] \right)$$

For n = 12 and k = 1 $\sum_{k=1}^{v} A_k(n)\sqrt{k} \frac{d}{dn}$ is equal to -4.04426 / 12 = - 0.337021666...

For n = 24 and k = 1 $\sum_{k=1}^{v} A_k(n)\sqrt{k} \frac{d}{dn}$ is equal to -5.7964 / 24 = - 0.241516666...

For n = 36 and k = 1 $\sum_{k=1}^{v} A_k(n)\sqrt{k} \frac{d}{dn}$ is equal to -7.1818 / 36 = - 0.199494444...

For n = 48 and k = 1 $\sum_{k=1}^{v} A_k(n)\sqrt{k} \frac{d}{dn}$ is equal to -8.35955 / 48 = - 0.174157291666...

For n = 60 and k = 1 $\sum_{k=1}^{v} A_k(n)\sqrt{k} \frac{d}{dn}$ is equal to -9.40098/ 60 = - 0.156683

For n = 72 and k = 1 $\sum_{k=1}^{v} A_k(n)\sqrt{k} \frac{d}{dn}$ is equal to -10.344268 / 72 = - 0.1436703888...

For n = 84 and k = 1 $\sum_{k=1}^{v} A_k(n)\sqrt{k}\frac{d}{dn}$ is equal to -11.212685 / 84 = - 0.133484345...

For n = 264 and k = 1 $\sum_{k=1}^{v} A_k(n)\sqrt{k}\frac{d}{dn}$ is equal to -20.28126 / 264 = - 0.076822954...

For n = 276 and k = 1 $\sum_{k=1}^{v} A_k(n)\sqrt{k}\frac{d}{dn}$ is equal to -20.7492 / 276 = - 0.0751782608...

For a fixed positive integer N, how many states are there with $\widehat{N}$ eigenvalue equal to N? This number, denoted as $p(N)$, is so important that it has been given a name: the *partitions* of N.

Assume the string can vibrate in d transverse directions. Then, for each frequency $\ell\omega_0$, we must have d harmonic oscillators representing the possible polarizations of the motion.

From Wikipedia:

***Polarization** (also **polarisation**) is a property applying to transverse waves that specifies the geometrical orientation of the oscillations. In a transverse wave, the direction of the oscillation is perpendicular to the direction of **motion** of the wave.*

Thence, the results of p(n) can be considered the numbers of oscillations of strings in d transverse directions

From p(24), where 24 is a number of eigenvalues, we obtain:

$$-\left(\frac{1}{24}\left(\frac{1}{2\pi\sqrt{2}}\times(-5.7964)\right)\right)\times\frac{1}{\sqrt{24-\frac{1}{24}}}\exp\left(\pi\sqrt{\frac{2}{3}\left(24-\frac{1}{24}\right)}\right)$$

= 1575.03... numbers of string oscillations in transverse directions

And:

$$\pi \log\left(-\left(\frac{1}{24}\left(\frac{1}{2\pi\sqrt{2}}\times(-5.7964)\right)\right)\times\frac{1}{\sqrt{24-\frac{1}{24}}}\exp\left(\pi\sqrt{\frac{2}{3}\left(24-\frac{1}{24}\right)}\right)\right)$$

= 23.1285...

Inserting the entropy value 23.1285 in the Hawking radiation calculator, we obtain:

Mass = 2.95273e-8

Radius = 4.38530e-35

Temperature = 4.15532e+30

We note that this black hole has a mass of $2.95273*10^{-8}$ kg

From the Ramanujan-Nardelli mock formula, we obtain:

sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(2.95273e-8)* sqrt[[-((((4.15532e+30 * 4*Pi*(4.38530e-35)^3-(4.38530e-35)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{1\Big/\left(\frac{4\times1.962364415\times10^{19}}{5\times0.0864055^2}\times\frac{1}{2.95273\times10^{-8}}\sqrt{-\frac{4.15532\times10^{30}\times4\pi\,(4.38530\times10^{-35})^3-(4.38530\times10^{-35})^2}{6.67\times10^{-11}}}\right)}$$

Result:

1.618076843440660282683814617115165077285594400292711475566...

1.618076843…

And:

1/sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(2.95273e-8)* sqrt[[-((((4.15532e+30 * 4*Pi*(4.38530e-35)^3-(4.38530e-35)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\frac{1}{\sqrt{\frac{1}{\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times \frac{1}{2.95273\times 10^{-8}}\sqrt{-\frac{4.15532\times 10^{30}\times 4\,\pi\,(4.38530\times 10^{-35})^3-(4.38530\times 10^{-35})^2}{6.67\times 10^{-11}}}}}}$$

Result:

0.618017620148132965278426744937286756630527099513911026682...

0.61801762014…

Appendix

From:

Chapter 16 String thermodynamics and black holes

http://fma.if.usp.br/~amsilva/Livros/Zwiebach/chapter16.pdf

$$\ln p(N) \simeq 2\pi\sqrt{\frac{N}{6}}\,. \tag{16.2.29}$$

This was our goal, an estimate of $\ln p(N)$ for large N. Indeed, we must require large N since

$$N = \frac{E}{\hbar\omega_0} = \frac{\pi^2}{6}\left(\frac{kT}{\hbar\omega_0}\right)^2 >> 1\,, \tag{16.2.30}$$

because of our high temperature assumption (16.2.17).

The result (16.2.29) is only the leading term of the celebrated Hardy-Ramanujan asymptotic expansion of $p(N)$:

$$\boxed{p(N) \simeq \frac{1}{4N\sqrt{3}}\exp\Big(2\pi\sqrt{\frac{N}{6}}\Big)\,.} \tag{16.2.31}$$

This is not an exact formula either, but is an accurate estimate of $p(N)$, as opposed to our accurate estimate of the logarithm of $p(N)$. We will not give here a derivation of the Hardy-Ramanujan result. It is fun, however, to test the accuracy of the Hardy-Ramanujan expansion. In Table 16.2 we compare the values of $p(N)$, as calculated exactly, with the estimate $p_{\rm est}(N)$ provided by (16.2.31). The estimate gives an error of about one-half of a percent for $N = 10000$.

We now need a minor generalization of (16.2.31). Assume the string can vibrate in d transverse directions. Then, for each frequency $\ell\omega_0$, we must have d harmonic oscillators representing the possible polarizations of the motion. Furthermore, the associated occupation numbers need a superscript labelling the d polarizations:

$$\begin{array}{cccc} n_1^{(1)} & n_1^{(2)} & \dots & n_1^{(d)} \\ n_2^{(1)} & n_2^{(2)} & \dots & n_2^{(d)} \\ \dots & \dots & \dots & \dots \\ n_l^{(1)} & n_l^{(2)} & \dots & n_l^{(d)} \\ \dots & \dots & \dots & \dots \end{array} \tag{16.2.32}$$

In order to sum over all possible states in the new partition function Z_d, we must sum over all possible values of the occupation numbers $n_k^{(q)}$, where

N	$p(N)$	$p(N)_{\text{est}}$	$p(N)/p_{\text{est}}(N)$
5	7	8.94	0.7829
10	42	48.10	0.8731
100	190569292	199281893.25	0.9563
1000	2.406×10^{31}	2.440×10^{31}	0.9860
10000	3.617×10^{106}	3.633×10^{106}	0.9956

Table 16.2: Comparing the exact values of $p(N)$ with the estimate $p(N)_{\text{est}}$ provided by the Hardy-Ramanujan formula.

$k = 1, 2, \ldots, \infty$, and $q = 1, 2, \ldots, d$. This gives

$$Z_d = \sum_{n_k^{(1)}, \ldots, n_k^{(d)}} \exp\Big[-\frac{\hbar\omega_0}{kT} \sum_{\ell=0}^{\infty} \sum_{q=1}^{d} \ell n_\ell^{(q)}\Big] . \tag{16.2.33}$$

The sums over the various $n^{(q)}$ factorize, so,

$$Z_d = \sum_{n_k^{(1)}} \exp\Big[-\frac{\hbar\omega_0}{kT} \sum_{\ell=0}^{\infty} \ell n_\ell^{(1)}\Big] \ldots \sum_{n_k^{(d)}} \exp\Big[-\frac{\hbar\omega_0}{kT} \sum_{\ell=0}^{\infty} \ell n_\ell^{(d)}\Big] . \tag{16.2.34}$$

Each factor here is equal to the previously calculated partition function Z. We therefore have

$$Z_d = (Z)^d . \tag{16.2.35}$$

The new free energy F_d is also easy to calculate:

$$F_d = -kT \ln Z_d = -kT\, d \ln Z = F\, d . \tag{16.2.36}$$

Let us call $p_d(N)$ the number of partitions of N when we have a d-fold degeneracy. This means, for example, that the partition $\{3, 2, 1\}$ of 6 now gives rise to many partitions written like $\{3_{p_1}, 2_{p_2}, 1_{p_3}\}$, where we include subscripts p_i that can take all possible values from one to d. A partition with different subscripts is considered a different partition. We now see that, for a given energy, with associated number N, the number of states is $p_d(N)$. Therefore $S_d = k \ln p_d(N)$, and comparing with (16.2.39) we conclude that for large N

$$\ln p_d(N) \simeq 2\pi\sqrt{\frac{Nd}{6}}\,. \qquad (16.2.40)$$

The more accurate version of this result can be shown to be

$$p_d(N) \simeq \frac{1}{\sqrt{2}}\left(\frac{d}{24}\right)^{(d+1)/4} N^{-(d+3)/4} \exp\left(2\pi\sqrt{\frac{Nd}{6}}\right). \qquad (16.2.41)$$

You can see that for $d = 1$ this reduces to $p(N)$, as given in (16.2.31). For $d = 24$, the number of transverse light-cone directions in the bosonic string, the expression simplifies a little:

$$\boxed{p_{24}(N) \simeq \frac{1}{\sqrt{2}} N^{-27/4} \exp\left(4\pi\sqrt{N}\right).} \qquad (16.2.42)$$

Emergent Gravity and the Dark Universe
Erik Verlinde - arXiv:1611.02269v2 [hep-th] 8 Nov 2016

We have that:

$$S_M(r) = -\frac{2\pi Mr}{\hbar},$$

We take the mass of SMBH M87. We know that the radius of SMBH87, by the Hawking Radiation Calculator, is equal to 1.94973e+13. From the above formula, we obtain:

(((-2Pi*(13.12806e+39)*(1.94973e+13)))) / (1.054571817e-34)

Input interpretation:

$$\frac{-2\pi \times 13.12806\times10^{39}\times1.94973\times10^{13}}{1.054571817\times10^{-34}}$$

Result:

$-1.52503... \times 10^{88}$

-1.52503…*10^{88}

We observe that:

(((-2x*(13.12806e+39)*(1.94973e+13)))) / (1.054571817e-34) = -1.52503e+88

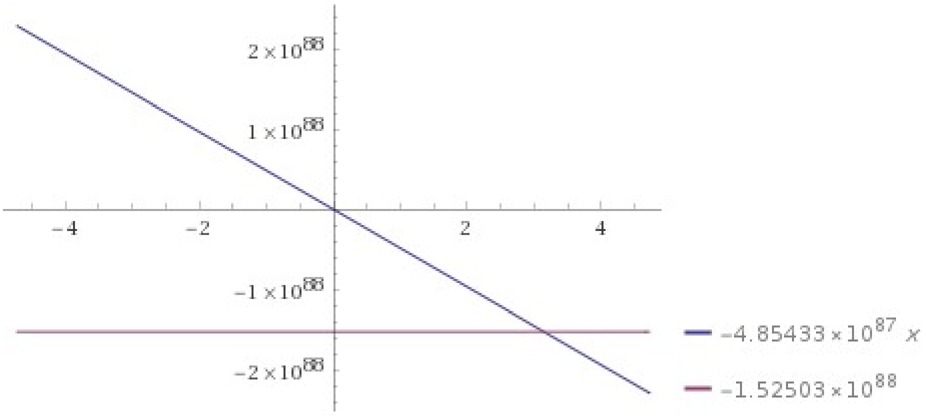
Input interpretation:

$$\frac{-2x \times 13.12806\times10^{39}\times1.94973\times10^{13}}{1.054571817\times10^{-34}} = -1.52503\times10^{88}$$

Result:

$-4.85433\times10^{87}x = -1.52503\times10^{88}$

Plot:



Alternate form:

$1.52503\times10^{88} - 4.85433\times10^{87}x = 0$

Alternate form assuming x is real:

$0 - 4.85433\times10^{87}x = -1.52503\times10^{88}$

Solution:

$x \approx 3.14159$

3.14159 = π

Furthermore, we have also that:

ln((((((-2Pi*(13.12806e+39)*(1.94973e+13)))) / (1.054571817e-34)))) - 64 + 1/golden ratio

Input interpretation:

$$\log\left(\frac{-2\pi\times 13.12806\times 10^{39}\times 1.94973\times 10^{13}}{1.054571817\times 10^{-34}}\right)-64+\frac{1}{\phi}$$

log(x) is the natural logarithm

ϕ is the golden ratio

Result:

139.6675... +
3.141593... i

Polar coordinates:

r = 139.703 (radius), θ = 1.28856° (angle)

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

The mass corresponding to the value of the entropy that we have obtained, -1.52503…*10^{88}, is -7.58210e+35. Performing the ratio between the two masses, we obtain:

13.12806e+39 / (-7.58210e+35)

Input interpretation:

$$-\frac{13.12806\times 10^{39}}{7.58210\times 10^{35}}$$

Result:

−17314.54346421176191292649793592804104403793144379525461 28...

-17314.543464…..

We have also that:

sqrt(-(13.12806e+39 / (-7.58210e+35))) + 7+1/golden ratio

where 7 is a Lucas number

Input interpretation:

$$\sqrt{-\left(-\frac{13.12806\times10^{39}}{7.58210\times10^{35}}\right)}+7+\frac{1}{\phi}$$

ϕ is the golden ratio

Result:

139.203...

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

And:

Input interpretation:

$$\frac{1}{4\pi}\left(-\left(-\frac{13.12806\times10^{39}}{7.58210\times10^{35}}\right)\right)+11-\phi$$

where 11 is a Lucas number

ϕ is the golden ratio

Result:

1387.23...

1387.23... result practically equal to the rest mass of Sigma baryon 1387.2

With regard the previous result -1.52503…*10^{88}, we note that utilizing the following Ramanujan expression concerning the structure of highly composite numbers:

$$2^8\cdot3^4\cdot5^3\cdot7^2\cdot11\cdot13\cdots41$$

this written expression in full becomes:

2^8 *3^4 *5^3 *7^2 *11*13*17*19*23*29*31*37*41*43 from which, we obtain:

(Pi+1/(sqrt2))*(2^8*3^4*5^3*7^2*11*13*17*19*23*29*31*37*41*43)^4

Input:

$$\left(\pi+\frac{1}{\sqrt{2}}\right)(2^8\times3^4\times5^3\times7^2\times11\times13\times17\times19\times23\times29\times31\times37\times41\times43)^4$$

Exact result:

3 919 627 577 226 453 593 242 808 213 608 713 624 862 166 388 230 066 934 279 044 383 326 203 805 696 000 000 000 000 $\left(\frac{1}{\sqrt{2}} + \pi\right)$

Decimal approximation:

1.5085468441005209897585611404827767171264435170154498... × 10^{88}

1.5085468441…*10^{88}

Property:

3 919 627 577 226 453 593 242 808 213 608 713 624 862 166 388 230 066 934 279 044 383 326 203 805 696 000 000 000 000 $\left(\frac{1}{\sqrt{2}} + \pi\right)$ is a transcendental number

Alternate forms:

1 959 813 788 613 226 796 621 404 106 804 356 812 431 083 194 115 033 467 139 522 191 663 101 902 848 000 000 000 000 $\left(\sqrt{2} + 2\pi\right)$

1 959 813 788 613 226 796 621 404 106 804 356 812 431 083 194 115 033 467 139 522 191 663 101 902 848 000 000 000 000 $\sqrt{2}$ + 3 919 627 577 226 453 593 242 808 213 608 713 624 862 166 388 230 066 934 279 044 383 326 203 805 696 000 000 000 000 π

1 959 813 788 613 226 796 621 404 106 804 356 812 431 083 194 115 033 467 139 522 191 663 101 902 848 000 000 000 000 $\sqrt{2}\left(1 + \sqrt{2}\,\pi\right)$

With regard the result of the ratio -17314.543464….., utilizing the formula for the Coefficients of the '5th order' mock theta function $\psi_1(q)$, for n = 274, we obtain, subtracting 76, 29 and 4 that are Lucas numbers:

sqrt(golden ratio) * exp(Pi*sqrt(274/15)) / (2*5^(1/4)*sqrt(274))-76-29-4

Input:

$$\sqrt{\phi} \times \frac{\exp\left(\pi \sqrt{\frac{274}{15}}\right)}{2\sqrt[4]{5}\,\sqrt{274}} - 76 - 29 - 4$$

ϕ is the golden ratio

Exact result:

$$\frac{e^{\sqrt{274/15}\,\pi}\sqrt{\frac{\phi}{274}}}{2\sqrt[4]{5}} - 109$$

Decimal approximation:

17314.09251881529671152737488340170088177941110633473803720...

17314.092518....

Property:

$$-109+\frac{e^{\sqrt{274/15}\,\pi}\sqrt{\frac{\phi}{274}}}{2\sqrt[4]{5}} \text{ is a transcendental number}$$

Alternate forms:

$$\frac{1}{4}\sqrt{\frac{1}{685}\left(5+\sqrt{5}\right)}\,e^{\sqrt{274/15}\,\pi}-109$$

$$\frac{\sqrt{\frac{1}{137}\left(1+\sqrt{5}\right)}\,e^{\sqrt{274/15}\,\pi}}{4\sqrt[4]{5}}-109$$

$$\frac{5^{3/4}\sqrt{137\left(1+\sqrt{5}\right)}\,e^{\sqrt{274/15}\,\pi}-298660}{2740}$$

Series representations:

$$\frac{\sqrt{\phi}\exp\left(\pi\sqrt{\frac{274}{15}}\right)}{2\sqrt[4]{5}\sqrt{274}}-76-29-4=\left(-1090\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(274-z_0)^k z_0^{-k}}{k!}+5^{3/4}\exp\left(\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{274}{15}-z_0\right)^k z_0^{-k}}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(\phi-z_0)^k z_0^{-k}}{k!}\right)\Big/\left(10\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(274-z_0)^k z_0^{-k}}{k!}\right) \text{ for not } ((z_0\in\mathbb{R} \text{ and } -\infty<z_0\le 0))$$

$$\frac{\sqrt{\phi}\exp\left(\pi\sqrt{\frac{274}{15}}\right)}{2\sqrt[4]{5}\sqrt{274}} - 76 - 29 - 4 = \left(-1090\exp\left(i\pi\left\lfloor\frac{\arg(274-x)}{2\pi}\right\rfloor\right)\sum_{k=0}^{\infty}\frac{(-1)^k (274-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!} + 5^{3/4}\exp\left(i\pi\left\lfloor\frac{\arg(\phi-x)}{2\pi}\right\rfloor\right)\exp\left(\pi\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{274}{15}-x\right)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{274}{15}-x\right)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k(\phi-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right) / \left(10\exp\left(i\pi\left\lfloor\frac{\arg(274-x)}{2\pi}\right\rfloor\right)\sum_{k=0}^{\infty}\frac{(-1)^k (274-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right) \text{ for } (x \in \mathbb{R} \text{ and } x < 0)$$

$$\frac{\sqrt{\phi}\exp\left(\pi\sqrt{\frac{274}{15}}\right)}{2\sqrt[4]{5}\sqrt{274}} - 76 - 29 - 4 = \left(\left(\frac{1}{z_0}\right)^{-1/2\lfloor\arg(274-z_0)/(2\pi)\rfloor} z_0^{-1/2\lfloor\arg(274-z_0)/(2\pi)\rfloor}\left(-1090\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(274-z_0)/(2\pi)\rfloor} z_0^{1/2\lfloor\arg(274-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(274-z_0)^k z_0^{-k}}{k!} + 5^{3/4}\exp\left(\pi\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(\frac{274}{15}-z_0\right)/(2\pi)\right\rfloor} z_0^{1/2\left(1+\left\lfloor\arg\left(\frac{274}{15}-z_0\right)/(2\pi)\right\rfloor\right)}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{274}{15}-z_0\right)^k z_0^{-k}}{k!}\right)\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(\phi-z_0)/(2\pi)\rfloor} z_0^{1/2\lfloor\arg(\phi-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(\phi-z_0)^k z_0^{-k}}{k!}\right)\right) / \left(10\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(274-z_0)^k z_0^{-k}}{k!}\right)$$

For the previous mass 13.12806e+39, we have the following A(r) = 4.77706e+27. Now:

$$\varepsilon^2(r) = \frac{1}{A(r)}\frac{dV_M(r)}{dr} = \frac{1}{A(r)}\frac{8\pi G}{a_0}\frac{M}{d-1}$$

$$\Sigma_D(r) = \frac{a_0}{8\pi G}\,\varepsilon(r)$$

$$\Sigma_B(r) = \frac{M}{A(r)}.$$

$$\Sigma_D(r)^2 = \frac{a_0}{8\pi G}\frac{\Sigma_B(r)}{d-1}.$$

From:

$$\Sigma_B(r) = \frac{M}{A(r)}.$$

for d = 4 and a_0 = 1, we have that:

(13.12806e+39) / (4.77706e+27)

Input interpretation:

$$\frac{13.12806 \times 10^{39}}{4.77706 \times 10^{27}}$$

Result:

$2.748146349428309462305267256429686878540357458353045 5\ldots \times 10^{12}$

$2.7481463494283\ldots*10^{12}$

And:

$$\Sigma_D(r)^2 = \frac{a_0}{8\pi G}\frac{\Sigma_B(r)}{d-1}.$$

1/(8Pi*6.67430e-11) * (2.7481463494283e+12)/3

Input interpretation:

$$\frac{1}{8\pi\times 6.67430\times 10^{-11}}\times\frac{2.7481463494283\times 10^{12}}{3}$$

Result:

$5.46101... \times 10^{20}$

$5.46101...*10^{20}$

From the above Ramanujan expression, we obtain:

(2^8*3^4*5^3*7^2*11*13*17*19*23*29*31*37*41*43)*1/(29*1/2)

Where 29 is a Lucas number

Input:

$$(2^8\times 3^4\times 5^3\times 7^2\times 11\times 13\times 17\times 19\times 23\times 29\times 31\times 37\times 41\times 43)\times\frac{1}{29\times\frac{1}{2}}$$

Exact result:

545 686 486 440 967 872 000

Scientific notation:

$5.45686486440967872 \times 10^{20}$

$5.45686486440967872 * 10^{20}$

From the previous formula

$$\Sigma_D(r)^2 = \frac{a_0}{8\pi G}\frac{\Sigma_B(r)}{d-1}.$$

We obtain also:

golden ratio^2 * ln(((1/(8Pi*6.67430e-11) * (2.7481463494283e+12)/3)))

Input interpretation:

$$\phi^2 \log\left(\frac{1}{8\pi\times 6.67430\times 10^{-11}}\times\frac{2.7481463494283\times 10^{12}}{3}\right)$$

log(x) is the natural logarithm

ϕ is the golden ratio

Result:

125.00938...

125.00938… result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0 and to the Higgs boson mass 125.18 GeV

And:

Pi* ln(((1/(8Pi*6.67430e-11) * (2.7481463494283e+12)/3))) - 11+1/golden ratio

Where 11 is a Lucas number

Input interpretation:

$$\pi \log\left(\frac{1}{8\pi\times 6.67430\times 10^{-11}}\times\frac{2.7481463494283\times 10^{12}}{3}\right) - 11 + \frac{1}{\phi}$$

ϕ is the golden ratio

Result:

139.62700...

139.62700... result practically equal to the rest mass of Pion meson 139.57 MeV

And also:

(29+7)* ln(((1/(8Pi*6.67430e-11) * (2.7481463494283e+12)/3))) + 11- golden ratio

Input interpretation:

$$(29+7)\log\left(\frac{1}{8\pi\times 6.67430\times 10^{-11}}\times\frac{2.7481463494283\times 10^{12}}{3}\right) + 11 - \phi$$

$\log(x)$ is the natural logarithm

ϕ is the golden ratio

Result:

1728.3581...

1728.3581...

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

Zagier theorem. The number 1728 is one less than the Hardy–Ramanujan number 1729

From

$$\overline{\beta}_B(r) = -\frac{d \log \overline{\rho}_B(r)}{d \log r}$$

And

$$\rho_D^2(r) = \left(4 - \overline{\beta}_B(r)\right) \frac{a_0}{8\pi G} \frac{\overline{\rho}_B(r)}{r}.$$

For r = 1.94973e+13

(4 + 4 ln(x)) / (4 ln(1.94973e+13)) * 1/(8Pi*6.67430e-11) * x / (1.94973e+13)

Input interpretation:

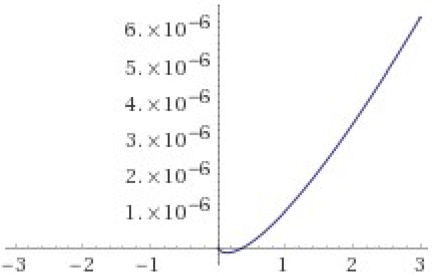
$$\frac{4 + 4 \log(x)}{4 \log(1.94973 \times 10^{13})} \times \frac{1}{8 \pi \times 6.67430 \times 10^{-11}} \times \frac{x}{1.94973 \times 10^{13}}$$

log(x) is the natural logarithm

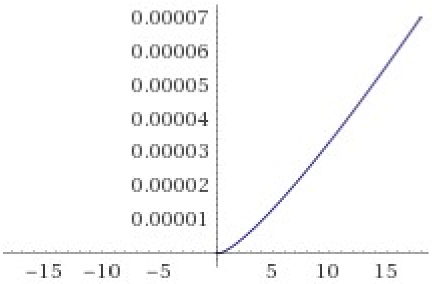
Result:

$2.49793 \times 10^{-7} x (4 \log(x) + 4)$

Plots:



(x from −3 to 3)



(x from −18 to 18)

Alternate forms:

$9.99172\times10^{-7}\,x\,(\log(x)+1)$

$9.99172\times10^{-7}\,x+9.99172\times10^{-7}\,x\log(x)$

Alternate form assuming x>0:

$x\,(9.99172\times10^{-7}\log(x)+9.99172\times10^{-7})$

Root:

$x\approx0.367879$

$0.367879=\bar{\rho}_B(r)$

Properties as a real function:

Domain

$\{x\in\mathbb{R}: x>0\}$ (all positive real numbers)

Range

$\{y\in\mathbb{R}: y\geq-\frac{312241143468497}{312500000000000000000\,e^2}\}$

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

Derivative:

$\frac{d}{dx}(2.49793\times10^{-7}\,x\,(4\log(x)+4))=9.99172\times10^{-7}\log(x)+1.99834\times10^{-6}$

Indefinite integral:

$\int\frac{(4+4\log(x))\,x}{(4\log(1.94973\times10^{13}))(8\pi\,6.67430\times10^{-11})\,1.94973\times10^{13}}\,dx=$

$x^2\,(4.99586\times10^{-7}\log(x)+2.49793\times10^{-7})$ + constant

(assuming a complex-valued logarithm)

Global minimum:

$\min\{2.49793\times10^{-7}\,x\,(4\log(x)+4)\}=-\frac{10102}{10110374837\,e^2}$ at $x=\frac{1}{e^2}$

Definite integral after subtraction of diverging parts:

$\int_0^\infty(2.49793\times10^{-7}\,x\,(4+4\log(x))-x\,(9.99172\times10^{-7}+9.99172\times10^{-7}\log(x)))\,dx=0$

Thence:

(4 + 4 ln(0.367879)) / (4 ln(1.94973e+13)) * 1/(8Pi*6.67430e-11) * 0.367879 / (1.94973e+13)

Input interpretation:

$$\frac{4+4\log(0.367879)}{4\log(1.94973\times 10^{13})}\times\frac{1}{8\pi\times 6.67430\times 10^{-11}}\times\frac{0.367879}{1.94973\times 10^{13}}$$

log(x) is the natural logarithm

Result:

$-4.40806\ldots \times 10^{-13}$

-4.40806…*10^-13

From

$$\overline{\beta}_D(r) = -\frac{d\log\overline{\rho}_D(r)}{d\log r}.$$

(((-4 ln ((-4.4086e-13)^1/2)))) / (((4 ln(1.94973e+13))))

Input interpretation:

$$\frac{-4\log\left(\sqrt{-4.4086\times 10^{-13}}\right)}{4\log(1.94973\times 10^{13})}$$

log(x) is the natural logarithm

Result:

$0.464850\ldots -$
$0.0513310\ldots\, i$

Polar coordinates:

$r = 0.467676$ (radius), $\theta = -6.30135°$ (angle)

0.467676

Now:

$$\rho_D(r) = \left(1 - \frac{1}{3}\overline{\beta}_D(r)\right)\overline{\rho}_D(r).$$

(1-1/3*0.467676)* ((-4.4086e-13)^1/2)

Input interpretation:

$$\left(1+\frac{1}{3}\times(-0.467676)\right)\sqrt{-4.4086\times 10^{-13}}$$

Result:

$5.60465\ldots \times 10^{-7}\, i$

Polar coordinates:

$r = 5.60465 \times 10^{-7}$ (radius), $\theta = 90°$ (angle)

5.60465*10^-7

And:

((((1-1/3*0.467676)* ((-4.4086e-13)^1/2))))^2

Input interpretation:

$$\left(\left(1 + \frac{1}{3} \times (-0.467676)\right) \sqrt{-4.4086 \times 10^{-13}}\right)^2$$

Result:

$-3.1412082464363104 \times 10^{-13}$

Repeating decimal:

$-3.14120824643631040000000000000 \times 10^{-13}$

-3.14120824643631040000000000000 * 10^-13

From the ratio of the two expression, we obtain:

((((4 + 4 ln(0.367879)) / (4 ln(1.94973e+13)) * 1/(8Pi*6.67430e-11) * 0.367879 / (1.94973e+13)))) *1/((((1-1/3*0.467676)* ((-4.4086e-13)^1/2))))^2

Input interpretation:

$$\left(\frac{4 + 4 \log(0.367879)}{4 \log(1.94973 \times 10^{13})} \times \frac{1}{8\pi \times 6.67430 \times 10^{-11}} \times \frac{0.367879}{1.94973 \times 10^{13}}\right) \times \frac{1}{\left(\left(1 + \frac{1}{3} \times (-0.467676)\right) \sqrt{-4.4086 \times 10^{-13}}\right)^2}$$

log(x) is the natural logarithm

Result:

1.4032999504509730183397986713015518342092860669556877812 99...

1.40329995045…..

Possible closed forms:

$\frac{2371\pi}{5308} \approx 1.40329995\,88661$

$\sqrt{\frac{1}{15}(5 - e + 10\pi - 6\log(2))} \approx 1.40329995\,90032$

$\log\left(\frac{1}{11}\left(-2\sqrt{2} + 10e + e^2 + \pi + \pi^2\right)\right) \approx 1.40329995\,00782$

$-e^{4/e+e-2/\pi-2\pi}\,\pi^{5-e}\sec(e\pi) \approx 1.4032999\,37845$

$\frac{567}{10\sqrt{11}\,e^{5/2}} \approx 1.40329995\,58796$

$\frac{50 + 117e - 40e^2}{19e} \approx 1.4032999\,43168$

$\frac{\sqrt[6]{2}\,\sqrt[3]{3e}\,\log(2)}{\log^{7/6}(3)} \approx 1.40329995\,47294$

root of $11x^3 - 60x^2 - 13x + 106$ near $x = 1.4033$ $\approx 1.4032999\,49431$

$\frac{-7e\,e! + 9 + 11e + 15e^2}{18e} \approx 1.4032999\,47940$

π root of $174x^3 + 16x^2 - 15x - 12$ near $x = 0.446684$ $\approx 1.40329995\,22749$

$\frac{1}{\text{root of } 106x^3 - 13x^2 - 60x + 11 \text{ near } x = 0.712606} \approx 1.4032999\,49431$

$\frac{1}{12}\left(4e^{\pi} - 17\pi + 9\log(\pi) - 15\log(2\pi) - 4\tan^{-1}(\pi)\right) \approx 1.4032999\,47823$

$\sqrt[3]{\frac{1}{13}(-15 + 29e - 8\pi - 4\log(2))} \approx 1.4032999\,48088$

π root of $6x^4 - 16x^3 - 30x^2 - 22x + 17$ near $x = 0.446684$ $\approx 1.4032999\,48896$

$\frac{-1 + 15\pi + 2\pi^2}{2(-3 - \pi + 3\pi^2)} \approx 1.4032999\,44844$

And:

2/(golden ratio^2+e)[((((4 + 4 ln(0.367879)) / (4 ln(1.94973e+13)) * 1/(8Pi*6.67430e-11) * 0.367879 / (1.94973e+13)))) *1/((((1-1/3*0.467676)* ((-4.4086e-13)^1/2))))^2]

Input interpretation:

$$\frac{2}{\phi^2+e}\left(\left(\frac{4+4\log(0.367879)}{4\log(1.94973\times 10^{13})}\times\frac{1}{8\pi\times 6.67430\times 10^{-11}}\times\frac{0.367879}{1.94973\times 10^{13}}\right)\times\frac{1}{\left(\left(1+\frac{1}{3}\times(-0.467676)\right)\sqrt{-4.4086\times 10^{-13}}\right)^2}\right)$$

log(x) is the natural logarithm

ϕ is the golden ratio

Result:

0.525943365617720407479593444177344018560924667652849694645...

0.52594336561772.... result very near to the following Rogers-Ramanujan continued fraction:

$$2\int_0^\infty \frac{t^2\,dt}{e^{\sqrt{3}t}\sinh t} = \cfrac{1}{1+\cfrac{1^3}{1+\cfrac{1^3}{3+\cfrac{2^3}{1+\cfrac{2^3}{5+\cfrac{3^3}{1+\cfrac{3^3}{7+\ldots}}}}}}} \approx 0.5269391135$$

Appendix

From:

STRING THEORY VOLUME II - Superstring Theory and Beyond

JOSEPH POLCHINSKI - Institute for Theoretical Physics

University of California at Santa Barbara

We note that:

In ten dimensions, massless particle states are classified by their behavior under the $SO(8)$ rotations that leave the momentum invariant. Take a frame with $k_0 = k_1$. In the NS sector, the massless physical states are the eight transverse polarizations forming the vector representation $\mathbf{8}_v$ of $SO(8)$. In the R sector, the massless Dirac operator becomes

$$k_0\Gamma^0 + k_1\Gamma^1 = -k_1\Gamma^0(\Gamma^0\Gamma^1 - 1) = -2k_1\Gamma^0(S_0 - \tfrac{1}{2}) . \qquad (10.5.15)$$

The physical state condition is then

$$(S_0 - \tfrac{1}{2})|s, 0; k\rangle_R u_s = 0 , \qquad (10.5.16)$$

so precisely the states with $s_0 = +\frac{1}{2}$ survive. As discussed in section B.1, we have under $SO(9,1) \to SO(1,1) \times SO(8)$ the decompositions

$$\mathbf{16} \to (+\tfrac{1}{2}, \mathbf{8}) + (-\tfrac{1}{2}, \mathbf{8}') , \qquad (10.5.17a)$$

$$\mathbf{16}' \to (+\tfrac{1}{2}, \mathbf{8}') + (-\tfrac{1}{2}, \mathbf{8}) . \qquad (10.5.17b)$$

Thus the Dirac equation leaves an $\mathbf{8}$ with $\exp(\pi i F) = +1$ and an $\mathbf{8}'$ with $\exp(\pi i F) = -1$.

The tachyonic and massless states are summarized in table 10.2. The open string spectrum has four sectors, according to the periodicity v and the world-sheet fermion number $\exp(\pi i F)$. We will use the notation NS$\pm$ and R$\pm$ to label these sectors. We will see in the next section that consistency requires us to keep only certain subsets of sectors, and that there are consistent string theories without the tachyon.

Table 10.3. *Products of $SO(8)$ representations appearing at the massless level of the closed string. The R–NS sector has the same content as the NS–R sector.*

sector	$SO(8)$ spin		tensors		dimensions
(NS+,NS+)	$\mathbf{8}_v \times \mathbf{8}_v$	=	[0] + [2] + (2)	=	$\mathbf{1} + \mathbf{28} + \mathbf{35}$
(R+,R+)	$\mathbf{8} \times \mathbf{8}$	=	[0] + [2] + $[4]_+$	=	$\mathbf{1} + \mathbf{28} + \mathbf{35}_+$
(R+,R−)	$\mathbf{8} \times \mathbf{8}'$	=	[1] + [3]	=	$\mathbf{8}_v + \mathbf{56}_t$
(R−,R−)	$\mathbf{8}' \times \mathbf{8}'$	=	[0] + [2] + $[4]_-$	=	$\mathbf{1} + \mathbf{28} + \mathbf{35}_-$
(NS+,R+)	$\mathbf{8}_v \times \mathbf{8}$			=	$\mathbf{8}' + \mathbf{56}$
(NS+,R−)	$\mathbf{8}_v \times \mathbf{8}'$			=	$\mathbf{8} + \mathbf{56}'$

Closed string spectrum

The closed string is two copies of the open string, with the momentum rescaled $k \to \frac{1}{2}k$ in the generators. With $v, \tilde{v}$ taking the values 0 and $\frac{1}{2}$, the mass-shell condition can be summarized as

$$\frac{\alpha'}{4}m^2 = N - v = \tilde{N} - \tilde{v} . \qquad (10.5.18)$$

The tachyonic and massless closed string spectrum is obtained by combining one left-moving and one right-moving state, subject to the equality (10.5.18).

From:

Three-dimensional AdS gravity and extremal CFTs at c = 8m

Spyros D. Avramis, Alex Kehagiasb and Constantina Mattheopoulou

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m	L_0	d	S	S_{BH}
3	1	196883	12.1904	12.5664
	2	21296876	16.8741	17.7715
	3	842609326	20.5520	21.7656
4	2/3	139503	11.8458	11.8477
	5/3	69193488	18.0524	18.7328
	8/3	6928824200	22.6589	23.6954
5	1/3	20619	9.9340	9.3664
	4/3	86645620	18.2773	18.7328
	7/3	24157197490	23.9078	24.7812

m	L_0	d	S	S_{BH}
6	1	42987519	17.5764	17.7715
	2	40448921875	24.4233	25.1327
	3	8463511703277	29.7668	30.7812
7	2/3	7402775	15.8174	15.6730
	5/3	33934039437	24.2477	24.7812
	8/3	16953652012291	30.4615	31.3460
8	1/3	278511	12.5372	11.8477
	4/3	13996384631	23.3621	23.6954
	7/3	19400406113385	30.5963	31.3460

Table 1: Degeneracies, microscopic entropies and semiclassical entropies for the first few values of m and L_0.

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Chapter 16 String thermodynamics and black holes

http://fma.if.usp.br/~amsilva/Livros/Zwiebach/chapter16.pdf

Emergent Gravity and the Dark Universe
Erik Verlinde - arXiv:1611.02269v2 [hep-th] 8 Nov 2016