On some Ramanujan's equations: mathematical connections with various formulas concerning some sectors of Particle Physics and Black Hole/Wormhole Physics. IV

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Abstract

In this paper we have described the mathematical connections between various Ramanujan's equations and some expressions of various topics of Particle Physics and Black Hole/Wormhole Physics

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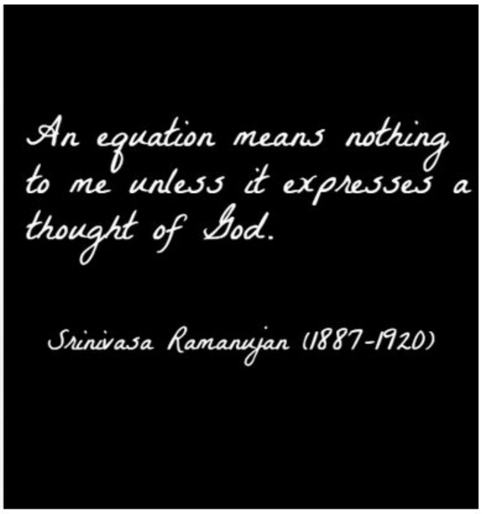


(N.O.A – Pics. from the web)

From:

Wormholes in generalized hybrid metric-Palatini gravity obeying the matter null energy condition everywhere - *Joao Luis Rosa, Jose P. S. Lemos, and Francisco S. N. Lobo* **-** arXiv:1808.08975v1 [gr-qc] 27 Aug 2018,

Morris -Thorne wormholes with a cosmological constant
Jose P. S. Lemos, Francisco S. N. Lobo, Sergio Quinet de Oliveira - arXiv:gr-qc/0302049v2 23 Dec 2003

Now, we have that:

$$\Phi(a) = \frac{1}{2}\ln\left(1 - \frac{2GM}{c^2 a} - \frac{\Lambda_{\rm ext}}{3}a^2\right), \quad (56)$$

$$b(a) = \frac{2GM}{c^2} + \frac{\Lambda_{\rm ext}}{3}a^3. \quad (57)$$

The exterior solution, $a \leq r < \infty$, is given by the following metric

$$ds^2 = -\left(1 - \frac{2(r_o a)^{1/2}}{3r} - \frac{r_o^{1/2} r^2}{3a^{5/2}}\right) c^2\,dt^2 + \frac{dr^2}{\left(1 - \frac{2(r_o a)^{1/2}}{3r} - \frac{r_o^{1/2} r^2}{3a^{5/2}}\right)} + r^2\left(d\theta^2 + \sin^2\theta\,d\phi^2\right). \quad (93)$$

The spacetime of the final solution is given by the metrics, Equations (92)-(93), which have been smoothly joined at a.

The additional parameter now is the cosmological constant, $\Lambda_{\rm ext}$, given by $\Lambda_{\rm ext} = (r_o/a^5)^{1/2}$. For instance, consider a traversal velocity $v = 0.01\,c$, so that $r_o = 5 \times 10^5$ m. If the observer traverses through the wormhole comfortably during a year, $\Delta\tau_{\rm traveler} \approx 3.16 \times 10^7$ s, and $a = 4.74 \times 10^{13}$ m. The mass of the wormhole is $M \approx 2.2 \times 10^{36}$ kg and the cosmological constant has the value $\Lambda_{\rm ext} = 4.6 \times 10^{-32}\,{\rm m}^{-2}$. The cosmological event horizon is then situated at $r_c = 8.1 \times 10^{15}$ m $\approx 200\,a$.

a = 4.74e+13

From Mwh, we obtain the following value of r: r = 3.26736e+9. Thence, we have:

M_{wh} = 2.2e+36; r_{wh} = 3.26736e+9

From the radius, we obtain:

Mass = 2.20000e+36

Radius = 3.26736e+9

Temperature = 5.57707e-14

from the Ramanujan-Nardelli mock formula, we obtain:

sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(2.20000e+36)* sqrt[[-((((5.57707e-14 * 4*Pi*(3.26736e+9)^3-(3.26736e+9)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\frac{1}{\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{2.20000\times 10^{36}}\sqrt{-\frac{5.57707\times 10^{-14}\times 4\pi\left(3.26736\times 10^9\right)^3-\left(3.26736\times 10^9\right)^2}{6.67\times 10^{-11}}}}}$$

Result:

1.618079198977871123189481727514155840933677846429431030699...

1.6180791989778…. result that is a very good approximation to the value of the golden ratio 1,618033988749...

From

$$\Phi(a) = \frac{1}{2}\ln\left(1-\frac{2GM}{c^2 a}-\frac{\Lambda_{\rm ext}}{3}a^2\right)$$

For a = 4.74e+13; M_{wh} = 2.2e+36; r_{wh} = 3.26736e+9; Λ = 1.1056e-52

1/2 ln(((((((1-((2*6.67e-11*2.2e+36))/((3e+8)^2*4.74e+13)-1/3((1.1056e-52(4.74e+13)^2))))))

Input interpretation:

$$\frac{1}{2}\log\left(1-\frac{2\times 6.67\times 10^{-11}\times 2.2\times 10^{36}}{\left(3\times 10^8\right)^2\times 4.74\times 10^{13}}-\frac{1}{3}\left(1.1056\times 10^{-52}\left(4.74\times 10^{13}\right)^2\right)\right)$$

log(x) is the natural logarithm

Result:

−0.0000343987...

-0.0000343987…

from

$$b(a) = \frac{2GM}{c^2}+\frac{\Lambda_{\rm ext}}{3}a^3 .$$

For a = 4.74e+13; M_{wh} = 2.2e+36, we obtain:

((2*6.67e-11*2.2e+36))/((3e+8)^2) + 1/3((1.1056e-52(4.74e+13)^3))

Input interpretation:

$$\frac{2\times 6.67\times 10^{-11}\times 2.2\times 10^{36}}{(3\times 10^{8})^2}+\frac{1}{3}\left(1.1056\times 10^{-52}\left(4.74\times 10^{13}\right)^3\right)$$

Result:

$3.260888888888888888889281363710136888888888888888888888... \times 10^9$

$3.260888...*10^9$

From the ratio of the two results, we obtain:

((((2*6.67e-11*2.2e+36))/((3e+8)^2) + 1/3((1.1056e-52(4.74e+13)^3)))) / -0.00003439874536562888

Input interpretation:

$$-\frac{\frac{2\times 6.67\times 10^{-11}\times 2.2\times 10^{36}}{(3\times 10^{8})^2}+\frac{1}{3}\left(1.1056\times 10^{-52}\left(4.74\times 10^{13}\right)^3\right)}{0.00003439874536562888}$$

Result:

$-9.479673907372095562544456779572545636922862997237133... \times 10^{13}$

$-9.47967390737…*10^{13}$

(((((((2*6.67e-11*2.2e+36))/((3e+8)^2) + 1/3((1.1056e-52(4.74e+13)^3)))) / -(-0.00003439874536562888)))))^1/64 - (29+7)/10^3

Input interpretation:

$$\sqrt[64]{-\frac{\frac{2\times 6.67\times 10^{-11}\times 2.2\times 10^{36}}{(3\times 10^{8})^2}+\frac{1}{3}\left(1.1056\times 10^{-52}\left(4.74\times 10^{13}\right)^3\right)}{-0.00003439874536562888}}-\frac{29+7}{10^3}$$

Result:

1.617436029040580320461527182542273196841378840853549134272...

1.61743602904…. result that is a very good approximation to the value of the golden ratio 1,618033988749...

1/10^27[((((((2*6.67e-11*2.2e+36))/((3e+8)^2) + 1/3((1.1056e-52(4.74e+13)^3)))) / -(-0.00003439874536562888))^1/64 +18/10^3]

Input interpretation:

$$\frac{1}{10^{27}}\left(\sqrt[64]{-\frac{\frac{2\times 6.67\times 10^{-11}\times 2.2\times 10^{36}}{(3\times 10^{8})^2}+\frac{1}{3}\left(1.1056\times 10^{-52}\left(4.74\times 10^{13}\right)^3\right)}{-0.00003439874536562888}}+\frac{18}{10^3}\right)$$

Result:

$1.6714360\ldots\times 10^{-27}$

1.671436…*10^{-27} result practically equal to the value of the formula:

$$m_{p'} = 2\times\frac{\eta}{R}m_P = 1.6714213\times 10^{-27}\ \text{kg}$$

that is the holographic proton mass (N. Haramein)

(((((((-(2*6.67e-11*2.2e+36))/((3e+8)^2) + 1/3((1.1056e-52(4.74e+13)^3)))) / -0.000034398745365628))))^1/(2Pi) - 29 -1

Input interpretation:

$$\sqrt[2\pi]{-\frac{-\frac{2\times 6.67\times 10^{-11}\times 2.2\times 10^{36}}{(3\times 10^{8})^2}+\frac{1}{3}\left(1.1056\times 10^{-52}\left(4.74\times 10^{13}\right)^3\right)}{0.000034398745365628}}-29-1$$

Result:

137.678…

137.678…. result practically equal to the golden angle value 137.5

(((((((-(2*6.67e-11*2.2e+36))/((3e+8)^2) + 1/3((1.1056e-52(4.74e+13)^3)))) / -0.000034398745365628))))^1/(2Pi) - (34+13)+ 5

Input interpretation:

$$\sqrt[2\pi]{-\frac{-\frac{2\times 6.67\times 10^{-11}\times 2.2\times 10^{36}}{(3\times 10^{8})^2}+\frac{1}{3}\left(1.1056\times 10^{-52}\left(4.74\times 10^{13}\right)^3\right)}{0.000034398745365628}}-(34+13)+5$$

Result:

125.678...

125.678…. result very near to the Higgs boson mass 125.18 GeV

(((((((-(2*6.67e-11*2.2e+36))/((3e+8)^2) + 1/3((1.1056e-52(4.74e+13)^3)))) / -0.000034398745365628))))^1/(2Pi) - 21 - 5 – 2

Input interpretation:

$$\sqrt[2\pi]{-\frac{-\frac{2\times 6.67\times 10^{-11}\times 2.2\times 10^{36}}{(3\times 10^{8})^2}+\frac{1}{3}\left(1.1056\times 10^{-52}\left(4.74\times 10^{13}\right)^3\right)}{0.000034398745365628}}-21-5-2$$

Result:

139.678...

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

Now, we have that:

Now we find the surface tangential pressure $\mathcal{P}$. From Equation (8) we see that $G_{\hat{\theta}\hat{\theta}}$ has an important term $(1-\frac{b}{r})\Phi''$. The other terms depend at most on the first derivative and as before do no contribute to the integral. Thus, in this case Equation (59) gives $8\pi G/c^2\mathcal{P} = \sqrt{1-b(a)/a}\,\Phi'^{+}_{-}$. Now, $\Phi'_{-} = 0$ by assumption, and $\Phi'^{+} = [G\,M/(c^2a^2) - \Lambda_{\rm ext}\,a/3]\,/\,(1-b(a)/a)$. Thus, $\mathcal{P} = \frac{c^4}{8\pi\,G\,a}\frac{G\,M/(c^2a^2)-\Lambda_{\rm ext}\,a/3}{\sqrt{1-b(a)/a}}$, or more explicitly,

$$\mathcal{P} = \frac{c^4}{8\pi Ga}\,\frac{\frac{GM}{c^2a}-\frac{\Lambda_{\rm ext}}{3}a^2}{\sqrt{1-\frac{2GM}{c^2a}-\frac{\Lambda_{\rm ext}}{3}a^2}}\,. \tag{61}$$

From

$$\mathcal{P} = \frac{c^4}{8\pi Ga}\,\frac{\frac{GM}{c^2a}-\frac{\Lambda_{\rm ext}}{3}a^2}{\sqrt{1-\frac{2GM}{c^2a}-\frac{\Lambda_{\rm ext}}{3}a^2}}\,.$$

For a = 4.74e+13, c = 3e+8, G = 6.67e-11 and M = 2.2e+36 , we obtain:

(3e+8)^4*1/(8Pi*6.67e-11*4.74e+13)* ((6.67e-11*2.2e+36))/((3e+8)^2*4.74e+13)-1/3((1.1056e-52(4.74e+13)^2))*1/(((1-((2*6.67e-11*2.2e+36))/((3e+8)^2*4.74e+13)))- 1/3((1.1056e-52(4.74e+13)^2)))^1/2

Input interpretation:

$$(3\times 10^8)^4 \times \frac{1}{8\pi\times 6.67\times 10^{-11}\times 4.74\times 10^{13}} \times \frac{6.67\times 10^{-11}\times 2.2\times 10^{36}}{(3\times 10^8)^2\times 4.74\times 10^{13}} - \frac{1}{3}(1.1056\times 10^{-52}(4.74\times 10^{13})^2)\times \frac{1}{\sqrt{\left(1-\frac{2\times 6.67\times 10^{-11}\times 2.2\times 10^{36}}{(3\times 10^8)^2\times 4.74\times 10^{13}}\right)-\frac{1}{3}(1.1056\times 10^{-52}(4.74\times 10^{13})^2)}}$$

Result:

$3.50646... \times 10^{24}$

$3.50646...*10^{24}$ that is a surface tangential pressure

Now, we have that:

One can also match the interior solution with an exterior Schwarzschild-de Sitter solution ($\tau_{ext} = 0$ and $\Lambda_{ext} > 0$) in the presence of a thin shell, $\mathcal{P} \neq 0$. From Equation (67), we have the behavior of the radial tension at the thin shell, given by

$$\tau_{int}(a) + \frac{c^4}{8\pi G}\Lambda_{int} = \frac{c^4}{8\pi G}\Lambda_{ext} + \frac{2}{a}\mathcal{P}\, e^{\Phi(a)}\,. \qquad (96)$$

$$e^{\Phi(a)} = \sqrt{1 - 2GM/(c^2 a) - \Lambda_{ext} a^2/3}.$$

For a = 4.74e+13, c = 3e+8, G = 6.67e-11 and M = 2.2e+36 , we obtain:

(((1-((2*6.67e-11*2.2e+36))/((3e+8)^2*4.74e+13)))- 1/3((1.1056e-52(4.74e+13)^2)))^1/2

Input interpretation:

$$\sqrt{\left(1-\frac{2\times 6.67\times 10^{-11}\times 2.2\times 10^{36}}{(3\times 10^8)^2\times 4.74\times 10^{13}}\right)-\frac{1}{3}(1.1056\times 10^{-52}(4.74\times 10^{13})^2)}$$

Result:

0.9999656018...

0.9999656018…

From which, for :

(((Pi((((e^(-27/34+(3e)/68+5/(34π)+(13π)/68) π^(7/17+(13e)/34))1/(sin(eπ)^(1/68)(-cos(eπ))^(35/34))))))))

Input:

$$\pi\left(\left(e^{-\frac{27}{34}+\frac{3e}{68}+\frac{5}{34\pi}+\frac{13\pi}{68}}\,\pi^{7/17+(13e)/34}\right)\times\frac{1}{\sqrt[68]{\sin(e\pi)}\,(-\cos(e\pi))^{35/34}}\right)$$

Exact result:

$$\frac{e^{-\frac{27}{34}+\frac{3e}{68}+\frac{5}{34\pi}+\frac{13\pi}{68}}\,\pi^{24/17+(13e)/34}}{\sqrt[68]{\sin(e\pi)}\,(-\cos(e\pi))^{35/34}}$$

Decimal approximation:

25.871939500151238434216562200617290341022350702559414260 81...

25.87193950015…

Alternate forms:

$$\frac{e^{\left(10+3(e-18)\pi+13\pi^2\right)/(68\pi)}\,\pi^{1/34(48+13e)}}{\sqrt[68]{\sin(e\pi)}\,(-\cos(e\pi))^{35/34}}$$

$$-\frac{e^{-\frac{27}{34}+\frac{3e}{68}+\frac{5}{34\pi}+\frac{13\pi}{68}}\,\pi^{24/17+(13e)/34}\sec(e\pi)}{\sqrt[68]{\sin(e\pi)}\,\sqrt[34]{-\cos(e\pi)}}$$

$$\frac{(-1)^{33/34}\,e^{-\frac{27}{34}+\frac{3e}{68}+\frac{5}{34\pi}+\left(\frac{13}{68}+\frac{i}{17}\right)\pi}\,\pi^{24/17+(13e)/34}}{\sqrt[68]{\sin(e\pi)}\,\cos^{35/34}(e\pi)}$$

sec(x) is the secant function

Alternative representations:

$$\frac{\pi\left(e^{-\frac{27}{34}+\frac{3e}{68}+\frac{5}{34\pi}+\frac{13\pi}{68}}\pi^{7/17+(13e)/34}\right)}{\sqrt[68]{\sin(e\pi)}\,(-\cos(e\pi))^{35/34}} = \frac{\pi\, e^{-\frac{27}{34}+\frac{3e}{68}+\frac{13\pi}{68}+\frac{5}{34\pi}}\pi^{7/17+(13e)/34}}{(-\cosh(e\,i\,\pi))^{35/34}\sqrt[68]{\cos\left(\frac{\pi}{2}-e\pi\right)}}$$

$$\frac{\pi\left(e^{-\frac{27}{34}+\frac{3e}{68}+\frac{5}{34\pi}+\frac{13\pi}{68}}\pi^{7/17+(13e)/34}\right)}{\sqrt[68]{\sin(e\pi)}\,(-\cos(e\pi))^{35/34}} = \frac{\pi\, e^{-\frac{27}{34}+\frac{3e}{68}+\frac{13\pi}{68}+\frac{5}{34\pi}}\pi^{7/17+(13e)/34}}{(-\cosh(-i\,e\,\pi))^{35/34}\sqrt[68]{\cos\left(\frac{\pi}{2}-e\pi\right)}}$$

$$\frac{\pi\left(e^{-\frac{27}{34}+\frac{3e}{68}+\frac{5}{34\pi}+\frac{13\pi}{68}}\pi^{7/17+(13e)/34}\right)}{\sqrt[68]{\sin(e\pi)}\,(-\cos(e\pi))^{35/34}} = \frac{\pi\, e^{-\frac{27}{34}+\frac{3e}{68}+\frac{13\pi}{68}+\frac{5}{34\pi}}\pi^{7/17+(13e)/34}}{(-\cosh(-i\,e\,\pi))^{35/34}\sqrt[68]{-\cos\left(\frac{\pi}{2}+e\pi\right)}}$$

Series representations:

$$\frac{\pi\left(e^{-\frac{27}{34}+\frac{3e}{68}+\frac{5}{34\pi}+\frac{13\pi}{68}}\pi^{7/17+(13e)/34}\right)}{\sqrt[68]{\sin(e\pi)}\,(-\cos(e\pi))^{35/34}} = \frac{e^{-\frac{27}{34}+\frac{3e}{68}+\frac{5}{34\pi}+\frac{13\pi}{68}}\pi^{24/17+(13e)/34}}{\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(\left(-\frac{1}{2}+e\right)\pi\right)^{1+2k}}{(1+2k)!}\right)^{35/34}\sqrt[68]{\sum_{k=0}^{\infty}\frac{(-1)^k(e\pi)^{1+2k}}{(1+2k)!}}}$$

$$\frac{\pi\left(e^{-\frac{27}{34}+\frac{3e}{68}+\frac{5}{34\pi}+\frac{13\pi}{68}}\pi^{7/17+(13e)/34}\right)}{\sqrt[68]{\sin(e\pi)}\,(-\cos(e\pi))^{35/34}} = \frac{e^{-\frac{27}{34}+\frac{3e}{68}+\frac{5}{34\pi}+\frac{13\pi}{68}}\pi^{24/17+(13e)/34}\left(-\sum_{k=0}^{\infty}\frac{(-1)^k(e\pi)^{2k}}{(2k)!}\right)^{33/34}}{\sqrt[68]{\sum_{k=0}^{\infty}\frac{(-1)^k\left(\left(-\frac{1}{2}+e\right)\pi\right)^{2k}}{(2k)!}}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(e\pi)^{2k}}{(2k)!}\right)^2}$$

$$\frac{\pi\left(e^{-\frac{27}{34}+\frac{3e}{68}+\frac{5}{34\pi}+\frac{13\pi}{68}}\pi^{7/17+(13e)/34}\right)}{\sqrt[68]{\sin(e\pi)}\,(-\cos(e\pi))^{35/34}} = \frac{e^{-\frac{27}{34}+\frac{3e}{68}+\frac{5}{34\pi}+\frac{13\pi}{68}}\pi^{24/17+(13e)/34}\left(-\sum_{k=0}^{\infty}\frac{(-1)^k(e\pi)^{2k}}{(2k)!}\right)^{33/34}}{\left(\sum_{k=0}^{\infty}\frac{(-1)^k(e\pi)^{2k}}{(2k)!}\right)^2\sqrt[68]{\sum_{k=0}^{\infty}\frac{(-1)^k(e\pi)^{1+2k}}{(1+2k)!}}}$$

Multiple-argument formulas:

$$\frac{\pi\left(e^{-\frac{27}{34}+\frac{3e}{68}+\frac{5}{34\pi}+\frac{13\pi}{68}}\pi^{7/17+(13e)/34}\right)}{\sqrt[68]{\sin(e\pi)}\,(-\cos(e\pi))^{35/34}} = \frac{e^{\left(10+3(-18+e)\pi+13\pi^2\right)/(68\pi)}\pi^{1/34(48+13e)}}{(-T_e(-1))^{35/34}\sqrt[68]{\sin(e\pi)}}$$

$$\frac{\pi\left(e^{-\frac{27}{34}+\frac{3e}{68}+\frac{5}{34\pi}+\frac{13\pi}{68}}\pi^{7/17+(13e)/34}\right)}{\sqrt[68]{\sin(e\pi)}\,(-\cos(e\pi))^{35/34}} = \frac{e^{-\frac{27}{34}+\frac{3e}{68}+\frac{5}{34\pi}+\frac{13\pi}{68}}\pi^{24/17+(13e)/34}}{\left(1-2\cos^2\left(\frac{e\pi}{2}\right)\right)^{35/34}\sqrt[68]{2\cos\left(\frac{e\pi}{2}\right)\sin\left(\frac{e\pi}{2}\right)}}$$

$$\frac{\pi\left(e^{-\frac{27}{34}+\frac{3e}{68}+\frac{5}{34\pi}+\frac{13\pi}{68}}\pi^{7/17+(13e)/34}\right)}{\sqrt[68]{\sin(e\pi)}\,(-\cos(e\pi))^{35/34}} = \frac{e^{-\frac{27}{34}+\frac{3e}{68}+\frac{5}{34\pi}+\frac{13\pi}{68}}\pi^{24/17+(13e)/34}}{\sqrt[68]{2\cos\left(\frac{e\pi}{2}\right)\sin\left(\frac{e\pi}{2}\right)}\left(-1+2\sin^2\left(\frac{e\pi}{2}\right)\right)^{35/34}}$$

we obtain:

((((((1-((2*6.67e-11*2.2e+36))/((3e+8)^2*4.74e+13)))- 1/3((1.1056e-52(4.74e+13)^2)))^1/2)))^25.8719395001512384342165622

Input interpretation:

$$\sqrt{\left(1-\frac{2\times 6.67\times 10^{-11}\times 2.2\times 10^{36}}{(3\times 10^8)^2\times 4.74\times 10^{13}}\right)-\frac{1}{3}\left(1.1056\times 10^{-52}\left(4.74\times 10^{13}\right)^2\right)}^{\,25.8719395001512384342165622}$$

Result:

0.999110433639976793618189099252885578328586245443546241272...

0.999110433639…. 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 **$0.989117352243 = \phi$**

or:

0.9999656018^(([(e^((10 + 3 (e - 18) π + 13 π^2)/(68 π)) π^(1/34 (48 + 13 e)))*1/(sin(e π)^(1/68) (-cos(e π))^(35/34))]))

Input interpretation:

$$0.9999656018^{\left(e^{(10+3(e-18)\pi+13\pi^2)/(68\pi)}\,\pi^{1/34(48+13e)}\right)\times 1/\left(\sqrt[68]{\sin(e\pi)}\,(-\cos(e\pi))^{35/34}\right)}$$

Result:

0.999110432444049923566976647076570266699481194505610041853...

0.99911043244404… as above

Alternative representations:

$$0.999966^{\left(e^{(10+3(e-18)\pi+13\pi^2)/(68\pi)}\,\pi^{1/34(48+13e)}\right)/\left(\sqrt[68]{\sin(e\pi)}\,(-\cos(e\pi))^{35/34}\right)} = 0.999966^{\left(e^{(10+3(-18+e)\pi+13\pi^2)/(68\pi)}\,\pi^{1/34(48+13e)}\right)/\left((-\cosh(e\,i\,\pi))^{35/34}\,\sqrt[68]{\cos\left(\frac{\pi}{2}-e\pi\right)}\right)}$$

$$0.999966^{\left(e^{(10+3(e-18)\pi+13\pi^2)/(68\pi)}\,\pi^{1/34(48+13e)}\right)/\left(\sqrt[68]{\sin(e\pi)}\,(-\cos(e\pi))^{35/34}\right)} = 0.999966^{\left(e^{(10+3(-18+e)\pi+13\pi^2)/(68\pi)}\,\pi^{1/34(48+13e)}\right)/\left((-\cosh(-i\,e\,\pi))^{35/34}\,\sqrt[68]{\cos\left(\frac{\pi}{2}-e\pi\right)}\right)}$$

$$0.999966^{\left(e^{(10+3(e-18)\pi+13\pi^2)/(68\pi)}\,\pi^{1/34(48+13e)}\right)/\left(\sqrt[68]{\sin(e\pi)}\,(-\cos(e\pi))^{35/34}\right)} = 0.999966^{\left(e^{(10+3(-18+e)\pi+13\pi^2)/(68\pi)}\,\pi^{1/34(48+13e)}\right)/\left((-\cosh(-i\,e\,\pi))^{35/34}\,\sqrt[68]{-\cos\left(\frac{\pi}{2}+e\pi\right)}\right)}$$

Series representations:

$$0.999966^{\left(e^{(10+3(e-18)\pi+13\pi^2)/(68\pi)}\,\pi^{1/34(48+13e)}\right)/\left(\sqrt[68]{\sin(e\pi)}\,(-\cos(e\pi))^{35/34}\right)} = 0.99996\ldots 6^{\left(e^{-\frac{27}{34}+\frac{3e}{68}+\frac{5}{34\pi}+\frac{13\pi}{68}}\,\pi^{24/17+(13e)/34}\right)/\left(\sqrt[68]{2}\,\sqrt[68]{\sum_{k=0}^{\infty}(-1)^k J_{1+2k}(e\pi)}\left(-\sum_{k=0}^{\infty}\frac{(-1)^k (e\pi)^{2k}}{(2k)!}\right)^{35/34}\right)}$$

$$0.999966^{\left(e^{(10+3(e-18)\pi+13\pi^2)/(68\pi)}\,\pi^{1/34(48+13e)}\right)/\left(\sqrt[68]{\sin(e\pi)}\,(-\cos(e\pi))^{35/34}\right)} = 0.99996\ldots 6^{\left(e^{-\frac{27}{34}+\frac{3e}{68}+\frac{5}{34\pi}+\frac{13\pi}{68}}\,\pi^{24/17+(13e)/34}\right)/\left(\left(-\sum_{k=0}^{\infty}\frac{(-1)^k (e\pi)^{2k}}{(2k)!}\right)^{35/34}\sqrt[68]{\sum_{k=0}^{\infty}\frac{(-1)^k e\pi (e\pi)^{2k}}{(1+2k)!}}\right)}$$

$$0.999966^{\left(e^{(10+3(e-18)\pi+13\pi^2)/(68\pi)}\,\pi^{1/34(48+13e)}\right)/\left(\sqrt[68]{\sin(e\pi)}\,(-\cos(e\pi))^{35/34}\right)} = 0.999966^{\left(e^{-\frac{27}{34}+\frac{3e}{68}+\frac{5}{34\pi}+\frac{13\pi}{68}}\,\pi^{24/17+(13e)/34}\right)/\left(\sqrt[68]{2}\,\sqrt[68]{\sum_{k=0}^{\infty}(-1)^k J_{1+2k}(e\pi)}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(\left(-\frac{1}{2}+e\right)\pi\right)^{1+2k}}{(1+2k)!}\right)^{35/34}\right)}$$

Integral representations:

$$0.999966^{\left(e^{(10+3(e-18)\pi+13\pi^2)/(68\pi)}\,\pi^{1/34(48+13e)}\right)/\left(\sqrt[68]{\sin(e\pi)}\,(-\cos(e\pi))^{35/34}\right)} = 0.999966^{\left(e^{-\frac{27}{34}+\frac{3e}{68}+\frac{5}{34\pi}+\frac{13\pi}{68}}\,\pi^{24/17+(13e)/34}\right)/\left(\sqrt[68]{e\pi\int_0^1\cos(e\pi t)\,dt}\left(\int_{\frac{\pi}{2}}^{e\pi}\sin(t)\,dt\right)^{35/34}\right)}$$

$$0.999966^{\left(e^{(10+3(e-18)\pi+13\pi^2)/(68\pi)}\,\pi^{1/34(48+13e)}\right)/\left(\sqrt[68]{\sin(e\pi)}\,(-\cos(e\pi))^{35/34}\right)} = 0.999966^{\left(e^{-\frac{27}{34}+\frac{3e}{68}+\frac{5}{34\pi}+\frac{13\pi}{68}}\,\pi^{24/17+(13e)/34}\right)/\left(\sqrt[68]{e\pi\int_0^1\cos(e\pi t)\,dt}\left(-1+e\pi\int_0^1\sin(e\pi t)\,dt\right)^{35/34}\right)}$$

$$0.999966^{\left(e^{(10+3(e-18)\pi+13\pi^2)/(68\pi)}\,\pi^{1/34(48+13e)}\right)/\left(\sqrt[68]{\sin(e\pi)}\,(-\cos(e\pi))^{35/34}\right)} = 0.999966^{\left(\sqrt[34]{2}\,e^{-\frac{27}{34}+\frac{3e}{68}+\frac{5}{34\pi}+\frac{13\pi}{68}}\,\pi^{24/17+(13e)/34}\right)/\left(\left(\int_{\frac{\pi}{2}}^{e\pi}\sin(t)\,dt\right)^{35/34}\sqrt[68]{\frac{e\sqrt{\pi}}{i}\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{e^{-(e^2\pi^2)/(4s)+s}}{s^{3/2}}\,ds}\right)} \quad \text{for } \gamma > 0$$

Multiple-argument formulas:

$$0.999966^{\left(e^{(10+3(e-18)\pi+13\pi^2)/(68\pi)}\,\pi^{1/34(48+13e)}\right)/\left(\sqrt[68]{\sin(e\pi)}\,(-\cos(e\pi))^{35/34}\right)} = 0.999966^{\left(e^{(10+3(-18+e)\pi+13\pi^2)/(68\pi)}\,\pi^{1/34(48+13e)}\right)/\left(\sqrt[68]{2}\left(1-2\cos^2\left(\frac{e\pi}{2}\right)\right)^{35/34}\sqrt[68]{\cos\left(\frac{e\pi}{2}\right)\sin\left(\frac{e\pi}{2}\right)}\right)}$$

$$0.999966^{\left(e^{(10+3(e-18)\pi+13\pi^2)/(68\pi)}\,\pi^{1/34(48+13e)}\right)/\left(\sqrt[68]{\sin(e\pi)}\,(-\cos(e\pi))^{35/34}\right)} = 0.999966^{\left(e^{(10+3(-18+e)\pi+13\pi^2)/(68\pi)}\,\pi^{1/34(48+13e)}\right)/\left(\sqrt[68]{2}\,\sqrt[68]{\cos\left(\frac{e\pi}{2}\right)\sin\left(\frac{e\pi}{2}\right)}\left(-1+2\sin^2\left(\frac{e\pi}{2}\right)\right)^{35/34}\right)}$$

$$0.999966^{\left(e^{(10+3(e-18)\pi+13\pi^2)/(68\pi)}\,\pi^{1/34(48+13e)}\right)/\left(\sqrt[68]{\sin(e\pi)}\,(-\cos(e\pi))^{35/34}\right)} = 0.999966^{\left(e^{(10+3(-18+e)\pi+13\pi^2)/(68\pi)}\,\pi^{1/34(48+13e)}\right)/\left(\left(1-2\cos^2\left(\frac{e\pi}{2}\right)\right)^{35/34}\sqrt[68]{3\sin\left(\frac{e\pi}{3}\right)-4\sin^3\left(\frac{e\pi}{3}\right)}\right)}$$

from

$$\frac{c^4}{8\pi G}\Lambda_{\rm ext} + \frac{2}{a}\mathcal{P}\, e^{\Phi(a)}$$

for a = 4.74e+13, c = 3e+8, G = 6.67e-11 $e^{\Phi(a)}$ = 0.9999656018 and M = 2.2e+36 , we obtain:

(((3e+8)^4*1.1056e-52))/(8Pi*6.67e-11)+(2*3.50646e+24*0.9999656018)/(4.74e+13)

Input interpretation:

$$\frac{(3\times 10^8)^4\times 1.1056\times 10^{-52}}{8\,\pi\times 6.67\times 10^{-11}}+\frac{2\times 3.50646\times 10^{24}\times 0.9999656018}{4.74\times 10^{13}}$$

Result:

$1.47947\ldots \times 10^{11}$

1.47947…*10^{11}

Thence:

$$\mathcal{P} = \frac{c^4}{8\pi G a}\frac{\frac{GM}{c^2 a} - \frac{\Lambda_{\rm ext}}{3}a^2}{\sqrt{1-\frac{2GM}{c^2 a} - \frac{\Lambda_{\rm ext}}{3}a^2}} =$$

= 3.50646e+24

and

$$\tau_{\rm int}(a) + \frac{c^4}{8\pi G}\Lambda_{\rm int} = \frac{c^4}{8\pi G}\Lambda_{\rm ext} + \frac{2}{a}\mathcal{P}\, e^{\Phi(a)} =$$

= 1.47947e+11

From this last expression, we obtain:

((((((3e+8)^4*1.1056e-52))/(8Pi*6.67e-11)+(2*3.50646e+24*0.9999656018)/(4.74e+13))))^[(383 - 1335 sqrt(π) + 1782 π - 247 π^(3/2) - 225 π^2)/(324 π)]

Input interpretation:

$$\left(\frac{(3\times 10^{8})^{4}\times 1.1056\times 10^{-52}}{8\,\pi\times 6.67\times 10^{-11}}+\frac{2\times 3.50646\times 10^{24}\times 0.9999656018}{4.74\times 10^{13}}\right)^{\left(383-1335\sqrt{\pi}+1782\,\pi-247\,\pi^{3/2}-225\,\pi^{2}\right)/(324\,\pi)}$$

Result:

1.618451513427500160373335977170839769623376998387115494312...

1.6184515134…. result that is a very good approximation to the value of the golden ratio 1,618033988749...

((((((3e+8)^4*1.1056e-52))/(8Pi*6.67e-11)+(2*3.50646e+24*0.9999656018)/(4.74e+13))))^[(383 - 1335 sqrt(π) + x π - 247 π^(3/2) - 225 π^2)/(324 π)] = 1.61845151342

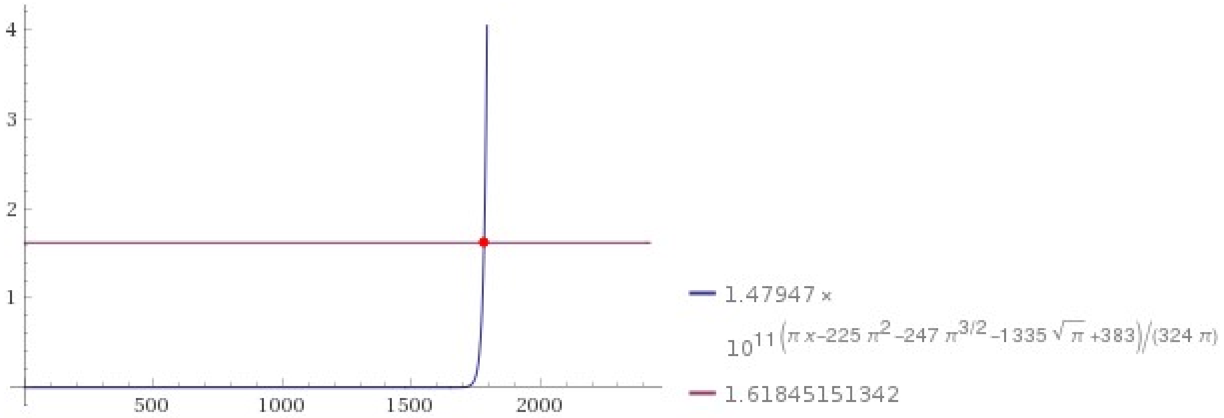
Input interpretation:

$$\left(\frac{(3\times 10^{8})^{4}\times 1.1056\times 10^{-52}}{8\,\pi\times 6.67\times 10^{-11}}+\frac{2\times 3.50646\times 10^{24}\times 0.9999656018}{4.74\times 10^{13}}\right)^{\left(383-1335\sqrt{\pi}+x\,\pi-247\,\pi^{3/2}-225\,\pi^{2}\right)/(324\,\pi)} = 1.61845151342$$

Result:

$$1.47947\times 10^{11\left(\pi x-225\,\pi^{2}-247\,\pi^{3/2}-1335\sqrt{\pi}+383\right)/(324\,\pi)} = 1.61845151342$$

Plot:



Alternate forms:

$1.47947\times 10^{11x/324} = 2.72635\times 10^{61}$

$5.93634\times 10^{-62}\times 1.47947\times 10^{11x/324} = 1.61845151342$

Alternate forms assuming x is real:

$5.93634\times 10^{-62}\sqrt[324]{1.47947\times 10^{11x}} = 1.61845151342$

$5.93634\times 10^{-62}\, e^{0.0793831\,x} = 1.61845$

Real solution:

$x \approx 1782.$

1782 result in the range of the mass of candidate "glueball" $f_0(1710)$ and the hypothetical mass of Gluino ("glueball" =1760 ± 15 MeV; gluino = 1785.16 GeV).

Solution:

$x \approx (12.5971\, i)(6.28319\, n + (-141.461\, i)), \quad n \in \mathbb{Z}$

((((((3e+8)^4*1.1056e-52))/(8Pi*6.67e-11)+(2*3.50646e+24*0.9999656018)/(4.74e+13))))^[(383 - 1335 sqrt(π) + (x+53) π - 247 π^(3/2) - 225 π^2)/(324 π)] = 1.61845151342

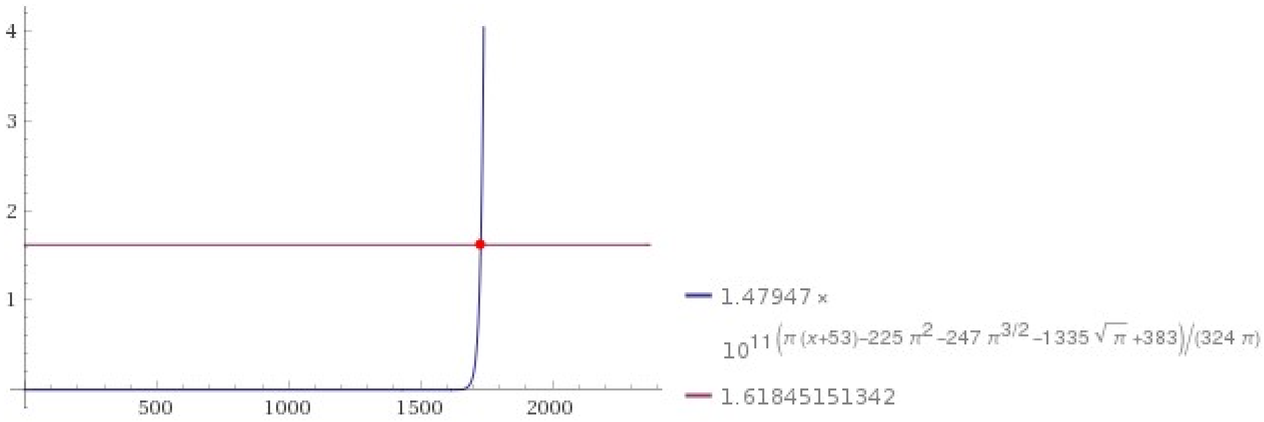
Input interpretation:

$$\left(\frac{(3\times 10^8)^4\times 1.1056\times 10^{-52}}{8\pi\times 6.67\times 10^{-11}} + \frac{2\times 3.50646\times 10^{24}\times 0.9999656018}{4.74\times 10^{13}}\right)^{\left(383-1335\sqrt{\pi}+(x+53)\pi-247\pi^{3/2}-225\pi^2\right)/(324\pi)} = 1.61845151342$$

Result:

$1.47947\times 10^{11\left(\pi(x+53)-225\pi^2-247\pi^{3/2}-1335\sqrt{\pi}+383\right)/(324\pi)} = 1.61845151342$

Plot:



Alternate forms:

$$1.47947\times 10^{11x/324}=4.05856\times 10^{59}$$

$$3.98775\times 10^{-60}\times 1.47947\times 10^{11x/324}=1.61845151342$$

Alternate forms assuming x is real:

$$3.98775\times 10^{-60}\sqrt[324]{1.47947\times 10^{11x}}=1.61845151342$$

$$3.98775\times 10^{-60}\,e^{0.0793831\,x}=1.61845$$

Real solution:

$x\approx 1729.$

1729…

This result is very near to the mass of candidate glueball **f_0(1710) scalar meson.** Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. 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 (taxicab number)

Solution:

$x\approx(12.5971\,i)\,(6.28319\,n+(-137.253\,i))\,,\quad n\in\mathbb{Z}$

From

$$\Phi(a) = \frac{1}{2}\ln\left(1 - \frac{2GM}{c^2 a} - \frac{\Lambda_{\text{ext}}}{3}a^2\right), \tag{56}$$

$$b(a) = \frac{2GM}{c^2} + \frac{\Lambda_{\text{ext}}}{3}a^3. \tag{57}$$

For M = 3.3 * 10^{36} kg , we obtain:

1/2 ln(((((((1-((2*6.67e-11*3.3e+36))/((3e+8)^2*4.74e+13)-1/3((1.1056e-52(4.74e+13)^2))))))

Input interpretation:

$$\frac{1}{2}\log\left(1 - \frac{2\times 6.67\times 10^{-11}\times 3.3\times 10^{36}}{(3\times 10^{8})^2\times 4.74\times 10^{13}} - \frac{1}{3}\left(1.1056\times 10^{-52}\,(4.74\times 10^{13})^2\right)\right)$$

log(x) is the natural logarithm

Result:

−0.0000515990...

-0.0000515990…

((2*6.67e-11*3.3e+36))/((3e+8)^2) + 1/3((1.1056e-52(4.74e+13)^3))

Input interpretation:

$$\frac{2\times 6.67\times 10^{-11}\times 3.3\times 10^{36}}{(3\times 10^{8})^2} + \frac{1}{3}\left(1.1056\times 10^{-52}\,(4.74\times 10^{13})^3\right)$$

Result:

4.891333333333333333337258081545813333333333333333333333... × 10^9

4.89133333…*10^9

((((2*6.67e-11*3.3e+36))/((3e+8)^2) + 1/3((1.1056e-52(4.74e+13)^3))))/ (-0.0000515990)

Input interpretation:

$$-\frac{\frac{2\times 6.67\times 10^{-11}\times 3.3\times 10^{36}}{(3\times 10^{8})^2} + \frac{1}{3}\left(1.1056\times 10^{-52}\,(4.74\times 10^{13})^3\right)}{0.0000515990}$$

Result:

−9.479511876845158497911312392770815971885760059949482... × 10^{13}

-9.479511876…*10^{13}

We obtain also:

((((((-(2*6.67e-11*3.3e+36))/((3e+8)^2) + 1/3((1.1056e-52(4.74e+13)^3))))/ (-0.0000515990))))^1/64 - (29+7) 1/10^3

Input interpretation:

$$\sqrt[64]{-\frac{-\frac{2\times 6.67\times 10^{-11}\times 3.3\times 10^{36}}{(3\times 10^{8})^2}+\frac{1}{3}\left(1.1056\times 10^{-52}\left(4.74\times 10^{13}\right)^3\right)}{0.0000515990}}-(29+7)\times\frac{1}{10^3}$$

Result:

1.617435587455366821055267434188062067203948951913692085951...

1.617435587455…. result that is a very good approximation to the value of the golden ratio 1,618033988749...

Now, we have that:

$$r_b = \frac{2GM}{c^2}\left[1-\frac{4}{3}|\Lambda_{\text{ext}}|\left(\frac{GM}{c^2}\right)^2\right], \tag{118}$$

which gives the black hole horizon. In Equation (118) to find the numerical factor of the first order term $\Lambda_{\text{ext}}\left(\frac{GM}{c^2}\right)^2$ it is easier to linearize the solution by writing $x = 1+\epsilon$, for small ϵ, and then with the help of (115) one finds ϵ.

From

$$r_b = \frac{2GM}{c^2}\left[1-\frac{4}{3}|\Lambda_{\text{ext}}|\left(\frac{GM}{c^2}\right)^2\right]$$

For M = 3.3 * 10^{36} kg , we obtain:

(2*6.67e-11*3.3e+36)/(3e+8)^2*(((((1-4/3*1.1056e-52*(((6.67e-11*3.3e+36)/(3e+8)^2))^2)))

Input interpretation:

$$\frac{2\times 6.67\times 10^{-11}\times 3.3\times 10^{36}}{(3\times 10^{8})^{2}}\left(1-\frac{4}{3}\times 1.1056\times 10^{-52}\left(\frac{6.67\times 10^{-11}\times 3.3\times 10^{36}}{(3\times 10^{8})^{2}}\right)^{2}\right)$$

Result:

$4.891333333333333333333333333333333290205409148630439506 1\ldots\times 10^{9}$

$4.89133333\ldots*10^{9}$ result practically equal to the previous

We have that:

2Pi * ln[(2*6.67e-11*3.3e+36)/(3e+8)^2*(((((1-4/3*1.1056e-52*(((6.67e-11*3.3e+36)/(3e+8)^2))^2)))))] – 3

Input interpretation:

$$2\pi\log\left(\frac{2\times 6.67\times 10^{-11}\times 3.3\times 10^{36}}{(3\times 10^{8})^{2}}\left(1-\frac{4}{3}\times 1.1056\times 10^{-52}\left(\frac{6.67\times 10^{-11}\times 3.3\times 10^{36}}{(3\times 10^{8})^{2}}\right)^{2}\right)\right)-3$$

$\log(x)$ is the natural logarithm

Result:

137.1825...

137.1825…. result practically equal to the golden angle value 137.5

2Pi * ln[(2*6.67e-11*3.3e+36)/(3e+8)^2*(((((1-4/3*1.1056e-52*(((6.67e-11*3.3e+36)/(3e+8)^2))^2)))))] – 1

Input interpretation:

$$2\pi\log\left(\frac{2\times 6.67\times 10^{-11}\times 3.3\times 10^{36}}{(3\times 10^{8})^{2}}\left(1-\frac{4}{3}\times 1.1056\times 10^{-52}\left(\frac{6.67\times 10^{-11}\times 3.3\times 10^{36}}{(3\times 10^{8})^{2}}\right)^{2}\right)\right)-1$$

$\log(x)$ is the natural logarithm

Result:

139.1825...

139.1825…. result practically equal to the rest mass of Pion meson 139.57 MeV

2Pi * ln[(2*6.67e-11*3.3e+36)/(3e+8)^2*(((((1-4/3*1.1056e-52*(((6.67e-11*3.3e+36)/(3e+8)^2))^2)))))] -18+Pi

Input interpretation:

$$2\pi \log\left(\frac{2\times 6.67\times 10^{-11}\times 3.3\times 10^{36}}{(3\times 10^8)^2}\left(1-\frac{4}{3}\times 1.1056\times 10^{-52}\left(\frac{6.67\times 10^{-11}\times 3.3\times 10^{36}}{(3\times 10^8)^2}\right)^2\right)\right)-18+\pi$$

log(x) is the natural logarithm

Result:

125.3240...

125.3240…. result very near to the Higgs boson mass 125.18 GeV

27*1/2((((2Pi * ln[(2*6.67e-11*3.3e+36)/(3e+8)^2*(((((1-4/3*1.1056e-52*(((6.67e-11*3.3e+36)/(3e+8)^2))^2)))))] -18+Pi+euler number))))+1/2

Input interpretation:

$$27\times\frac{1}{2}\left(2\pi \log\left(\frac{2\times 6.67\times 10^{-11}\times 3.3\times 10^{36}}{(3\times 10^8)^2}\left(1-\frac{4}{3}\times 1.1056\times 10^{-52}\left(\frac{6.67\times 10^{-11}\times 3.3\times 10^{36}}{(3\times 10^8)^2}\right)^2\right)\right)-18+\pi+e\right)+\frac{1}{2}$$

log(x) is the natural logarithm

Result:

1729.071...

1729.071….

This result is very near to the mass of candidate glueball **f_0(1710) scalar meson.** Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. 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 (taxicab number)

(((((27*1/2((((2Pi * ln[(2*6.67e-11*3.3e+36)/(3e+8)^2*(((((1-4/3*1.1056e-52*(((6.67e-11*3.3e+36)/(3e+8)^2))^2)))))] -18+Pi+euler number))))+1/2)))))^1/15 -(21+5)1/10^3

Input interpretation:

$$\left(27\times\frac{1}{2}\left(2\pi\log\left(\frac{2\times6.67\times10^{-11}\times3.3\times10^{36}}{(3\times10^8)^2}\left(1-\frac{4}{3}\times1.1056\times10^{-52}\left(\frac{6.67\times10^{-11}\times3.3\times10^{36}}{(3\times10^8)^2}\right)^2\right)\right)-18+\pi+e\right)+\frac{1}{2}\right)\char`^(1/15)-(21+5)\times\frac{1}{10^3}$$

log(x) is the natural logarithm

Result:

1.617819757835602181226540979770782130948934661811672192077...

1.6178197578356….. result that is a very good approximation to the value of the golden ratio 1,618033988749...

Or, also:

((((2*6.67e-11*3.3e+36)/(3e+8)^2*(((((1-4/3*1.1056e-52*(((6.67e-11*3.3e+36)/(3e+8)^2))^2))))))))^((5Pi)/(728))

Input interpretation:

$$\left(\frac{2\times6.67\times10^{-11}\times3.3\times10^{36}}{(3\times10^8)^2}\left(1-\frac{4}{3}\times1.1056\times10^{-52}\left(\frac{6.67\times10^{-11}\times3.3\times10^{36}}{(3\times10^8)^2}\right)^2\right)\right)^{(5\pi)/728}$$

Result:

1.618331687158096976688757149984848088626105642362673115270...

1.618331687158….. result that is a very good approximation to the value of the golden ratio 1,618033988749...

From:

EISENSTEIN SERIES IN RAMANUJAN'S LOST NOTEBOOK
BRUCE C. BERNDT, HENG HUAT CHAN, JAEBUM SOHN, AND SEUNG HWAN SON

Now, we have that:

(1.3) $$R(q) := 1 - 504\sum_{k=1}^{\infty}\frac{k^5q^k}{1-q^k},$$

where $|q| < 1$. (The notation above is that used in Ramanujan's paper [4], [6,

As usual, set

$$(a;q)_\infty := \prod_{n=0}^{\infty}(1-aq^n), \qquad |q| < 1.$$

Define, after Ramanujan,

(2.1) $$f(-q) := (q;q)_\infty =: e^{-2\pi iz/24}\eta(z), \qquad q = e^{2\pi iz}, \qquad \text{Im } z > 0,$$

where η denotes the Dedekind eta-function. We shall use the well-known transformation formula [1, p. 43, Entry 27(iii)]

(2.2) $$\eta(-1/z) = \sqrt{z/i}\,\eta(z).$$

If $q = e^{2\pi iz}$, Im $z > 0$, $Q(q)$ and $R(q)$ obey the well-known transformation formulas [8, p. 136]

(2.3) $$Q(e^{-2\pi i/z}) = z^4 Q(e^{2\pi iz})$$

and

(2.4) $$R(e^{-2\pi i/z}) = z^6 R(e^{2\pi iz}).$$

From:

e^(2Pi)

Input:

$e^{2\pi}$

Decimal approximation:

535.4916555247647365030493295890471814778057976032949155072...

q = 535.49165552476…

Property:

$e^{2\pi}$ is a transcendental number

Alternative representations:

$e^{2\pi} = e^{360°}$

$e^{2\pi} = e^{-2i\log(-1)}$

$e^{2\pi} = \exp^{2\pi}(z)$ for $z = 1$

Series representations:

$$e^{2\pi} = e^{8 \sum_{k=0}^{\infty} (-1)^k/(1+2k)}$$

$$e^{2\pi} = \left(\sum_{k=0}^{\infty} \frac{1}{k!}\right)^{2\pi}$$

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

Integral representations:

$$e^{2\pi} = e^{8 \int_0^1 \sqrt{1-t^2}\, dt}$$

$$e^{2\pi} = e^{4 \int_0^1 1/\sqrt{1-t^2}\, dt}$$

$$e^{2\pi} = e^{4 \int_0^{\infty} 1/(1+t^2)\, dt}$$

exp((-2Pi)/24) * 0.5^(1/24) product (1-0.5^n), n = 1..infinity

Input interpretation:

$$\exp\left(\frac{1}{24}(-2\pi)\right) \sqrt[24]{0.5} \prod_{n=1}^{\infty} (1 - 0.5^n)$$

Result:

0.215943

f(-q) = 0.215943

1-504 sum (((k^5*0.5^k)/(1-0.5^k))), k = 1..infinity

Input interpretation:

$$1 - 504 \sum_{k=1}^{\infty} \frac{k^5 \times 0.5^k}{1 - 0.5^k}$$

Result:

−554787.

R(q) = -554787

Thence: q = 535.49165; f(-q) = 0.215943; R(q) = -554787

Now, we have that:

Theorem 3.2 (p. 51). *For $f(-q)$ and $R(q)$ defined by (2.1) and (1.3), respectively,*

$$R(q) = \left(\frac{f^{15}(-q)}{f^3(-q^5)} - 500q f^9(-q) f^3(-q^5) - 15625q^2 f^3(-q) f^9(-q^5)\right) \times\sqrt{1 + 22q\frac{f^6(-q^5)}{f^6(-q)} + 125q^2\frac{f^{12}(-q^5)}{f^{12}(-q)}} \tag{3.7}$$

and

$$R(q^5) = \left(\frac{f^{15}(-q)}{f^3(-q^5)} + 4q f^9(-q) f^3(-q^5) - q^2 f^3(-q) f^9(-q^5)\right) \times\sqrt{1 + 22q\frac{f^6(-q^5)}{f^6(-q)} + 125q^2\frac{f^{12}(-q^5)}{f^{12}(-q)}}. \tag{3.8}$$

We have:

$$R(q^5) = \left(\frac{f^{15}(-q)}{f^3(-q^5)} + 4q f^9(-q) f^3(-q^5) - q^2 f^3(-q) f^9(-q^5)\right) \times\sqrt{1 + 22q\frac{f^6(-q^5)}{f^6(-q)} + 125q^2\frac{f^{12}(-q^5)}{f^{12}(-q)}}.$$

that is:

$$F(q) := \frac{f^{15}(-q^2)}{f^3(-q^{10})}\left(1 + 4q^2\frac{f^6(-q^{10})}{f^6(-q^2)} - q^4\frac{f^{12}(-q^{10})}{f^{12}(-q^2)}\right) \times\sqrt{1 + 22q^2\frac{f^6(-q^{10})}{f^6(-q^2)} + 125q^4\frac{f^{12}(-q^{10})}{f^{12}(-q^2)}}$$

For

$$\frac{f^{15}(-q^2)}{f^3(-q^{10})} \quad \frac{f^6(-q^{10})}{f^6(-q^2)} \quad \frac{f^{12}(-q^{10})}{f^{12}(-q^2)}$$

that we put equal to ((0.215943)^15)/x ((0.215943)^6)/y and ((0.215943)^12)/z

and for: q = 535.49165; f(-q) = 0.215943; we obtain:

((0.215943)^15)/x ((((1+4*535.49165^2*((0.215943)^6)/y-535.49165^4*((0.215943)^12)/z)))*sqrt(((((((1+22*535.49165^2*((0.215943)^6)/y+125*535.49165^4*((0.215943)^12)/z))))))

Input interpretation:

$$\frac{0.215943^{15}}{x}\left(\left(1+4\times 535.49165^2\times\frac{0.215943^6}{y}-535.49165^4\times\frac{0.215943^{12}}{z}\right)\sqrt{1+22\times 535.49165^2\times\frac{0.215943^6}{y}+125\times 535.49165^4\times\frac{0.215943^{12}}{z}}\right)$$

Result:

$$\frac{1.03535\times 10^{-10}\left(\frac{116.305}{y}-\frac{845.435}{z}+1\right)\sqrt{\frac{639.68}{y}+\frac{105\,679.}{z}+1}}{x}$$

Alternate forms:

$$\frac{\left(\frac{1.20417\times 10^{-8}}{y}-\frac{8.75321\times 10^{-8}}{z}+1.03535\times 10^{-10}\right)\sqrt{\frac{y(z+105\,679.)+639.68\,z}{y\,z}}}{x}$$

$$\frac{\left(y\left(1.03535\times 10^{-10}\,z-8.75321\times 10^{-8}\right)+1.20417\times 10^{-8}\,z\right)\sqrt{\frac{y(z+105\,679.)+639.68\,z}{y\,z}}}{x\,y\,z}$$

Expanded form:

$$\frac{1.03535\times 10^{-10}\sqrt{\frac{639.68}{y}+\frac{105\,679.}{z}+1}}{x}+\frac{1.20417\times 10^{-8}\sqrt{\frac{639.68}{y}+\frac{105\,679.}{z}+1}}{x\,y}-\frac{8.75321\times 10^{-8}\sqrt{\frac{639.68}{y}+\frac{105\,679.}{z}+1}}{x\,z}$$

Alternate form assuming x, y, and z are positive:

$$\frac{\sqrt{\frac{639.68}{y}+\frac{105\,679.}{z}+1}\left(y\left(1.03535\times 10^{-10}\,z-8.75321\times 10^{-8}\right)+1.20417\times 10^{-8}\,z\right)}{x\,y\,z}$$

Real roots:

$$x < 0, \quad y < -639.68, \quad z \approx -\frac{1.28915 \times 10^{11}\, y}{1.21987 \times 10^{6}\, y + 7.80324 \times 10^{8}}$$

$$x < 0, \quad y < -639.68, \quad z \approx \frac{3.16256 \times 10^{17}\, y}{3.74075 \times 10^{14}\, y + 4.3507 \times 10^{16}}$$

$$x < 0, \quad y \approx -639.68, \quad z \approx 1033.31$$

$$x < 0, \quad -639.68 < y < -120.459, \quad z \approx \frac{3.16256 \times 10^{17}\, y}{3.74075 \times 10^{14}\, y + 4.3507 \times 10^{16}}$$

$$x < 0, \quad -639.68 < y < -120.459, \quad z \approx -\frac{1.28915 \times 10^{11}\, y}{1.21987 \times 10^{6}\, y + 7.80324 \times 10^{8}}$$

Properties as a function:

Domain

$$\{(x, y, z) \in \mathbb{R}^3 : x \neq 0 \text{ and } y \neq 0 \text{ and } z \neq 0 \text{ and } y\,z\,(y\,(1\,280\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,z + 135\,269\,648\,631\,258\,433\,605\,355\,327\,955\,069\,426\,044\,651\,065\,286\,985\,077\,463\,063\,519\,216\,087\,585\,825\,828\,379\,833\,278\,128\,321) + 818\,790\,584\,801\,936\,885\,521\,399\,140\,709\,973\,806\,824\,050\,259\,014\,400\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,z) \geq 0\}$$

Range

$\mathbb{R}$ (all real numbers)

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

Roots for the variable z:

$$z \approx \frac{845.435\, y}{y + 116.305}$$

$$z = -\frac{12\,534\,120\,669\,402\,488\, y}{118\,605\,131\,448\, y + 75\,869\,347\,608\,452}$$

Partial derivatives:

$$\frac{\partial}{\partial x}\left(\frac{1.03535 \times 10^{-10} \left(\frac{116.305}{y} - \frac{845.435}{z} + 1\right) \sqrt{\frac{639.68}{y} + \frac{105\,679.}{z} + 1}}{x}\right) = -\frac{1.03535 \times 10^{-10} \left(\frac{116.305}{y} - \frac{845.435}{z} + 1\right) \sqrt{\frac{639.68}{y} + \frac{105\,679.}{z} + 1}}{x^2}$$

$$\frac{\partial}{\partial y}\left(\frac{1.03535\times 10^{-10}\left(\frac{116.305}{y}-\frac{845.435}{z}+1\right)\sqrt{\frac{639.68}{y}+\frac{105\,679.}{z}+1}}{x}\right)=$$

$$\frac{y\,(-4.51563\times 10^{-8}\,z-0.00124456)-0.0000115542\,z}{x\,y^3\,z\sqrt{\frac{639.68}{y}+\frac{105\,679.}{z}+1}}$$

$$\frac{\partial}{\partial z}\left(\frac{1.03535\times 10^{-10}\left(\frac{116.305}{y}-\frac{845.435}{z}+1\right)\sqrt{\frac{639.68}{y}+\frac{105\,679.}{z}+1}}{x}\right)=$$

$$\frac{y\,(0.0138755-5.38322\times 10^{-6}\,z)-0.000580286\,z}{x\,y\,z^3\sqrt{\frac{639.68}{y}+\frac{105\,679.}{z}+1}}$$

Indefinite integral:

$$\int \frac{1}{x}0.215943^{15}\left(\left(1+\frac{4\times 535.49165^2\times 0.215943^6}{y}-\frac{535.49165^4\times 0.215943^{12}}{z}\right)\sqrt{1+\frac{22\times 535.49165^2\times 0.215943^6}{y}+\frac{125\times 535.49165^4\times 0.215943^{12}}{z}}\right)dx=$$

$$1.03535\times 10^{-10}\log(x)\left(\frac{116.305}{y}-\frac{845.435}{z}+1\right)\sqrt{\frac{639.68}{y}+\frac{105\,679.}{z}+1}+\text{constant}$$

(assuming a complex-valued logarithm)

$\log(x)$ is the natural logarithm

Limit:

$$\lim_{x\to\pm\infty}\frac{1.03535\times 10^{-10}\left(1+\frac{116.305}{y}-\frac{845.435}{z}\right)\sqrt{1+\frac{639.68}{y}+\frac{105\,679.}{z}}}{x}=0\approx 0$$

$$\lim_{y\to\pm\infty}\frac{1.03535\times 10^{-10}\left(1+\frac{116.305}{y}-\frac{845.435}{z}\right)\sqrt{1+\frac{639.68}{y}+\frac{105\,679.}{z}}}{x}=$$

$$\frac{1.03535\times 10^{-10}\,(z-845.435)\sqrt{\frac{z+105\,679.}{z}}}{x\,z}$$

$$\lim_{z\to\pm\infty}\frac{1.03535\times 10^{-10}\left(1+\frac{116.305}{y}-\frac{845.435}{z}\right)\sqrt{1+\frac{639.68}{y}+\frac{105\,679.}{z}}}{x}=$$

$$\frac{1.03535\times 10^{-10}\,(y+116.305)\sqrt{\frac{y+639.68}{y}}}{x\,y}$$

From:

$$x < 0, \quad y < -639.68, \quad z \approx -\frac{1.28915\times10^{11}\,y}{1.21987\times10^{6}\,y + 7.80324\times10^{8}}$$

For y = -644

((0.215943)^15)/x ((((1+4*535.49165^2*((0.215943)^6)/(-644)-535.49165^4*((0.215943)^12)/(-15746747))))*sqrt(((((((1+22*535.49165^2*((0.215943)^6)/(-644)+125*535.49165^4*((0.215943)^12)/(-15746747)))))))

-(((1.28915e+11(-644)))) / (((1.21987e+6(-644) + 7.80324e+8)))

Input interpretation:

$$-\frac{1.28915\times10^{11}\times(-644)}{1.21987\times10^{6}\times(-644) + 7.80324\times10^{8}}$$

Result:

$-1.57467471378606599042539470589574150083076012654866580\ldots\times10^{7}$

-1.5746747137860659904253947058957415008307601265486658 × 10^7 = z

-644 = y

((0.215943)^15)/x (((1+4*535.49165^2*((0.215943)^6)/(-644)-535.49165^4*((0.215943)^12)/(-15746747))))*sqrt(((((((1+22*535.49165^2*((0.215943)^6)/(-644)+125*535.49165^4*((0.215943)^12)/(-15746747)))))))

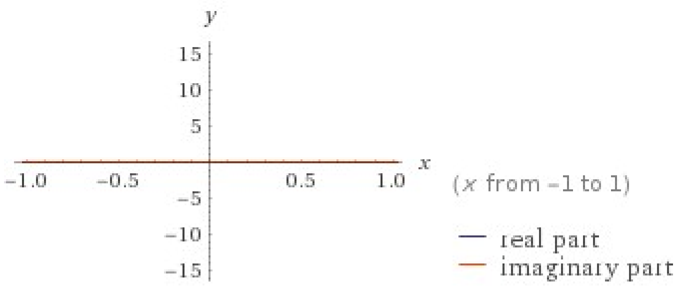
Input interpretation:

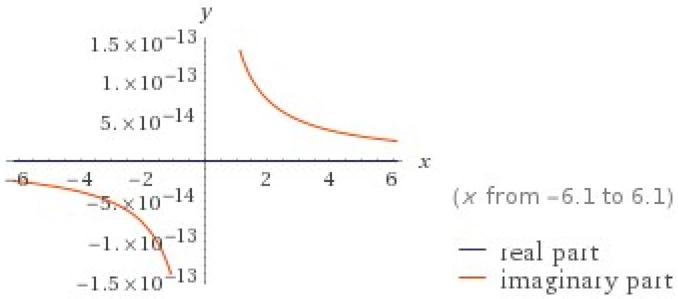
$$\frac{\frac{0.215943^{15}}{x}\left(1+4\times535.49165^2\left(-\frac{0.215943^6}{644}\right)-535.49165^4\left(-\frac{0.215943^{12}}{15\,746\,747}\right)\right)}{\sqrt{1+22\times535.49165^2\left(-\frac{0.215943^6}{644}\right)+125\times535.49165^4\left(-\frac{0.215943^{12}}{15\,746\,747}\right)}}$$

Result:

$$\frac{1.5505\times10^{-13}\,i}{x}$$

Plots:





Alternate form assuming x is real:

$$0 + i\left(\frac{1.5505\times10^{-13}}{x} + 0\right)$$

Roots:

(no roots exist)

Properties as a function:

Domain

$\{x \in \mathbb{R} : x \neq 0\}$

Range

$\{y \in \mathbb{R} : (-i)\,\infty < y < 0\,i$ or $0\,i < y < i\,\infty\}$

Parity

odd

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

Derivative:

$$\frac{d}{dx}\left(\frac{1.5505\times10^{-13}\,i}{x}\right) = -\frac{1.5505\times10^{-13}\,i}{x^2}$$

Indefinite integral:

$$\int \frac{1}{x}0.215943^{15}\left(1+-\frac{4}{644}\times 535.49165^2\times 0.215943^6--\frac{535.49165^4\times 0.215943^{12}}{15\,746\,747}\right)\sqrt{1+-\frac{22}{644}\times 535.49165^2\times 0.215943^6+-\frac{125\times 535.49165^4\times 0.215943^{12}}{15\,746\,747}}\,dx =$$

$$(1.5505\times 10^{-13}\,i)\log(x)+\text{constant}$$

(assuming a complex-valued logarithm)

$\log(x)$ is the natural logarithm

Series representations:

$$\frac{1}{x}\left(\left(1+-\frac{4}{644}\times 535.492^2\times 0.215943^6--\frac{535.492^4\times 0.215943^{12}}{15\,746\,747}\right)\sqrt{1+-\frac{22}{644}\times 535.492^2\times 0.215943^6+-\frac{125\times 535.492^4\times 0.215943^{12}}{15\,746\,747}}\right)0.215943^{15}=\frac{8.48422\times 10^{-11}\sqrt{-1.}\sum_{k=0}^{\infty}(-1.)^{-k}\binom{\frac{1}{2}}{k}}{x}$$

$$\frac{1}{x}\left(\left(1+-\frac{4}{644}\times 535.492^2\times 0.215943^6--\frac{535.492^4\times 0.215943^{12}}{15\,746\,747}\right)\sqrt{1+-\frac{22}{644}\times 535.492^2\times 0.215943^6+-\frac{125\times 535.492^4\times 0.215943^{12}}{15\,746\,747}}\right)0.215943^{15}=\frac{8.48422\times 10^{-11}\sqrt{-1.}\sum_{k=0}^{\infty}\frac{e^{-3.33977\times 10^{-6}k}\left(-\frac{1}{2}\right)_k}{k!}}{x}$$

$$\frac{1}{x}\left(\left(1+-\frac{4}{644}\times 535.492^2\times 0.215943^6--\frac{535.492^4\times 0.215943^{12}}{15\,746\,747}\right)\sqrt{1+-\frac{22}{644}\times 535.492^2\times 0.215943^6+-\frac{125\times 535.492^4\times 0.215943^{12}}{15\,746\,747}}\right)0.215943^{15}=\frac{4.24211\times 10^{-11}\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}(-1.)^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{x\sqrt{\pi}}$$

((0.215943)^15)/x (((1+4*535.49^2((0.215943)^6)/(-644)-535.49^4((0.215943)^12)/(-15746747))))sqrt[(((1+22*535.49^2((0.215943)^6)/(-644)+125*535.49^4((0.215943)^12)/(-15746747))))] = 1/x(1.5505e-13)i

Input interpretation:

$$\frac{0.215943^{15}}{x}\left(1+4\times 535.49^2\left(-\frac{0.215943^6}{644}\right)-535.49^4\left(-\frac{0.215943^{12}}{15\,746\,747}\right)\right)\sqrt{1+22\times 535.49^2\left(-\frac{0.215943^6}{644}\right)+125\times 535.49^4\left(-\frac{0.215943^{12}}{15\,746\,747}\right)} = \frac{1}{x}\times 1.5505\times 10^{-13}\,i$$

i is the imaginary unit

Result:

$$\frac{1.43586\times 10^{-13}}{x} = \frac{1.5505\times 10^{-13}\,i}{x}$$

Multiplying by x both sides and dividing the right hand-side by the left hand-side

Input interpretation:

$$1.5505\times 10^{-13}\times \frac{i}{1.43586\times 10^{-13}}$$

i is the imaginary unit

Result:

$1.07984\ldots\,i$

Polar coordinates:

$r = 1.07984$ (radius), $\theta = 90°$ (angle)

1.07984

With regard 1/x, we consider x = 1.07984i and obtain:

Input interpretation:

$$\frac{1}{1.07984\,i}$$

i is the imaginary unit

Result:

$-0.926063\ldots\,i$

Polar coordinates:

$r = 0.926063$ (radius), $\theta = -90°$ (angle)

0.926063

In conclusion, we have:

((0.215943)^15)(0.926063) (((1+4*535.49^2((0.215943)^6)/(-644)-535.49^4((0.215943)^12)/(-15746747))))sqrt[(((1+22*535.49^2((0.215943)^6)/(-644)+125*535.49^4((0.215943)^12)/(-15746747))))]

Input interpretation:

$$0.215943^{15} \times 0.926063 \left(\left(1 + 4 \times 535.49^2 \left(-\frac{0.215943^6}{644}\right) - 535.49^4 \left(-\frac{0.215943^{12}}{15\,746\,747}\right)\right)\right) \sqrt{1 + 22 \times 535.49^2 \left(-\frac{0.215943^6}{644}\right) + 125 \times 535.49^4 \left(-\frac{0.215943^{12}}{15\,746\,747}\right)}$$

Result:

$1.32969231185311730708474939350590228629448540196308 96\ldots \times 10^{-13}$

1.32969231185311730708474939350590228629448540 19 × 10^-13

1.32969231185…*10^{-13}

$$\frac{0.215943^{15}}{x} \left(\left(1 + 4 \times 535.49165^2 \times \frac{0.215943^6}{y} - 535.49165^4 \times \frac{0.215943^{12}}{z}\right)\right) \sqrt{1 + 22 \times 535.49165^2 \times \frac{0.215943^6}{y} + 125 \times 535.49165^4 \times \frac{0.215943^{12}}{z}}$$

$$F(q) := \frac{f^{15}(-q^2)}{f^3(-q^{10})}\left(1 + 4q^2\frac{f^6(-q^{10})}{f^6(-q^2)} - q^4\frac{f^{12}(-q^{10})}{f^{12}(-q^2)}\right) \times \sqrt{1 + 22q^2\frac{f^6(-q^{10})}{f^6(-q^2)} + 125q^4\frac{f^{12}(-q^{10})}{f^{12}(-q^2)}}$$
$$= \frac{z_1^6 m^{3/2}}{64}\left(\frac{2-p}{1+2p}\right)^6$$

((0.215943)^15)(0.926063) (((1+4*535.49^2((0.215943)^6)/(-644)-535.49^4((0.215943)^12)/(-15746747))))sqrt[(((1+22*535.49^2((0.215943)^6)/(-644)+x*535.49^4((0.215943)^12)/(-15746747))))] = 1.3296923118531173e-13

Input interpretation:

$$0.215943^{15}\times 0.926063\left(\left(1+4\times 535.49^2\left(-\frac{0.215943^6}{644}\right)-535.49^4\left(-\frac{0.215943^{12}}{15\,746\,747}\right)\right)\sqrt{1+22\times 535.49^2\left(-\frac{0.215943^6}{644}\right)+x\times 535.49^4\left(-\frac{0.215943^{12}}{15\,746\,747}\right)}\right)=$$

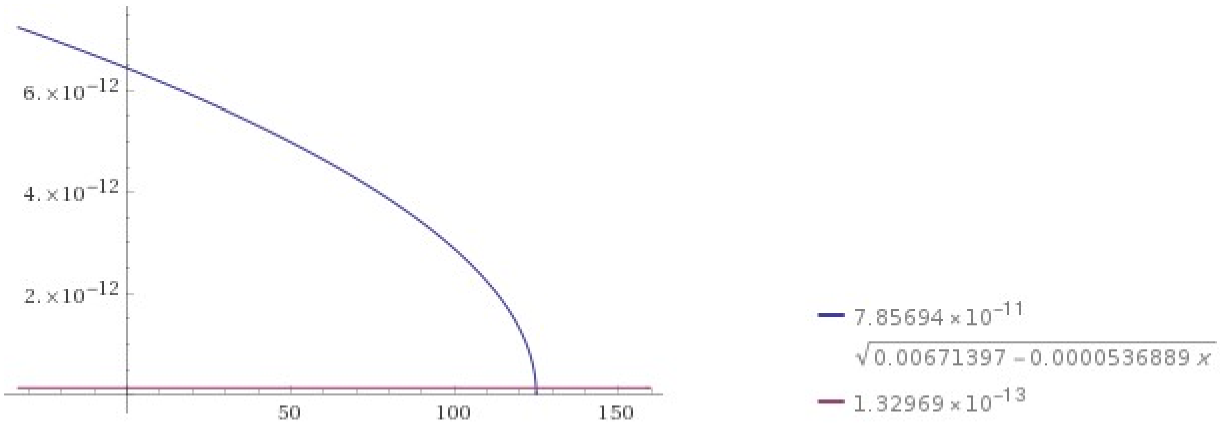
1.32969×10^{-13}

$1.32969*10^{-13}$

Result:

$$7.85694\times 10^{-11}\sqrt{0.00671397-0.0000536889\,x}=1.32969\times 10^{-13}$$

Plot:



Alternate form assuming x is positive:

$$\sqrt{0.00671397-0.0000536889\,x}=0.00169238$$

Solution:

$x\approx 125.$

125

Further, we have:

2(((((0.215943)^15)(0.926063)(((1+4*535.49^2((0.215943)^6)/(-644)-535.49^4((0.215943)^12)/(-15746747))))sqrt[(((1+22*535.49^2((0.215943)^6)/(-644)+125*535.49^4((0.215943)^12)/(-15746747))))])))^1/140

Input interpretation:

$$2\left(0.215943^{15}\times 0.926063\left(1+4\times 535.49^2\left(-\frac{0.215943^6}{644}\right)-535.49^4\left(-\frac{0.215943^{12}}{15\,746\,747}\right)\right)\right.$$
$$\left.\sqrt{1+22\times 535.49^2\left(-\frac{0.215943^6}{644}\right)+125\times 535.49^4\left(-\frac{0.215943^{12}}{15\,746\,747}\right)}\right)\text{^}(1/140)$$

Result:

1.618291636471157375032925212043033340429253985167673522183...

1.61829163647.... result that is a very good approximation to the value of the golden ratio 1,618033988749...

From which:

2+18e-12/[((0.215943)^15)(0.926063)(((1+4*535.49^2((0.215943)^6)/(-644)-535.49^4((0.215943)^12)/(-15746747))))sqrt[(((1+22*535.49^2((0.215943)^6)/(-644)+125*535.49^4((0.215943)^12)/(-15746747))))]]

Input interpretation:

$$2+(18\times 10^{-12})\Big/$$
$$\left(0.215943^{15}\times 0.926063\left(1+4\times 535.49^2\left(-\frac{0.215943^6}{644}\right)-535.49^4\left(-\frac{0.215943^{12}}{15\,746\,747}\right)\right)\right.$$
$$\left.\sqrt{1+22\times 535.49^2\left(-\frac{0.215943^6}{644}\right)+125\times 535.49^4\left(-\frac{0.215943^{12}}{15\,746\,747}\right)}\right)$$

Result:

137.3696628877579466850249391472836843564463875601568548975...

137.36966288.... result practically equal to the golden angle value 137.5

4+18e-12/[((0.215943)^15)(0.926063)(((1+4*535.49^2((0.215943)^6)/(-644)-535.49^4((0.215943)^12)/(-15746747))))sqrt[(((1+22*535.49^2((0.215943)^6)/(-644)+125*535.49^4((0.215943)^12)/(-15746747))))]]

Input interpretation:

$$4+\frac{18\times 10^{-12}}{0.215943^{15}\times 0.926063\left(1+4\times 535.49^2\left(-\frac{0.215943^6}{644}\right)-535.49^4\left(-\frac{0.215943^{12}}{15\,746\,747}\right)\right)\sqrt{1+22\times 535.49^2\left(-\frac{0.215943^6}{644}\right)+125\times 535.49^4\left(-\frac{0.215943^{12}}{15\,746\,747}\right)}}$$

Result:

139.369662887757946685024939147283684356446387560156854897 5...

139.36966288… result practically equal to the rest mass of Pion meson 139.57 MeV

-8-2+18e-12/[((0.215943)^15)(0.926063)(((1+4*535.49^2((0.215943)^6)/(-644)-535.49^4((0.215943)^12)/(-15746747))))sqrt[(((1+22*535.49^2((0.215943)^6)/(-644)+125*535.49^4((0.215943)^12)/(-15746747))))]]

Input interpretation:

$$-8-2+\frac{18\times 10^{-12}}{0.215943^{15}\times 0.926063\left(1+4\times 535.49^2\left(-\frac{0.215943^6}{644}\right)-535.49^4\left(-\frac{0.215943^{12}}{15\,746\,747}\right)\right)\sqrt{1+22\times 535.49^2\left(-\frac{0.215943^6}{644}\right)+125\times 535.49^4\left(-\frac{0.215943^{12}}{15\,746\,747}\right)}}$$

Result:

125.369662887757946685024939147283684356446387560156854897 5...

125.36966288.... result very near to the Higgs boson mass 125.18 GeV

Page 301 - **Manuscript Book II of Srinivasa Ramanujan**

Now, we have:

$$\sqrt{145}\quad(\sqrt{5}-2)^6.\left(\frac{\sqrt{29}-5}{2}\right)^6\left(\sqrt{\frac{17+\sqrt{145}}{8}}\pm\sqrt{\frac{9+\sqrt{145}}{8}}\right)^{12}$$

sqrt145 (sqrt5-2)^6 ((sqrt29-5)/2)^6 ((((((17+sqrt145)/8)^1/2+((9+sqrt145)/8)^1/2))))^12

Input:

$$\sqrt{145}\left(\sqrt{5}-2\right)^6\left(\frac{1}{2}\left(\sqrt{29}-5\right)\right)^6\left(\sqrt{\frac{1}{8}\left(17+\sqrt{145}\right)}+\sqrt{\frac{1}{8}\left(9+\sqrt{145}\right)}\right)^{12}$$

Result:

$$\frac{1}{64}\sqrt{145}\left(\sqrt{5}-2\right)^6\left(\sqrt{29}-5\right)^6\left(\frac{1}{2}\sqrt{\frac{1}{2}\left(9+\sqrt{145}\right)}+\frac{1}{2}\sqrt{\frac{1}{2}\left(17+\sqrt{145}\right)}\right)^{12}$$

Decimal approximation:

0.394107878245521876106704896352320685975182263920250100259...

0.39410787824….

Alternate forms:

$$\frac{1}{16\,777\,216}\left(340\,958\,800-152\,481\,420\sqrt{5}-63\,314\,460\sqrt{29}+28\,315\,089\sqrt{145}\right)\left(\sqrt{2\left(9+\sqrt{145}\right)}+\sqrt{5}+\sqrt{29}\right)^{12}$$

$$\frac{\sqrt{145}\left(\sqrt{5}-2\right)^6\left(\sqrt{29}-5\right)^6\left(\sqrt{5}+\sqrt{9-8i}+\sqrt{9+8i}+\sqrt{29}\right)^{12}}{1\,073\,741\,824}$$

$$\frac{\sqrt{145}\left(\sqrt{5}-2\right)^6\left(\sqrt{29}-5\right)^6\left(\sqrt{9+\sqrt{145}}+\sqrt{17+\sqrt{145}}\right)^{12}}{16\,777\,216}$$

Minimal polynomial:

$$x^8-5\,055\,579\,370\,108\,800\,x^7+1\,915\,366\,312\,863\,301\,820\,x^6-28\,916\,231\,085\,363\,024\,000\,x^5+3\,161\,600\,309\,605\,299\,390\,150\,x^4-4\,192\,853\,507\,377\,638\,480\,000\,x^3+40\,270\,576\,727\,950\,920\,765\,500\,x^2-15\,412\,565\,657\,197\,940\,400\,000\,x+442\,050\,625$$

sqrt((((129/125)*1/(((sqrt145 (sqrt5-2)^6 ((sqrt29-5)/2)^6 ((((((17+sqrt145)/8)^1/2+((9+sqrt145)/8)^1/2))))^12))))))

Input:

$$\sqrt{\frac{129}{125}\times\frac{1}{\sqrt{145}\left(\sqrt{5}-2\right)^6\left(\frac{1}{2}\left(\sqrt{29}-5\right)\right)^6\left(\sqrt{\frac{1}{8}\left(17+\sqrt{145}\right)}+\sqrt{\frac{1}{8}\left(9+\sqrt{145}\right)}\right)^{12}}}$$

Result:

$$\frac{8\sqrt{129}}{5\times5^{3/4}\sqrt[4]{29}\left(\sqrt{5}-2\right)^3\left(\sqrt{29}-5\right)^3\left(\frac{1}{2}\sqrt{\frac{1}{2}\left(9+\sqrt{145}\right)}+\frac{1}{2}\sqrt{\frac{1}{2}\left(17+\sqrt{145}\right)}\right)^6}$$

Decimal approximation:

1.6182003485472641457172380342640024039958399473230124457 53...

1.618200348547… result that is a very good approximation to the value of the golden ratio 1,618033988749...

Alternate forms:

$$\frac{4096\sqrt{3741\,(340\,958\,800+152\,481\,420\sqrt{5}+63\,314\,460\sqrt{29}+28\,315\,089\sqrt{145})}}{725\,(\sqrt{5}+\sqrt{29}+2\sqrt{77})^6}$$

$$\frac{32\,768\sqrt{129}}{5\times 5^{3/4}\sqrt[4]{29}\,(\sqrt{5}-2)^3\,(\sqrt{29}-5)^3\,(\sqrt{5}+\sqrt{9-8i}+\sqrt{9+8i}+\sqrt{29})^6}$$

$$\frac{4096\sqrt{129}}{5\times 5^{3/4}\sqrt[4]{29}\,(\sqrt{5}-2)^3\,(\sqrt{29}-5)^3\left(\sqrt{9+\sqrt{145}}+\sqrt{17+\sqrt{145}}\right)^6}$$

Minimal polynomial:

$$26\,348\,270\,475\,864\,410\,400\,390\,625\,x^{16} - 948\,057\,637\,109\,057\,575\,035\,095\,214\,843\,750\,000\,000\,x^{14} + 2\,556\,391\,400\,641\,751\,375\,040\,761\,947\,631\,835\,937\,500\,x^{12} - 274\,681\,167\,691\,009\,380\,218\,283\,691\,406\,250\,000\,000\,x^{10} + 213\,749\,869\,703\,708\,857\,418\,916\,265\,173\,339\,843\,750\,x^{8} - 2\,017\,531\,282\,337\,583\,270\,052\,395\,656\,250\,000\,000\,x^{6} + 137\,914\,564\,594\,234\,135\,859\,954\,772\,690\,937\,500\,x^{4} - 375\,672\,078\,834\,721\,594\,174\,418\,972\,400\,000\,x^{2} + 76\,686\,282\,021\,340\,161$$

All 2nd roots of 8256/(125 sqrt(145) (sqrt(5) - 2)^6 (sqrt(29) - 5)^6 (1/2 sqrt(1/2 (9 + sqrt(145))) + 1/2 sqrt(1/2 (17 + sqrt(145))))^12):

$$\frac{8\sqrt{129}\,e^{0}}{5\times 5^{3/4}\sqrt[4]{29}\,(\sqrt{5}-2)^3\,(\sqrt{29}-5)^3\left(\frac{1}{2}\sqrt{\frac{1}{2}(9+\sqrt{145})}+\frac{1}{2}\sqrt{\frac{1}{2}(17+\sqrt{145})}\right)^6}\approx 1.62$$

(real, principal root)

$$\frac{8\sqrt{129}\,e^{i\pi}}{5\times 5^{3/4}\sqrt[4]{29}\,(\sqrt{5}-2)^3\,(\sqrt{29}-5)^3\left(\frac{1}{2}\sqrt{\frac{1}{2}(9+\sqrt{145})}+\frac{1}{2}\sqrt{\frac{1}{2}(17+\sqrt{145})}\right)^6}\approx -1.62$$

(real root)

55/(((sqrt145 (sqrt5-2)^6 ((sqrt29-5)/2)^6 ((((((17+sqrt145)/8)^1/2+((9+sqrt145)/8)^1/2))))^12)))

Input:

$$\frac{55}{\sqrt{145}\,(\sqrt{5}-2)^6\left(\frac{1}{2}(\sqrt{29}-5)\right)^6\left(\sqrt{\frac{1}{8}(17+\sqrt{145})}+\sqrt{\frac{1}{8}(9+\sqrt{145})}\right)^{12}}$$

Result:

$$\frac{704\sqrt{\frac{5}{29}}}{(\sqrt{5}-2)^6(\sqrt{29}-5)^6\left(\frac{1}{2}\sqrt{\frac{1}{2}(9+\sqrt{145})}+\frac{1}{2}\sqrt{\frac{1}{2}(17+\sqrt{145})}\right)^{12}}$$

Decimal approximation:

139.55569790902790130979040224443015164680222570924717365 05...

139.555697909… result practically equal to the rest mass of Pion meson 139.57 MeV

Alternate forms:

$$\frac{184549376\,(340958800+152481420\sqrt{5}+63314460\sqrt{29}+28315089\sqrt{145})}{29\,(\sqrt{5}+\sqrt{29}+2\sqrt{77})^{12}}$$

$$\frac{11811160064\sqrt{\frac{5}{29}}}{(\sqrt{5}-2)^6(\sqrt{29}-5)^6(\sqrt{5}+\sqrt{9-8i}+\sqrt{9+8i}+\sqrt{29})^{12}}$$

$$\frac{184549376\sqrt{\frac{5}{29}}}{(\sqrt{5}-2)^6(\sqrt{29}-5)^6\left(\sqrt{9+\sqrt{145}}+\sqrt{17+\sqrt{145}}\right)^{12}}$$

Minimal polynomial:

$707281x^8 - 1356305777833418755200x^7 + 194909591363282456505020x^6 - 1116137603663927363376000x^5 + 46288990132931188371186150x^4 - 23284939662644001891120000x^3 + 84829706514560595888525500x^2 - 12314867461172809275600000x + 133974300625$

55/(((sqrt145 (sqrt5-2)^6 ((sqrt29-5)/2)^6 ((((((17+sqrt145)/8)^1/2+((9+sqrt145)/8)^1/2))))^12)))-2

Input:

$$\frac{55}{\sqrt{145}\,(\sqrt{5}-2)^6\left(\frac{1}{2}(\sqrt{29}-5)\right)^6\left(\sqrt{\frac{1}{8}(17+\sqrt{145})}+\sqrt{\frac{1}{8}(9+\sqrt{145})}\right)^{12}}-2$$

Result:

$$\frac{704\sqrt{\frac{5}{29}}}{(\sqrt{5}-2)^6(\sqrt{29}-5)^6\left(\frac{1}{2}\sqrt{\frac{1}{2}(9+\sqrt{145})}+\frac{1}{2}\sqrt{\frac{1}{2}(17+\sqrt{145})}\right)^{12}}-2$$

Decimal approximation:

137.5556979090279013097904022444301516468022257092471736505...

137.555697909… result practically equal to the golden angle value 137.5

Alternate forms:

$$\left(-965\,946\,964\,004\,098\,048+28\,140\,350\,912\,593\,920\sqrt{5}+11\,684\,644\,084\,776\,960\sqrt{29}-65\,128\,462\,029\,402\,112\sqrt{145}-43\,292\,218\,524\,336\,128\sqrt{385}-21\,723\,524\,016\,865\,280\sqrt{2233}\right)/\left(29\left(\sqrt{5}+\sqrt{29}+2\sqrt{77}\right)^{12}\right)$$

$$-2+\frac{11\,811\,160\,064\sqrt{\frac{5}{29}}}{(\sqrt{5}-2)^6(\sqrt{29}-5)^6(\sqrt{5}+\sqrt{9-8i}+\sqrt{9+8i}+\sqrt{29})^{12}}$$

$$\frac{184\,549\,376\sqrt{\frac{5}{29}}}{(\sqrt{5}-2)^6(\sqrt{29}-5)^6\left(\sqrt{9+\sqrt{145}}+\sqrt{17+\sqrt{145}}\right)^{12}}-2$$

Minimal polynomial:

$$707\,281\,x^8-1\,356\,305\,777\,833\,407\,438\,704\,x^7+175\,921\,310\,473\,614\,673\,147\,692\,x^6+1\,108\,847\,807\,357\,455\,256\,109\,328\,x^5+46\,442\,423\,960\,295\,505\,668\,426\,070\,x^4+332\,807\,480\,636\,786\,890\,348\,667\,952\,x^3+1\,012\,631\,687\,880\,414\,649\,805\,351\,052\,x^2+1\,476\,356\,375\,159\,306\,251\,163\,828\,784\,x+845\,617\,619\,352\,085\,621\,955\,908\,641$$

(((55/(((sqrt145 (sqrt5-2)^6 ((sqrt29-5)/2)^6 ((((((17+sqrt145)/8)^1/2+((9+sqrt145)/8)^1/2))))^12))))))-11-Pi

Input:

$$\frac{55}{\sqrt{145}\,(\sqrt{5}-2)^6\left(\frac{1}{2}(\sqrt{29}-5)\right)^6\left(\sqrt{\frac{1}{8}(17+\sqrt{145})}+\sqrt{\frac{1}{8}(9+\sqrt{145})}\right)^{12}}-11-\pi$$

Exact result:

$$-11+\frac{704\sqrt{\frac{5}{29}}}{(\sqrt{5}-2)^6(\sqrt{29}-5)^6\left(\frac{1}{2}\sqrt{\frac{1}{2}(9+\sqrt{145})}+\frac{1}{2}\sqrt{\frac{1}{2}(17+\sqrt{145})}\right)^{12}}-\pi$$

Decimal approximation:

125.41410525543810807132775886115064876260505630987206782 95...

125.41410525543… result very near to the Higgs boson mass 125.18 GeV

Property:

$$-11+\frac{704\sqrt{\frac{5}{29}}}{(-2+\sqrt{5})^6(-5+\sqrt{29})^6\left(\frac{1}{2}\sqrt{\frac{1}{2}(9+\sqrt{145})}+\frac{1}{2}\sqrt{\frac{1}{2}(17+\sqrt{145})}\right)^{12}}-\pi$$

is a transcendental number

or:

(((55/(((sqrt145 (sqrt5-2)^6 ((sqrt29-5)/2)^6 ((((((17+sqrt145)/8)^1/2+((9+sqrt145)/8)^1/2))))^12))))))-11-2golden ratio

Input:

$$\frac{55}{\sqrt{145}\,(\sqrt{5}-2)^6\left(\frac{1}{2}(\sqrt{29}-5)\right)^6\left(\sqrt{\frac{1}{8}(17+\sqrt{145})}+\sqrt{\frac{1}{8}(9+\sqrt{145})}\right)^{12}}-11-2\phi$$

ϕ is the golden ratio

Exact result:

$$-2\phi-11+\frac{704\sqrt{\frac{5}{29}}}{(\sqrt{5}-2)^6(\sqrt{29}-5)^6\left(\frac{1}{2}\sqrt{\frac{1}{2}(9+\sqrt{145})}+\frac{1}{2}\sqrt{\frac{1}{2}(17+\sqrt{145})}\right)^{12}}$$

Decimal approximation:

125.3196299315281116133812285756988754113616073496356479262...

125.319629931… result very near to the Higgs boson mass 125.18 GeV

Alternate forms:

$$-2\phi-11+\frac{11811160064\sqrt{\frac{5}{29}}}{(\sqrt{5}-2)^6(\sqrt{29}-5)^6(\sqrt{5}+\sqrt{9-8i}+\sqrt{9+8i}+\sqrt{29})^{12}}$$

$$-2\phi-11+\frac{184549376\sqrt{\frac{5}{29}}}{(\sqrt{5}-2)^6(\sqrt{29}-5)^6\left(\sqrt{9+\sqrt{145}}+\sqrt{17+\sqrt{145}}\right)^{12}}$$

root of $707281x^8-1356305777833350856224x^7+84012697942789358334792x^6+8206163058652806737899008x^5+275407756909441483638486320x^4+5281597542619427819651837952x^3+60420629105325189920025616512x^2+374682913235193685563587856384x+955400839344012049313456210176$ near $x=125.32$

Minimal polynomial:

$$707281x^8-1356305777833350856224x^7+84012697942789358334792x^6+8206163058652806737899008x^5+275407756909441483638486320x^4+5281597542619427819651837952x^3+60420629105325189920025616512x^2+374682913235193685563587856384x+955400839344012049313456210176$$

Series representations:

$$\frac{55}{\sqrt{145}\left(\sqrt{5}-2\right)^6\left(\frac{1}{2}\left(\sqrt{29}-5\right)\right)^6\left(\sqrt{\frac{1}{8}\left(17+\sqrt{145}\right)}+\sqrt{\frac{1}{8}\left(9+\sqrt{145}\right)}\right)^{12}}-11-2\phi=$$

$$-11-2\phi+3520\Bigg/\left(\sqrt{144}\left(-2+\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}\right)^6\left(-5+\sqrt{28}\sum_{k=0}^{\infty}28^{-k}\binom{\frac{1}{2}}{k}\right)^6\left(\sum_{k=0}^{\infty}144^{-k}\binom{\frac{1}{2}}{k}\right)\left(\frac{\sqrt{9+\sqrt{144}\sum_{k=0}^{\infty}144^{-k}\binom{\frac{1}{2}}{k}}}{2\sqrt{2}}+\frac{\sqrt{17+\sqrt{144}\sum_{k=0}^{\infty}144^{-k}\binom{\frac{1}{2}}{k}}}{2\sqrt{2}}\right)^{12}\right)$$

$$\frac{55}{\sqrt{145}\left(\sqrt{5}-2\right)^6\left(\frac{1}{2}\left(\sqrt{29}-5\right)\right)^6\left(\sqrt{\frac{1}{8}\left(17+\sqrt{145}\right)}+\sqrt{\frac{1}{8}\left(9+\sqrt{145}\right)}\right)^{12}}-11-2\phi=$$

$$-11-2\phi+3520\Bigg/\left(\sqrt{144}\left(-2+\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)^6\left(-5+\sqrt{28}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{28}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)^6\left(\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{144}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\left(\frac{\sqrt{9+\sqrt{144}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{144}\right)^k\left(-\frac{1}{2}\right)_k}{k!}}}{2\sqrt{2}}+\frac{\sqrt{17+\sqrt{144}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{144}\right)^k\left(-\frac{1}{2}\right)_k}{k!}}}{2\sqrt{2}}\right)^{12}\right)$$

$$\frac{55}{\sqrt{145}\,(\sqrt{5}-2)^6\left(\frac{1}{2}(\sqrt{29}-5)\right)^6\left(\sqrt{\frac{1}{8}(17+\sqrt{145})}+\sqrt{\frac{1}{8}(9+\sqrt{145})}\right)^{12}}-11-2\phi =$$

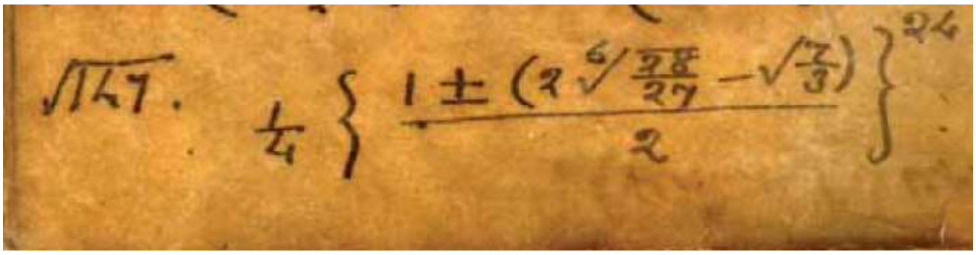
$$-11-2\phi+3520\Bigg/\left(\sqrt{z_0}\left(-2+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}\right)^6\right.$$

$$\left(-5+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(29-z_0)^k z_0^{-k}}{k!}\right)^6$$

$$\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(145-z_0)^k z_0^{-k}}{k!}\right)\left(\frac{\sqrt{9+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(145-z_0)^k z_0^{-k}}{k!}}}{2\sqrt{2}}+\right.$$

$$\left.\left.\frac{\sqrt{17+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(145-z_0)^k z_0^{-k}}{k!}}}{2\sqrt{2}}\right)^{12}\right)$$

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



sqrt147 * 1/4 [(1/2(1+(2(28/27)^1/6-(7/3)^1/2)))]^24

Input:

$$\sqrt{147}\times\frac{1}{4}\left(\frac{1}{2}\left(1+\left(2\sqrt[6]{\frac{28}{27}}-\sqrt{\frac{7}{3}}\right)\right)\right)^{24}$$

Result:

$$\frac{7\sqrt{3}\left(1-\sqrt{\frac{7}{3}}+\frac{2\sqrt[3]{2}\sqrt[6]{7}}{\sqrt{3}}\right)^{24}}{67\,108\,864}$$

Decimal approximation:

0.002375446998015593652699176828666312896463588049572173350...

0.002375446998…

Alternate forms:

$$\frac{7\sqrt{3}\left(3+2\sqrt[3]{2}\sqrt{3}\sqrt[6]{7}-\sqrt{21}\right)^{24}}{18\,953\,525\,353\,286\,467\,584}$$

$$\frac{7\sqrt{3}\left(-1+\sqrt{\frac{7}{3}}-\frac{2\sqrt[3]{2}\sqrt[6]{7}}{\sqrt{3}}\right)^{24}}{67\,108\,864}$$

$$\frac{7\left(\sqrt{3}+2\sqrt[3]{2}\sqrt[6]{7}-\sqrt{7}\right)^{24}}{11\,888\,133\,931\,008\sqrt{3}}$$

Minimal polynomial:

$$16\,777\,216\,x^{12}+41\,965\,406\,750\,929\,707\,859\,968\,x^{10}+ 26\,242\,365\,893\,781\,074\,497\,078\,567\,129\,850\,511\,360\,x^{8}+ 613\,126\,613\,976\,783\,772\,404\,361\,354\,938\,184\,718\,499\,840\,x^{6}+ 3\,606\,652\,938\,269\,232\,022\,348\,555\,370\,061\,318\,335\,121\,719\,040\,x^{4}- 20\,351\,435\,261\,937\,652\,270\,756\,815\,897\,837\,426\,960\,672\,x^{2}+10\,090\,298\,369\,529$$

(1/3) 1/(((sqrt147 * 1/4 [(1/2(1+(2(28/27)^1/6-(7/3)^1/2)))]^24))) – 3

Input:

$$\frac{1}{3}\times\frac{1}{\sqrt{147}\times\frac{1}{4}\left(\frac{1}{2}\left(1+\left(2\sqrt[6]{\frac{28}{27}}-\sqrt{\frac{7}{3}}\right)\right)\right)^{24}}-3$$

Exact result:

$$\frac{67\,108\,864}{21\sqrt{3}\left(1-\sqrt{\frac{7}{3}}+\frac{2\sqrt[3]{2}\sqrt[6]{7}}{\sqrt{3}}\right)^{24}}-3$$

Decimal approximation:

137.3244667684836141872732365744474278599026877464558261308...

137.3244667684… result practically equal to the golden angle value 137.5

Alternate forms:

$$\frac{67\,108\,864}{21\sqrt{3}\left(-1+\sqrt{\frac{7}{3}}-\frac{2\sqrt[3]{2}\sqrt[6]{7}}{\sqrt{3}}\right)^{24}}-3$$

$$\frac{3962711310336\sqrt{3}}{7\left(\sqrt{3}+2\sqrt[3]{2}\sqrt[6]{7}-\sqrt{7}\right)^{24}}-3$$

$$\sqrt{\left(\begin{array}{l}\text{root of } 5362398255800861289x^6 - \\ 1201731900782156428935918932381896411354211322x^5 + \\ 23609171992449234259326755424499810377424612645815x^4 + \\ 850904041537107569118571372474834026186719310397140x^3 + \\ 11491590907617000227439077338003069778367163561982535x^2 + \\ 68962722588575990539938610213366377007979874787060038x + \\ 155183947551289602793905678656171473335258997941414841 \\ \text{near } x = 19682.\end{array}+9\right)}-3$$

(1/3) 1/(((sqrt147 * 1/4 [(1/2(1+(2(28/27)^1/6-(7/3)^1/2)))]^24))) – 1

Input:

$$\frac{1}{3}\times\frac{1}{\sqrt{147}\times\frac{1}{4}\left(\frac{1}{2}\left(1+\left(2\sqrt[6]{\frac{28}{27}}-\sqrt{\frac{7}{3}}\right)\right)\right)^{24}}-1$$

Exact result:

$$\frac{67108864}{21\sqrt{3}\left(1-\sqrt{\frac{7}{3}}+\frac{2\sqrt[3]{2}\sqrt[6]{7}}{\sqrt{3}}\right)^{24}}-1$$

Decimal approximation:

139.3244667684836141872732365744474278599026877464558261308...

139.3244667684... result practically equal to the rest mass of Pion meson 139.57 MeV

Alternate forms:

$$\frac{67108864}{21\sqrt{3}\left(-1+\sqrt{\frac{7}{3}}-\frac{2\sqrt[3]{2}\sqrt[6]{7}}{\sqrt{3}}\right)^{24}}-1$$

$$\frac{3962711310336\sqrt{3}}{7\left(\sqrt{3}+2\sqrt[3]{2}\sqrt[6]{7}-\sqrt{7}\right)^{24}}-1$$

$$\sqrt{\left(\boxed{\begin{array}{l}\text{root of } 5362398255800861289x^6 - \\ \quad 1201731900782156428935919189777012689795553194x^5 + \\ \quad 23657241268480520516484192186942988559447607936135x^4 + \\ \quad 94641429362231492705596210719204722266464190885620x^3 + \\ \quad 141968823158929165090990386878241393279489848008935x^2 + \\ \quad 94648331964589844913273590320310294208728708778966x + \\ \quad 23662495167510869854966286055135495225309864082249 \\ \quad \text{near } x = 19690.\end{array}}+1\right)}-1$$

(1/3) 1/(((sqrt147 * 1/4 [(1/2(1+(2(28/27)^1/6-(7/3)^1/2)))]^24))) -11-4

Input:

$$\frac{1}{3}\times\frac{1}{\sqrt{147}\times\frac{1}{4}\left(\frac{1}{2}\left(1+\left(2\sqrt[6]{\frac{28}{27}}-\sqrt{\frac{7}{3}}\right)\right)\right)^{24}}-11-4$$

Exact result:

$$\frac{67108864}{21\sqrt{3}\left(1-\sqrt{\frac{7}{3}}+\frac{2\sqrt[3]{2}\sqrt[6]{7}}{\sqrt{3}}\right)^{24}}-15$$

Decimal approximation:

125.3244667684836141872732365744474278599026877464558261308...

125.3244667684… result very near to the Higgs boson mass 125.18 GeV

Alternate forms:

$$\frac{67108864}{21\sqrt{3}\left(-1+\sqrt{\frac{7}{3}}-\frac{2\sqrt[3]{2}\sqrt[6]{7}}{\sqrt{3}}\right)^{24}}-15$$

$$\frac{3962711310336\sqrt{3}}{7\left(\sqrt{3}+2\sqrt[3]{2}\sqrt[6]{7}-\sqrt{7}\right)^{24}}-15$$

$$\sqrt{\left(\text{root of } 5362398255800861289x^6 - 1201731900782156428935911982713756893437980778x^5 + 22311301539604505316075966730348157592836828911815x^4 + 20688548607384323065692546802962961660426495976191860x^3 + 7050827693006084199482550163494188384558776554310322535x^2 + 1062757355615864192023819918308858820256382780571526205462x + 59953347318710478396600039205404694510590543942288704828041 \text{ near } x = 19466. + 225\right)} - 15$$

27*1/2(((((1/3) 1/(((sqrt147 * 1/4 [(1/2(1+(2(28/27)^1/6-(7/3)^1/2)))]^24)))-13))))+8+2

Input:

$$27 \times \frac{1}{2}\left(\frac{1}{3} \times \frac{1}{\sqrt{147} \times \frac{1}{4}\left(\frac{1}{2}\left(1+\left(2\sqrt[6]{\frac{28}{27}}-\sqrt{\frac{7}{3}}\right)\right)\right)^{24}} - 13\right) + 8 + 2$$

Exact result:

$$10 + \frac{27}{2}\left(\frac{67108864}{21\sqrt{3}\left(1-\sqrt{\frac{7}{3}}+\frac{2\sqrt[3]{2}\sqrt[6]{7}}{\sqrt{3}}\right)^{24}} - 13\right)$$

Decimal approximation:

1728.880301374528791528188693755040276108686284577153652766...

1728.88030137… ≈ 1729

This result is very near to the mass of candidate glueball **f_0(1710) scalar meson.** Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. 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 (taxicab number)

Alternate forms:

$$\frac{100663296\sqrt{3}}{7\left(-1+\sqrt{\frac{7}{3}}-\frac{2\sqrt[3]{2}\sqrt[6]{7}}{\sqrt{3}}\right)^{24}}-\frac{331}{2}$$

$$\frac{53496602689536\sqrt{3}}{7\left(\sqrt{3}+2\sqrt[3]{2}\sqrt[6]{7}-\sqrt{7}\right)^{24}}-\frac{331}{2}$$

$$\frac{100663296\sqrt{3}}{7\left(1-\sqrt{\frac{7}{3}}+\frac{2\sqrt[3]{2}\sqrt[6]{7}}{\sqrt{3}}\right)^{24}}-\frac{331}{2}$$

(((27*1/2(((((1/3) 1/(((sqrt147 * 1/4 [(1/2(1+(2(28/27)^1/6-(7/3)^1/2))]^24)))-13))))+8+2)))^1/15 - (21+5)1/10^3

Input:

$$\sqrt[15]{27\times\frac{1}{2}\left(\frac{1}{3}\times\frac{1}{\sqrt{147}\times\frac{1}{4}\left(\frac{1}{2}\left(1+\left(2\sqrt[6]{\frac{28}{27}}-\sqrt{\frac{7}{3}}\right)\right)\right)^{24}}-13\right)+8+2}-(21+5)\times\frac{1}{10^3}$$

Exact result:

$$\sqrt[15]{10+\frac{27}{2}\left(\frac{67108864}{21\sqrt{3}\left(1-\sqrt{\frac{7}{3}}+\frac{2\sqrt[3]{2}\sqrt[6]{7}}{\sqrt{3}}\right)^{24}}-13\right)}-\frac{13}{500}$$

Decimal approximation:

1.617807641751212791314019676912981193380409068128027356371...

1.617807641... result that is a very good approximation to the value of the golden ratio 1,618033988749...

Observations

From:
https://www.scientificamerican.com/article/mathematics-ramanujan/?fbclid=IwAR2caRXrn_RpOSvJ1QxWsVLBcJ6KVgd_Af_hrmDYBNyU8mpSjRs1BDeremA

Ramanujan's statement concerned the deceptively simple concept of partitions—the different ways in which a whole number can be subdivided into smaller numbers. Ramanujan's original statement, in fact, stemmed from the observation of patterns, such as the fact that p(9) = 30, p(9 + 5) = 135, p(9 + 10) = 490, p(9 + 15) = 1,575 and so on are all divisible by 5. Note that here the n's come at intervals of five units.

Ramanujan posited that this pattern should go on forever, and that similar patterns exist when 5 is replaced by 7 or 11—there are infinite sequences of p(n) that are all divisible by 7 or 11, or, as mathematicians say, in which the "moduli" are 7 or 11.

Then, in nearly oracular tone Ramanujan went on: "There appear to be corresponding properties," he wrote in his 1919 paper, "in which the moduli are powers of 5, 7 or 11...and no simple properties for any moduli involving primes other than these three." (Primes are whole numbers that are only divisible by themselves or by 1.) Thus, for instance, there should be formulas for an infinity of n's separated by 5^3 = 125 units, saying that the corresponding p(n)'s should all be divisible by 125.
In the past methods developed to understand partitions have later been applied to physics problems such as the theory of the strong nuclear force or the entropy of black holes.

From Wikipedia

In particle physics, Yukawa's interaction or Yukawa coupling, named after Hideki Yukawa, is an interaction between a scalar field ϕ and a Dirac field ψ. The Yukawa interaction can be used to describe the nuclear force between nucleons (which are fermions), mediated by pions (which are pseudoscalar mesons). The Yukawa interaction is also used in the Standard Model to describe the coupling between the Higgs field and massless quark and lepton fields (i.e., the fundamental fermion particles). Through spontaneous symmetry breaking, these fermions acquire a mass proportional to the vacuum expectation value of the Higgs field.

Can be this the motivation that from the development of the Ramanujan's equations we obtain results 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 practically equal to the rest mass of Pion meson 139.57 MeV

Note that:

$$g_{22} = \sqrt{(1+\sqrt{2})}.$$

Hence

$$\begin{aligned} 64g_{22}^{24} &= e^{\pi\sqrt{22}} - 24 + 276e^{-\pi\sqrt{22}} - \cdots, \\ 64g_{22}^{-24} &= 4096e^{-\pi\sqrt{22}} + \cdots, \end{aligned}$$

so that

$$64(g_{22}^{24} + g_{22}^{-24}) = e^{\pi\sqrt{22}} - 24 + 4372e^{-\pi\sqrt{22}} + \cdots = 64\{(1+\sqrt{2})^{12} + (1-\sqrt{2})^{12}\}.$$

Hence

$$e^{\pi\sqrt{22}} = 2508951.9982\ldots.$$

Thence:

$$64g_{22}^{-24} = 4096e^{-\pi\sqrt{22}} + \cdots$$

And

$$64(g_{22}^{24} + g_{22}^{-24}) = e^{\pi\sqrt{22}} - 24 + 4372e^{-\pi\sqrt{22}} + \cdots = 64\{(1+\sqrt{2})^{12} + (1-\sqrt{2})^{12}\}$$

That are connected with 64, 128, 256, 512, 1024 and 4096 = 64^2

(Modular equations and approximations to π - S. Ramanujan - Quarterly Journal of Mathematics, XLV, 1914, 350 – 372)

All the results of the most important connections are signed in blue throughout the drafting of the paper. We highlight as in the development of the various equations we use always the constants π, ϕ, 1/ϕ, the Fibonacci and Lucas numbers, linked to the golden ratio, that play a fundamental role in the development, and therefore, in the final results of the analyzed expressions.

In mathematics, the Fibonacci numbers, commonly denoted F_n, form a sequence, called the Fibonacci sequence, such that each number is the sum of the two preceding ones, starting from 0 and 1. Fibonacci numbers are strongly related to the golden ratio: Binet's formula expresses the nth Fibonacci number in terms of n and the golden ratio, and implies that the ratio of two consecutive Fibonacci numbers tends to the golden ratio as n increases.
Fibonacci numbers are also closely related to Lucas numbers ,in that the Fibonacci and Lucas numbers form a complementary pair of Lucas sequences

The beginning of the sequence is thus:

0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233, 377, 610, 987, 1597, 2584, 4181, 6765, 10946, 17711, 28657, 46368, 75025, 121393, 196418, 317811, 514229, 832040, 1346269, 2178309, 3524578, 5702887, 9227465, 14930352, 24157817, 39088169, 63245986, 102334155...

The Lucas numbers or Lucas series are an integer sequence named after the mathematician François Édouard Anatole Lucas (1842–91), who studied both that sequence and the closely related Fibonacci numbers. Lucas numbers and Fibonacci numbers form complementary instances of Lucas sequences.

The Lucas sequence has the same recursive relationship as the Fibonacci sequence, where each term is the sum of the two previous terms, but with different starting values. This produces a sequence where the ratios of successive terms approach the golden ratio, and in fact the terms themselves are roundings of integer powers of the golden ratio.[1] The sequence also has a variety of relationships with the Fibonacci numbers, like the fact that adding any two Fibonacci numbers two terms apart in the Fibonacci sequence results in the Lucas number in between.

The sequence of Lucas numbers is:

2, 1, 3, 4, 7, 11, 18, 29, 47, 76, 123, 199, 322, 521, 843, 1364, 2207, 3571, 5778, 9349, 15127, 24476, 39603, 64079, 103682, 167761, 271443, 439204, 710647, 1149851, 1860498, 3010349, 4870847, 7881196, 12752043, 20633239, 33385282, 54018521, 87403803……

All Fibonacci-like integer sequences appear in shifted form as a row of the Wythoff array; the Fibonacci sequence itself is the first row and the Lucas sequence is the second row. Also like all Fibonacci-like integer sequences, the ratio between two consecutive Lucas numbers converges to the golden ratio.

A Lucas prime is a Lucas number that is prime. The first few Lucas primes are:

2, 3, 7, 11, 29, 47, 199, 521, 2207, 3571, 9349, 3010349, 54018521, 370248451, 6643838879, ... (sequence A005479 in the OEIS).

In geometry, a golden spiral is a logarithmic spiral whose growth factor is φ, the golden ratio.[1] That is, a golden spiral gets wider (or further from its origin) by a factor of φ for every quarter turn it makes. Approximate logarithmic spirals can occur in nature, for example the arms of spiral galaxies[3] - golden spirals are one special case of these logarithmic spirals

We note how the following three values: 137.508 (golden angle), 139.57 (mass of the Pion - meson Pi) and 125.18 (mass of the Higgs boson), are connected to each other. In fact, just add 2 to 137.508 to obtain a result very close to the mass of the Pion and subtract 12 to 137.508 to obtain a result that is also very close to the mass of the Higgs boson. We can therefore hypothesize that it is the golden angle (and the related golden ratio inherent in it) to be a fundamental ingredient both in the structures of the microcosm and in those of the macrocosm.

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