On the mathematical connections between some Ramanujan expressions, Modular j- Invariant and Class Invariant, various parameters of Particle Physics, ϕ and $\zeta(2)$.

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Abstract

In this paper we describe and analyze the mathematical connections between some Ramanujan expressions, Modular j-Invariant and Class Invariant, various parameters of Particle Physics, ϕ and $\zeta(2)$.

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https://physicsforme.com/2012/12/17/math-formula-gives-new-glimpse-into-the-magical-mind-of-ramanujan/

We want to highlight that the development of the various equations was carried out according an our possible logical and original interpretation

For more information on the data entered for the development of the various equations, see the "Observations" section.

From

G.E. Andrews, B.C. Berndt, *Ramanujan's Lost Notebook: Part II*,
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Corollary 9.2.6 (p. 212).

$$\lambda_{57} = 3^{3/4}\sqrt{2\sqrt{19}+5\sqrt{3}}\left(\sqrt{46+6\sqrt{57}}+\sqrt{45+6\sqrt{57}}\right).$$

3^(3/4) (2sqrt19+5sqrt3)^0.5 ((46+6sqrt57)^0.5+(45+6sqrt57)^0.5)

Input:

$$3^{3/4}\sqrt{2\sqrt{19}+5\sqrt{3}}\left(\sqrt{46+6\sqrt{57}}+\sqrt{45+6\sqrt{57}}\right)$$

Decimal approximation:

181.096636545768865885276785052302033624169688746920747279 4...

181.09663654…

Alternate forms:

$$45+6\sqrt{57}+\sqrt{6\left(687+91\sqrt{57}\right)}$$

$$3^{3/4}\sqrt{5\sqrt{3}+2\sqrt{19}}\left(\sqrt{3\left(15+2\sqrt{57}\right)}+\sqrt{2\left(23+3\sqrt{57}\right)}\right)$$

$$3^{3/4}\sqrt{\left(5\sqrt{3}+2\sqrt{19}\right)\left(45+6\sqrt{57}\right)}+3^{3/4}\sqrt{\left(5\sqrt{3}+2\sqrt{19}\right)\left(46+6\sqrt{57}\right)}$$

Minimal polynomial:

$$x^4-180x^3-198x^2-108x-27$$

From which:

2[(((3^(3/4) (2sqrt19+5sqrt3)^0.5 ((46+6sqrt57)^0.5+(45+6sqrt57)^0.5))))^2]^1/3

Input:

$$2\sqrt[3]{\left(3^{3/4}\sqrt{2\sqrt{19}+5\sqrt{3}}\left(\sqrt{46+6\sqrt{57}}+\sqrt{45+6\sqrt{57}}\right)\right)^2}$$

Exact result:

$$2\sqrt{3}\sqrt[3]{5\sqrt{3}+2\sqrt{19}}\left(\sqrt{45+6\sqrt{57}}+\sqrt{46+6\sqrt{57}}\right)^{2/3}$$

Decimal approximation:

64.018218620702509118049483995130644711663729637963264602 00...

64.01821862… ≈ 64

Alternate forms:

$$2\sqrt[3]{3\left(2733+362\sqrt{57}+6\sqrt{2\left(207477+27481\sqrt{57}\right)}\right)}$$

$$2\sqrt{3}\sqrt[6]{151+20\sqrt{57}} \quad \text{root of } x^4-7x^3-7x+1 \text{ near } x=7.13476$$

$$2\sqrt{3}\sqrt[3]{5\sqrt{3}+2\sqrt{19}}\left(\sqrt{3\left(15+2\sqrt{57}\right)}+\sqrt{2\left(23+3\sqrt{57}\right)}\right)^{2/3}$$

Minimal polynomial:

$$x^{12}-262\,368\,x^9+17\,280\,x^6-497\,664\,x^3+2\,985\,984$$

[(((3^(3/4) (2sqrt19+5sqrt3)^0.5 ((46+6sqrt57)^0.5+(45+6sqrt57)^0.5))))]^1/11

Input:

$$\sqrt[11]{3^{3/4}\sqrt{2\sqrt{19}+5\sqrt{3}}\left(\sqrt{46+6\sqrt{57}}+\sqrt{45+6\sqrt{57}}\right)}$$

Exact result:

$$3^{3/44}\sqrt[22]{5\sqrt{3}+2\sqrt{19}}\;\sqrt[11]{\sqrt{45+6\sqrt{57}}+\sqrt{46+6\sqrt{57}}}$$

Decimal approximation:

1.604222415628659335946021703718063237636195611014615657591...

1.604222415….

Alternate forms:

$$3^{3/44}\sqrt[22]{5\sqrt{3}+2\sqrt{19}}\;\sqrt[11]{\sqrt{3\left(15+2\sqrt{57}\right)}+\sqrt{2\left(23+3\sqrt{57}\right)}}$$

$$3^{3/44}\sqrt[22]{\frac{1}{2}\left(5\sqrt{3}+2\sqrt{19}\right)}\;\sqrt[11]{\sqrt{45-3i\sqrt{3}}+\sqrt{2}\left(3\sqrt{3}+\sqrt{19}+\sqrt{\frac{3}{2}i\left(\sqrt{3}+-15i\right)}\right)}$$

All 11th roots of 3^(3/4) sqrt(5 sqrt(3) + 2 sqrt(19)) (sqrt(45 + 6 sqrt(57)) + sqrt(46 + 6 sqrt(57))):

$$3^{3/44}\sqrt[22]{5\sqrt{3}+2\sqrt{19}}\;\sqrt[11]{\sqrt{45+6\sqrt{57}}+\sqrt{46+6\sqrt{57}}}\;e^{0}\approx 1.60422$$

(real, principal root)

$$3^{3/44}\sqrt[22]{5\sqrt{3}+2\sqrt{19}}\;\sqrt[11]{\sqrt{45+6\sqrt{57}}+\sqrt{46+6\sqrt{57}}}\;e^{(2i\pi)/11}$$

$$\approx 1.3496+0.8673\,i$$

$$3^{3/44}\sqrt[22]{5\sqrt{3}+2\sqrt{19}}\;\sqrt[11]{\sqrt{45+6\sqrt{57}}+\sqrt{46+6\sqrt{57}}}\;e^{(4i\pi)/11}$$

$$\approx 0.6664+1.45925\,i$$

$$3^{3/44}\sqrt[22]{5\sqrt{3}+2\sqrt{19}}\;\sqrt[11]{\sqrt{45+6\sqrt{57}}+\sqrt{46+6\sqrt{57}}}\;e^{(6i\pi)/11}$$

$$\approx -0.22830+1.58789\,i$$

$$3^{3/44}\sqrt[22]{5\sqrt{3}+2\sqrt{19}}\;\sqrt[11]{\sqrt{45+6\sqrt{57}}+\sqrt{46+6\sqrt{57}}}\;e^{(8i\pi)/11}$$

$$\approx -1.0505+1.2124\,i$$

4[(((3^(3/4) (2sqrt19+5sqrt3)^0.5 ((46+6sqrt57)^0.5+(45+6sqrt57)^0.5))))^2]^1/3-3

Input:

$$\sqrt[4]{\sqrt[3]{\left(3^{3/4}\sqrt{2\sqrt{19}+5\sqrt{3}}\left(\sqrt{46+6\sqrt{57}}+\sqrt{45+6\sqrt{57}}\right)\right)^2}}-3$$

Exact result:

$$4\sqrt{3}\sqrt[3]{5\sqrt{3}+2\sqrt{19}}\left(\sqrt{45+6\sqrt{57}}+\sqrt{46+6\sqrt{57}}\right)^{2/3}-3$$

Decimal approximation:

125.036437241405018236098967990261289423327459275926529204 0...

125.03643724… result very near to the Higgs boson mass 125.18 GeV

Alternate forms:

$$\sqrt[4]{\sqrt[3]{3\left(2733+362\sqrt{57}+6\sqrt{2\left(207477+27481\sqrt{57}\right)}\right)}}-3$$

$$4\sqrt{3}\sqrt[6]{151+20\sqrt{57}}\ \text{root of } x^4-7x^3-7x+1 \text{ near } x=7.13476-3$$

$$4\sqrt{3}\sqrt[3]{5\sqrt{3}+2\sqrt{19}}\left(\sqrt{3\left(15+2\sqrt{57}\right)}+\sqrt{2\left(23+3\sqrt{57}\right)}\right)^{2/3}-3$$

Minimal polynomial:

$$x^{12}+36x^{11}+594x^{10}-2\,093\,004x^9-56\,631\,393x^8-679\,865\,400x^7-4\,758\,625\,476x^6-21\,400\,183\,800x^5-64\,112\,920\,497x^4-128\,184\,211\,692x^3-166\,199\,704\,686x^2-129\,205\,694\,268x-35\,155\,884\,303$$

4[(((3^(3/4) (2sqrt19+5sqrt3)^0.5
((46+6sqrt57)^0.5+(45+6sqrt57)^0.5))))^2]^1/3+11

Input:

$$\sqrt[4]{\sqrt[3]{\left(3^{3/4}\sqrt{2\sqrt{19}+5\sqrt{3}}\left(\sqrt{46+6\sqrt{57}}+\sqrt{45+6\sqrt{57}}\right)\right)^2}}+11$$

Exact result:

$$11+4\sqrt{3}\,\sqrt[3]{5\sqrt{3}+2\sqrt{19}}\left(\sqrt{45+6\sqrt{57}}+\sqrt{46+6\sqrt{57}}\right)^{2/3}$$

Decimal approximation:

139.036437241405018236098967990261289423327459275926529204 0...

139.03643724… result practically equal to the rest mass of Pion meson 139.57 MeV

Alternate forms:

$$11+4\sqrt[3]{3\left(2733+362\sqrt{57}+6\sqrt{2\left(207477+27481\sqrt{57}\right)}\right)}$$

$$4\sqrt{3}\,\sqrt[6]{151+20\sqrt{57}}\quad \text{root of } x^4-7x^3-7x+1 \text{ near } x=7.13476\quad +11$$

$$11+4\sqrt{3}\,\sqrt[3]{5\sqrt{3}+2\sqrt{19}}\left(\sqrt{3\left(15+2\sqrt{57}\right)}+\sqrt{2\left(23+3\sqrt{57}\right)}\right)^{2/3}$$

Minimal polynomial:

$$x^{12}-132x^{11}+7986x^{10}-2\,391\,764x^9+215\,042\,751x^8-9\,270\,552\,456x^7+236\,308\,363\,260x^6-3\,887\,567\,357\,256x^5+42\,700\,780\,689\,039x^4-312\,894\,658\,739\,444x^3+1\,474\,452\,458\,482\,674x^2-4\,053\,930\,475\,114\,212x+4\,954\,649\,166\,128\,017$$

27*2[(((3^(3/4) (2sqrt19+5sqrt3)^0.5 ((46+6sqrt57)^0.5+(45+6sqrt57)^0.5))))^2]^1/3+1/golden ratio

Input:

$$27\times 2\sqrt[3]{\left(3^{3/4}\sqrt{2\sqrt{19}+5\sqrt{3}}\left(\sqrt{46+6\sqrt{57}}+\sqrt{45+6\sqrt{57}}\right)\right)^2}+\frac{1}{\phi}$$

ϕ is the golden ratio

Exact result:

$$\frac{1}{\phi}+54\sqrt{3}\,\sqrt[3]{5\sqrt{3}+2\sqrt{19}}\left(\sqrt{45+6\sqrt{57}}+\sqrt{46+6\sqrt{57}}\right)^{2/3}$$

Decimal approximation:

1729.109936747717641035540654702893045332641009404813907116...

1729.10993674…

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. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number)

With regard 27 (From Wikipedia):

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

Alternate forms:

$$54\sqrt{3}\sqrt[6]{151+20\sqrt{57}}\ \text{root of } x^4-7x^3-7x+1 \text{ near } x=7.13476+\frac{1}{\phi}$$

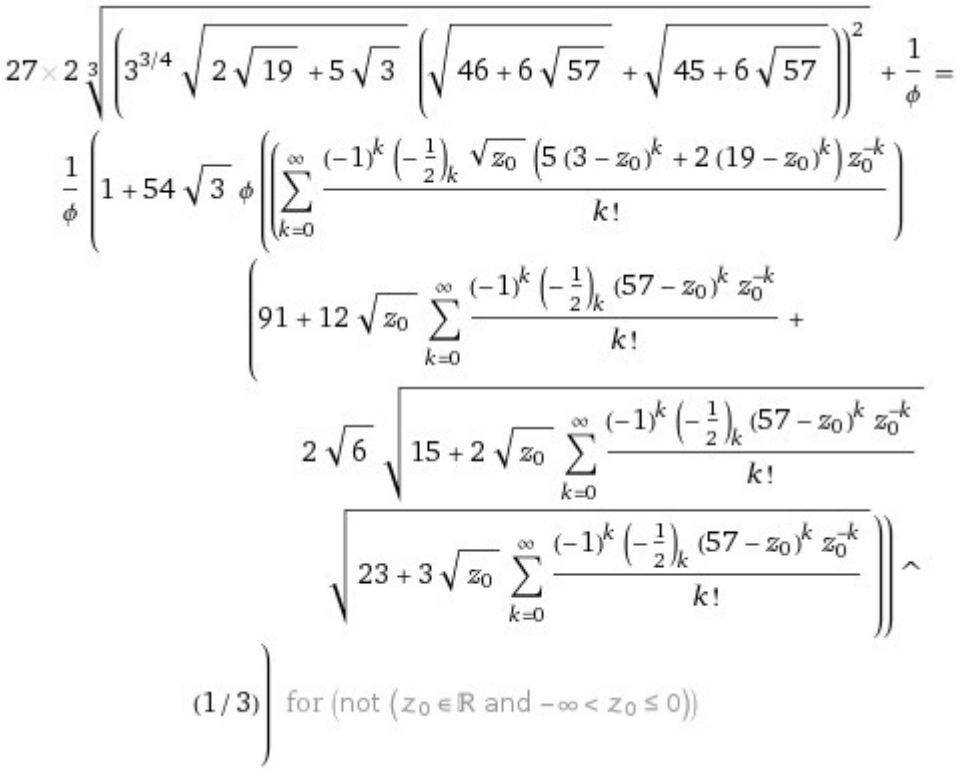
$$\frac{2}{1+\sqrt{5}}+54\sqrt{3}\sqrt[3]{5\sqrt{3}+2\sqrt{19}}\left(3\sqrt{3}+\sqrt{19}+\sqrt{45+6\sqrt{57}}\right)^{2/3}$$

$$\frac{1}{\frac{1}{2}+\frac{\sqrt{5}}{2}}+54\sqrt{3}\sqrt[3]{5\sqrt{3}+2\sqrt{19}}\left(\sqrt{3\left(15+2\sqrt{57}\right)}+\sqrt{2\left(23+3\sqrt{57}\right)}\right)^{2/3}$$

Series representations:

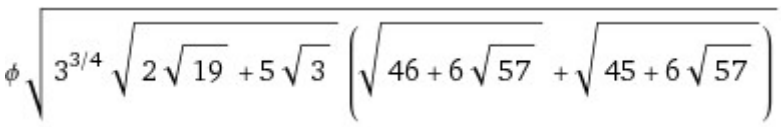
$$27 \times 2 \sqrt[3]{\left(3^{3/4} \sqrt{2\sqrt{19}+5\sqrt{3}}\left(\sqrt{46+6\sqrt{57}}+\sqrt{45+6\sqrt{57}}\right)\right)^2}+\frac{1}{\phi}=$$
$$\frac{1}{\phi}\left(1+54\sqrt{3}\,\phi\left(\left(91+12\sqrt{56}\sum_{k=0}^{\infty}56^{-k}\binom{\frac{1}{2}}{k}+\right.\right.\right.$$
$$\left.\left.2\sqrt{6}\sqrt{15+2\sqrt{56}\sum_{k=0}^{\infty}56^{-k}\binom{\frac{1}{2}}{k}}\sqrt{23+3\sqrt{56}\sum_{k=0}^{\infty}56^{-k}\binom{\frac{1}{2}}{k}}\right)$$
$$\left.\sum_{k=0}^{\infty}18^{-k}\binom{\frac{1}{2}}{k}\left(5\times 9^k\sqrt{2}+2\sqrt{18}\right)\right)\text{^}(1/3)\Bigg)$$

$$27 \times 2 \sqrt[3]{\left(3^{3/4} \sqrt{2\sqrt{19}+5\sqrt{3}}\left(\sqrt{46+6\sqrt{57}}+\sqrt{45+6\sqrt{57}}\right)\right)^2}+\frac{1}{\phi}=$$
$$\frac{1}{\phi}\left(1+54\sqrt{3}\,\phi\right.$$
$$\left(\left(91+12\sqrt{56}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{56}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\sqrt{6}\sqrt{15+2\sqrt{56}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{56}\right)^k\left(-\frac{1}{2}\right)_k}{k!}}\right.\right.$$
$$\left.\left.\sqrt{23+3\sqrt{56}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{56}\right)^k\left(-\frac{1}{2}\right)_k}{k!}}\right)$$
$$\left.\left.\sum_{k=0}^{\infty}\frac{2^{-k}\left(-\frac{1}{2}\right)_k\left(5(-1)^k\sqrt{2}+2\left(-\frac{1}{9}\right)^k\sqrt{18}\right)}{k!}\right)\text{^}(1/3)\right)$$



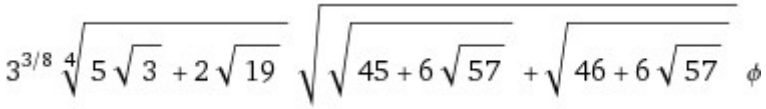
golden ratio*(((3^(3/4) (2sqrt19+5sqrt3)^0.5
((46+6sqrt57)^0.5+(45+6sqrt57)^0.5))))^1/2

Input:



ϕ is the golden ratio

Exact result:



Decimal approximation:

21.774231323404030632874058302602976149893316775944074340 98...

21.7742313….. result very near to the Bekenstein-Hawking black hole entropy 21.7656

Alternate forms:

$$3^{3/8}\sqrt[8]{151+20\sqrt{57}}\ \sqrt{3\sqrt{3}+\sqrt{19}+\sqrt{45+6\sqrt{57}}}\ \phi$$

$$\sqrt{\text{root of } x^8-540x^7+31014x^6+104976x^5+174015x^4+151632x^3+49086x^2+8748x+729 \text{ near } x=474.117}$$

$$\frac{1}{2}\times 3^{3/8}\left(1+\sqrt{5}\right)\sqrt[4]{5\sqrt{3}+2\sqrt{19}}\ \sqrt{\sqrt{3\left(15+2\sqrt{57}\right)}+\sqrt{2\left(23+3\sqrt{57}\right)}}$$

Minimal polynomial:

$$x^{16}-540x^{14}+31014x^{12}+104976x^{10}+174015x^8+151632x^6+49086x^4+8748x^2+729$$

Series representations:

$$\phi\sqrt{3^{3/4}\sqrt{2\sqrt{19}+5\sqrt{3}}\left(\sqrt{46+6\sqrt{57}}+\sqrt{45+6\sqrt{57}}\right)}=$$
$$3^{3/8}\phi\sqrt{\left(\sqrt{3}\sqrt{15+2\sqrt{56}\sum_{k=0}^{\infty}56^{-k}\binom{\frac{1}{2}}{k}}+\sqrt{2}\sqrt{23+3\sqrt{56}\sum_{k=0}^{\infty}56^{-k}\binom{\frac{1}{2}}{k}}\right)\sqrt{\sum_{k=0}^{\infty}18^{-k}\binom{\frac{1}{2}}{k}\left(5\times 9^k\sqrt{2}+2\sqrt{18}\right)}}$$

$$\phi\sqrt{3^{3/4}\sqrt{2\sqrt{19}+5\sqrt{3}}\left(\sqrt{46+6\sqrt{57}}+\sqrt{45+6\sqrt{57}}\right)}=3^{3/8}\,\phi$$
$$\sqrt{\left(\left(\sqrt{3}\sqrt{15+2\sqrt{56}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{56}\right)^k\left(-\frac{1}{2}\right)_k}{k!}}+\sqrt{2}\sqrt{23+3\sqrt{56}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{56}\right)^k\left(-\frac{1}{2}\right)_k}{k!}}\right)\right.}$$
$$\left.\sqrt{\sum_{k=0}^{\infty}\frac{2^{-k}\left(-\frac{1}{2}\right)_k\left(5(-1)^k\sqrt{2}+2\left(-\frac{1}{9}\right)^k\sqrt{18}\right)}{k!}}\right)$$

$$\phi\sqrt{3^{3/4}\sqrt{2\sqrt{19}+5\sqrt{3}}\left(\sqrt{46+6\sqrt{57}}+\sqrt{45+6\sqrt{57}}\right)}=$$
$$3^{3/8}\,\phi\sqrt{\left(\sqrt{\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\sqrt{z_0}\left(5(3-z_0)^k+2(19-z_0)^k\right)z_0^{-k}}{k!}}\right.}$$
$$\left(\sqrt{3}\sqrt{15+2\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(57-z_0)^k z_0^{-k}}{k!}}+\right.$$
$$\left.\left.\sqrt{2}\sqrt{23+3\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(57-z_0)^k z_0^{-k}}{k!}}\right)\right)$$
for $\left(\text{not}\left(z_0\in\mathbb{R}\text{ and }-\infty<z_0\le 0\right)\right)$

((((27*2[(((3^(3/4) (2sqrt19+5sqrt3)^0.5
((46+6sqrt57)^0.5+(45+6sqrt57)^0.5))))^2]^1/3+1/2))))^1/15

Input:

$$\sqrt[15]{27\times 2\sqrt[3]{\left(3^{3/4}\sqrt{2\sqrt{19}+5\sqrt{3}}\left(\sqrt{46+6\sqrt{57}}+\sqrt{45+6\sqrt{57}}\right)\right)^2}+\frac{1}{2}}$$

Exact result:

$$\sqrt[15]{\frac{1}{2}+54\sqrt{3}\,\sqrt[3]{5\sqrt{3}+2\sqrt{19}}\left(\sqrt{45+6\sqrt{57}}+\sqrt{46+6\sqrt{57}}\right)^{2/3}}$$

Decimal approximation:

1.643814715527320402251697172553771790485160094064274725571...

$1.6438147155\ldots \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

Alternate forms:

$$\sqrt[15]{\frac{1}{2}+54\sqrt[3]{3\left(2733+362\sqrt{57}+6\sqrt{2\left(207477+27481\sqrt{57}\right)}\right)}}$$

$$\frac{1}{\sqrt[15]{\frac{2}{1+108\sqrt{3}\,\sqrt[3]{5\sqrt{3}+2\sqrt{19}}\left(\sqrt{3\left(15+2\sqrt{57}\right)}+\sqrt{2\left(23+3\sqrt{57}\right)}\right)^{2/3}}}}$$

$$\left(\frac{1}{2}\left(1+54\sqrt{3}\,\sqrt[3]{5\sqrt{3}+2\sqrt{19}}\left(2\left(\sqrt{45-3i\sqrt{3}}+\sqrt{2}\left(3\sqrt{3}+\sqrt{19}+\sqrt{\frac{3}{2}i\left(\sqrt{3}+-15i\right)}\right)\right)^{2/3}\right)\right)\right)\text{^}(1/15)$$

Minimal polynomial:

$$4096x^{180}-24576x^{165}+67584x^{150}-21\,152\,519\,665\,664x^{135}+95\,186\,338\,115\,328x^{120}-190\,372\,676\,078\,592x^{105}+27\,643\,289\,755\,838\,208x^{90}-82\,430\,140\,992\,922\,368x^{75}+102\,912\,744\,172\,519\,152x^{60}-15\,544\,328\,561\,097\,497\,323\,232x^{45}+23\,316\,415\,683\,859\,274\,158\,344x^{30}-11\,658\,200\,127\,489\,497\,774\,616x^{15}+1\,835\,747\,958\,193\,961\,300\,007\,720\,193$$

All 15th roots of 1/2 + 54 sqrt(3) (5 sqrt(3) + 2 sqrt(19))^(1/3) (sqrt(45 + 6 sqrt(57)) + sqrt(46 + 6 sqrt(57)))^(2/3):

$$\sqrt[15]{\frac{1}{2}+54\sqrt{3}\,\sqrt[3]{5\sqrt{3}+2\sqrt{19}}\left(\sqrt{45+6\sqrt{57}}+\sqrt{46+6\sqrt{57}}\right)^{2/3}}\;e^{0}\approx 1.64381$$

(real, principal root)

$$\sqrt[15]{\frac{1}{2}+54\sqrt{3}\,\sqrt[3]{5\sqrt{3}+2\sqrt{19}}\left(\sqrt{45+6\sqrt{57}}+\sqrt{46+6\sqrt{57}}\right)^{2/3}}\,e^{(2i\pi)/15}$$

$$\approx 1.50170+0.6686\,i$$

$$\sqrt[15]{\frac{1}{2}+54\sqrt{3}\,\sqrt[3]{5\sqrt{3}+2\sqrt{19}}\left(\sqrt{45+6\sqrt{57}}+\sqrt{46+6\sqrt{57}}\right)^{2/3}}\,e^{(4i\pi)/15}$$

$$\approx 1.0999+1.2216\,i$$

$$\sqrt[15]{\frac{1}{2}+54\sqrt{3}\,\sqrt[3]{5\sqrt{3}+2\sqrt{19}}\left(\sqrt{45+6\sqrt{57}}+\sqrt{46+6\sqrt{57}}\right)^{2/3}}\,e^{(2i\pi)/5}$$

$$\approx 0.5080+1.5634\,i$$

$$\sqrt[15]{\frac{1}{2}+54\sqrt{3}\,\sqrt[3]{5\sqrt{3}+2\sqrt{19}}\left(\sqrt{45+6\sqrt{57}}+\sqrt{46+6\sqrt{57}}\right)^{2/3}}\,e^{(8i\pi)/15}$$

$$\approx -0.17183+1.63481\,i$$

From

Corollary 9.4.4 (p. 212).

$$\lambda_{121} = \left(\sqrt{\frac{19+3\sqrt{33}}{8}}+\sqrt{\frac{11+3\sqrt{33}}{8}}\right)^6$$
$$= \left(\frac{3\sqrt{3}+\sqrt{11}}{4}+\sqrt{\frac{11+3\sqrt{33}}{8}}\right)^6.$$

we obtain:

(((((1/4*(3sqrt3+sqrt11)+(1/8*(11+3sqrt33))^0.5))))^6

Input:

$$\left(\frac{1}{4}\left(3\sqrt{3}+\sqrt{11}\right)+\sqrt{\frac{1}{8}\left(11+3\sqrt{33}\right)}\right)^6$$

Exact result:

$$\left(\frac{1}{4}\left(3\sqrt{3}+\sqrt{11}\right)+\frac{1}{2}\sqrt{\frac{1}{2}\left(11+3\sqrt{33}\right)}\right)^6$$

Decimal approximation:

4138.042311093522339288112903053698611848587289877557543315...

4138.04231109…

Alternate forms:

$$1035+180\sqrt{33}+2\sqrt{2\left(267553+46575\sqrt{33}\right)}$$

root of $x^4-4140\,x^3+8102\,x^2-4140\,x+1$ near $x=4138.04$

$$\frac{\left(3\sqrt{3}+\sqrt{11}+\sqrt{22+6\sqrt{33}}\right)^6}{4096}$$

Minimal polynomial:

$$x^4-4140\,x^3+8102\,x^2-4140\,x+1$$

sqrt(((((((1/4*(3sqrt3+sqrt11)+(1/8*(11+3sqrt33))^0.5)))))^6 - 42)))

Input:

$$\sqrt{\left(\frac{1}{4}\left(3\sqrt{3}+\sqrt{11}\right)+\sqrt{\frac{1}{8}\left(11+3\sqrt{33}\right)}\right)^6-42}$$

Exact result:

$$\sqrt{\left(\frac{1}{4}\left(3\sqrt{3}+\sqrt{11}\right)+\frac{1}{2}\sqrt{\frac{1}{2}\left(11+3\sqrt{33}\right)}\right)^6-42}$$

Decimal approximation:

64.000330554564500149814290618816529927634018403901572221 07...

64.000330554… ≈ 64

Alternate forms:

$$\sqrt{993+180\sqrt{33}+2\sqrt{535\,106+93\,150\sqrt{33}}}$$

$$\sqrt{993+180\sqrt{33}+2\sqrt{2\left(267553+46\,575\sqrt{33}\right)}}$$

$$\sqrt{\frac{\left(3\sqrt{3}+\sqrt{11}+\sqrt{22+6\sqrt{33}}\right)^6}{4096}-42}$$

Minimal polynomial:

$$x^8-3972\,x^6-502\,954\,x^4-20\,936\,100\,x^2-289\,494\,575$$

All 2nd roots of (1/4 (3 sqrt(3) + sqrt(11)) + 1/2 sqrt(1/2 (11 + 3 sqrt(33))))^6 - 42:

$$\sqrt{\left(\frac{1}{4}\left(3\sqrt{3}+\sqrt{11}\right)+\frac{1}{2}\sqrt{\frac{1}{2}\left(11+3\sqrt{33}\right)}\right)^6-42}\;\;e^0\approx 64.00 \text{ (real, principal root)}$$

$$\sqrt{\left(\frac{1}{4}\left(3\sqrt{3}+\sqrt{11}\right)+\frac{1}{2}\sqrt{\frac{1}{2}\left(11+3\sqrt{33}\right)}\right)^6-42}\;\;e^{i\pi}\approx -64.00 \text{ (real root)}$$

2*sqrt(((((((1/4*(3sqrt3+sqrt11)+(1/8*(11+3sqrt33))^0.5)))))^6 - 42)))-3

Input:

$$2\sqrt{\left(\frac{1}{4}\left(3\sqrt{3}+\sqrt{11}\right)+\sqrt{\frac{1}{8}\left(11+3\sqrt{33}\right)}\right)^6-42}-3$$

Exact result:

$$2\sqrt{\left(\frac{1}{4}\left(3\sqrt{3}+\sqrt{11}\right)+\frac{1}{2}\sqrt{\frac{1}{2}\left(11+3\sqrt{33}\right)}\right)^6-42}-3$$

Decimal approximation:

125.000661109129000299628581237633059855268036807803144442 1...

125.000661109… result very near to the Higgs boson mass 125.18 GeV

Alternate forms:

$$2\sqrt{993+180\sqrt{33}+2\sqrt{535\,106+93\,150\sqrt{33}}}-3$$

$$2\sqrt{993+180\sqrt{33}+2\sqrt{2\left(267\,553+46\,575\sqrt{33}\right)}}-3$$

$$2\sqrt{\frac{\left(3\sqrt{3}+\sqrt{11}+\sqrt{22+6\sqrt{33}}\right)^6}{4096}-42}-3$$

Minimal polynomial:

$$x^8+24x^7-15\,636x^6-284\,472x^5-10\,186\,474x^4-105\,133\,080x^3-1\,793\,746\,164x^2-8\,931\,714\,120x-86\,833\,208\,975$$

2*sqrt(((((((1/4*(3sqrt3+sqrt11)+(1/8*(11+3sqrt33))^0.5)))))^6 - 42)))+11

Input:

$$2\sqrt{\left(\frac{1}{4}\left(3\sqrt{3}+\sqrt{11}\right)+\sqrt{\frac{1}{8}\left(11+3\sqrt{33}\right)}\right)^6-42}+11$$

Exact result:

$$11+2\sqrt{\left(\frac{1}{4}\left(3\sqrt{3}+\sqrt{11}\right)+\frac{1}{2}\sqrt{\frac{1}{2}\left(11+3\sqrt{33}\right)}\right)^6-42}$$

Decimal approximation:

139.000661109129000299628581237633059855268036807803144442 1...

139.000661109… result practically equal to the rest mass of Pion meson 139.57 MeV

Alternate forms:

$$11+2\sqrt{993+180\sqrt{33}+2\sqrt{535\,106+93\,150\sqrt{33}}}$$

$$11+2\sqrt{993+180\sqrt{33}+2\sqrt{2\left(267\,553+46\,575\sqrt{33}\right)}}$$

$$11+2\sqrt{\frac{\left(3\sqrt{3}+\sqrt{11}+\sqrt{22+6\sqrt{33}}\right)^6}{4096}-42}$$

Minimal polynomial:

$$x^8-88x^7-12\,500x^6+974\,072x^5-35\,859\,114x^4+767\,999\,320x^3-10\,621\,863\,476x^2+87\,518\,434\,696x-381\,991\,964\,111$$

27*sqrt(((((((1/4*(3sqrt3+sqrt11)+(1/8*(11+3sqrt33))^0.5)))))^6 - 42)))

Input:

$$27\sqrt{\left(\frac{1}{4}\left(3\sqrt{3}+\sqrt{11}\right)+\sqrt{\frac{1}{8}\left(11+3\sqrt{33}\right)}\right)^6-42}$$

Exact result:

$$27\sqrt{\left(\frac{1}{4}\left(3\sqrt{3}+\sqrt{11}\right)+\frac{1}{2}\sqrt{\frac{1}{2}\left(11+3\sqrt{33}\right)}\right)^6-42}$$

Decimal approximation:

1728.008924973241504044985846708046308046118496905342449969...

1728.0089249…

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. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number)

Alternate forms:

$$27\sqrt{993+180\sqrt{33}+2\sqrt{535\,106+93\,150\sqrt{33}}}$$

$$27\sqrt{993+180\sqrt{33}+2\sqrt{2\left(267\,553+46\,575\sqrt{33}\right)}}$$

$$27\sqrt{\frac{\left(3\sqrt{3}+\sqrt{11}+\sqrt{22+6\sqrt{33}}\right)^6}{4096}-42}$$

Minimal polynomial:

$$x^8-2\,895\,588\,x^6-267\,290\,376\,714\,x^4-8\,111\,074\,099\,752\,900\,x^2-81\,761\,818\,631\,014\,090\,575$$

[27*sqrt(((((((1/4*(3sqrt3+sqrt11)+(1/8*(11+3sqrt33))^0.5)))))^6 - 42)))]^1/15

Input:

$$\sqrt[15]{27\sqrt{\left(\frac{1}{4}\left(3\sqrt{3}+\sqrt{11}\right)+\sqrt{\frac{1}{8}\left(11+3\sqrt{33}\right)}\right)^6-42}}$$

Exact result:

$$\sqrt[5]{3}\,\sqrt[30]{\left(\frac{1}{4}\left(3\sqrt{3}+\sqrt{11}\right)+\frac{1}{2}\sqrt{\frac{1}{2}\left(11+3\sqrt{33}\right)}\right)^6-42}$$

Decimal approximation:

1.643752395505101308624724259685513555472935710540169997562...

$1.6437523955\ldots \approx \zeta(2)=\frac{\pi^2}{6}=1.644934\ldots$

Alternate forms:

$$\sqrt[5]{3}\,\sqrt[30]{993+180\sqrt{33}+2\sqrt{535\,106+93\,150\sqrt{33}}}$$

$$\sqrt[5]{3}\,\sqrt[30]{993+180\sqrt{33}+2\sqrt{2\left(267\,553+46\,575\sqrt{33}\right)}}$$

$$\sqrt[5]{3}\,\sqrt[30]{\frac{\left(3\sqrt{3}+\sqrt{11}+\sqrt{22+6\sqrt{33}}\right)^6}{4096}-42}$$

Minimal polynomial:

$$x^{120}-2\,895\,588\,x^{90}-267\,290\,376\,714\,x^{60}-8\,111\,074\,099\,752\,900\,x^{30}-81\,761\,818\,631\,014\,090\,575$$

All 15th roots of 27 sqrt((1/4 (3 sqrt(3) + sqrt(11)) + 1/2 sqrt(1/2 (11 + 3 sqrt(33))))^6 - 42):

$$\sqrt[5]{3}\,\sqrt[30]{\left(\frac{1}{4}\left(3\sqrt{3}+\sqrt{11}\right)+\frac{1}{2}\sqrt{\frac{1}{2}\left(11+3\sqrt{33}\right)}\right)^6-42}\;e^{0}\approx 1.6438$$

(real, principal root)

$$\sqrt[5]{3}\,\sqrt[30]{\left(\frac{1}{4}\left(3\sqrt{3}+\sqrt{11}\right)+\frac{1}{2}\sqrt{\frac{1}{2}\left(11+3\sqrt{33}\right)}\right)^6-42}\;e^{(2i\pi)/15}\approx 1.5016+0.6686\,i$$

$$\sqrt[5]{3}\,\sqrt[30]{\left(\frac{1}{4}\left(3\sqrt{3}+\sqrt{11}\right)+\frac{1}{2}\sqrt{\frac{1}{2}\left(11+3\sqrt{33}\right)}\right)^6-42}\;e^{(4i\pi)/15}\approx 1.0999+1.2215\,i$$

$$\sqrt[5]{3}\,\sqrt[30]{\left(\frac{1}{4}\left(3\sqrt{3}+\sqrt{11}\right)+\frac{1}{2}\sqrt{\frac{1}{2}\left(11+3\sqrt{33}\right)}\right)^6-42}\;e^{(2i\pi)/5}\approx 0.5079+1.5633\,i$$

$$\sqrt[5]{3}\,\sqrt[30]{\left(\frac{1}{4}\left(3\sqrt{3}+\sqrt{11}\right)+\frac{1}{2}\sqrt{\frac{1}{2}\left(11+3\sqrt{33}\right)}\right)^6-42}\;e^{(8i\pi)/15}$$

$$\approx -0.17182+1.6347\,i$$

Now, we have that:

Corollary 9.5.1 (p. 212).

$$\lambda_{289} = \left(\frac{\sqrt{34 + 13\sqrt[3]{17} + 5\sqrt[3]{17^2}}}{2} + \frac{\sqrt{30 + 13\sqrt[3]{17} + 5\sqrt[3]{17^2}}}{2} \right)^6 .$$

From

$$\lambda_{289} = \left(\frac{\sqrt{34 + 13\sqrt[3]{17} + 5\sqrt[3]{17^2}}}{2} + \frac{\sqrt{30 + 13\sqrt[3]{17} + 5\sqrt[3]{17^2}}}{2} \right)^6$$

we obtain:

[1/2*sqrt(((34+13(17)^(1/3)+5(17^2)^(1/3))))+1/2*sqrt(((30+13(17)^(1/3)+5(17^2)^(1/3))))]^6

Input:

$$\left(\frac{1}{2}\sqrt{34 + 13\sqrt[3]{17} + 5\sqrt[3]{17^2}} + \frac{1}{2}\sqrt{30 + 13\sqrt[3]{17} + 5\sqrt[3]{17^2}} \right)^6$$

Result:

$$\left(\frac{1}{2}\sqrt{30 + 13\sqrt[3]{17} + 5 \times 17^{2/3}} + \frac{1}{2}\sqrt{34 + 13\sqrt[3]{17} + 5 \times 17^{2/3}} \right)^6$$

Decimal approximation:

954913.617974356360212493237591566344756994753695517888092 5…

954913.61797435…

Alternate forms:

$$\frac{159\,153 + 99\,252\sqrt[6]{17} + 61\,896\sqrt[3]{17} + 38\,600\sqrt{17} + 24\,072 \times 17^{2/3} + 15\,012 \times 17^{5/6}}{\left(10 + 5\sqrt[3]{17} + 17^{2/3} + 3\sqrt{34 + 13\sqrt[3]{17} + 5 \times 17^{2/3}}\right)^6}$$

$$46\,656$$

$$\text{root of } x^6 - 954\,918\,x^5 + 4\,184\,463\,x^4 - 6\,721\,236\,x^3 + 4\,184\,463\,x^2 - 954\,918\,x + 1 \text{ near } x = 954\,914.$$

Minimal polynomial:

$$x^6 - 954\,918\,x^5 + 4\,184\,463\,x^4 - 6\,721\,236\,x^3 + 4\,184\,463\,x^2 - 954\,918\,x + 1$$

From which:

1/(3*196884)[1/2*sqrt(((34+13(17)^(1/3)+5(17^2)^(1/3))))+1/2*sqrt(((30+13(17)^(1/3)+5(17^2)^(1/3))))]^6

Input:

$$\frac{1}{3\times 196\,884}\left(\frac{1}{2}\sqrt{34+13\sqrt[3]{17}+5\sqrt[3]{17^2}}+\frac{1}{2}\sqrt{30+13\sqrt[3]{17}+5\sqrt[3]{17^2}}\right)^6$$

Result:

$$\frac{\left(\frac{1}{2}\sqrt{30+13\sqrt[3]{17}+5\times 17^{2/3}}+\frac{1}{2}\sqrt{34+13\sqrt[3]{17}+5\times 17^{2/3}}\right)^6}{590\,652}$$

Decimal approximation:

1.6167110548586246388948030948706960185642218323065322526 50...

1.616711054…. result that is a very good approximation to the value of the golden ratio 1.618033988749...

Alternate forms:

$$\frac{159\,153+99\,252\sqrt[6]{17}+61\,896\sqrt[3]{17}+38\,600\sqrt{17}+24\,072\times 17^{2/3}+15\,012\times 17^{5/6}}{590\,652}$$

$$\frac{\left(10+5\sqrt[3]{17}+17^{2/3}+3\sqrt{34+13\sqrt[3]{17}+5\times 17^{2/3}}\right)^6}{27\,557\,459\,712}$$

$$\text{root of } 42\,460\,985\,836\,996\,338\,637\,046\,973\,984\,804\,864\,x^6 - 68\,647\,460\,219\,372\,608\,064\,666\,880\,504\,293\,376\,x^5 + 509\,291\,522\,983\,192\,401\,634\,728\,791\,808\,x^4 - 1\,384\,982\,166\,958\,065\,972\,050\,688\,x^3 + 1\,459\,832\,707\,585\,639\,152\,x^2 - 564\,024\,226\,536\,x + 1 \text{ near } x = 1.61671$$

Minimal polynomial:

$$42\,460\,985\,836\,996\,338\,637\,046\,973\,984\,804\,864\,x^6 - 68\,647\,460\,219\,372\,608\,064\,666\,880\,504\,293\,376\,x^5 + 509\,291\,522\,983\,192\,401\,634\,728\,791\,808\,x^4 - 1\,384\,982\,166\,958\,065\,972\,050\,688\,x^3 + 1\,459\,832\,707\,585\,639\,152\,x^2 - 564\,024\,226\,536\,x + 1$$

1/13[1/2*sqrt(((34+13(17)^(1/3)+5(17^2)^(1/3))))+1/2*sqrt(((30+13(17)^(1/3)+5(17^2)^(1/3))))]^6 +34 + golden ratio

Input:

$$\frac{1}{13}\left(\frac{1}{2}\sqrt{34+13\sqrt[3]{17}+5\sqrt[3]{17^2}}+\frac{1}{2}\sqrt{30+13\sqrt[3]{17}+5\sqrt[3]{17^2}}\right)^6+34+\phi$$

ϕ is the golden ratio

Result:

$$\phi+34+\frac{1}{13}\left(\frac{1}{2}\sqrt{30+13\sqrt[3]{17}+5\times 17^{2/3}}+\frac{1}{2}\sqrt{34+13\sqrt[3]{17}+5\times 17^{2/3}}\right)^6$$

Decimal approximation:

73490.511724323854526578453632339469080963470593450412539 21…

73490.511724…

Alternate forms:

$$\frac{1}{14\,640\,111\,450\,432}\left(179\,737\,211\,358\,163\,296+7\,320\,055\,725\,216\sqrt{5}+111\,773\,872\,436\,790\,528\sqrt[6]{17}+69\,704\,949\,102\,764\,544\sqrt[3]{17}+43\,469\,869\,383\,590\,400\sqrt{17}+27\,108\,981\,756\,523\,008\times 17^{2/3}+16\,905\,950\,237\,991\,168\times 17^{5/6}\right)$$

$$\phi+34+\frac{\left(10+5\sqrt[3]{17}+17^{2/3}+3\sqrt{34+13\sqrt[3]{17}+5\times 17^{2/3}}\right)^6}{606\,528}$$

$$\left(\phi + 34 + \frac{1}{13}\left(\frac{1}{2}\sqrt{30 + 13\sqrt[3]{17} + 5 \times 17^{2/3}} + \frac{1}{2}\sqrt{34 + 13\sqrt[3]{17} + 5 \times 17^{2/3}}\right)^6\right) = 73490.511 \Rightarrow$$

$$\Rightarrow -3927 + 2\left(\sqrt[13]{\begin{array}{c} N \exp\left[\int d\hat{\sigma}\left(-\frac{1}{4u^2}\mathbf{P}_i D\mathbf{P}_i\right)\right] |\, Bp\rangle_{\mathrm{NS}} + \\ \int [d\mathrm{X}^\mu] \exp\left\{\int d\hat{\sigma}\left(-\frac{1}{4v^2} D\mathrm{X}^\mu D^2\mathrm{X}^\mu\right)\right\} |\, \mathrm{X}^\mu, \mathrm{X}^i = 0\rangle_{\mathrm{NS}} \end{array}}\right) =$$

$$-3927 + 2\sqrt[13]{2.2983717437 \times 10^{59} + 2.0823329825883 \times 10^{59}}$$

$$= 73490.8437525.... \Rightarrow$$

$$\Rightarrow \left(A(r) \times \frac{1}{B(r)}\left(-\frac{1}{\phi(r)}\right) \times \frac{1}{e^{\Lambda(r)}}\right) \Rightarrow$$

$$\Rightarrow \left(-0.000029211892 \times \frac{1}{0.0003644621}\left(-\frac{1}{0.0005946833}\right) \times \frac{1}{0.00183393}\right) =$$

$$= 73491.788325481187105491595720422205480251957265634133987 00...$$

$$= 73491.7883254... \Rightarrow$$

$$\left(I_{21} \ll \int_{-\infty}^{+\infty} \exp\left(-\left(\frac{t}{H}\right)^2\right) \left| \sum_{\lambda \leqslant p^{1-\varepsilon_2}} \frac{a(\lambda)}{\sqrt{\lambda}} B(\lambda) \lambda^{-i(T+t)} \right|^2 dt \ll \right.$$

$$\left. \ll H\left\{\left(\frac{4}{\varepsilon_2 \log T}\right)^{2r} (\log T)(\log X)^{-2\beta} + (\varepsilon_2^{-2r} (\log T)^{-2r} + \varepsilon_2^{-r} h_1^r (\log T)^{-r}) T^{-\varepsilon_1}\right\}\right) /$$

$$/(26 \times 4)^2 - 24 = \left(\frac{7.9313976505275 \times 10^8}{(26 \times 4)^2 - 24}\right) = 73493.30662\ldots$$

Mathematical connections with the boundary state corresponding to the NSNS-sector of N Dp-branes in the limit of u → ∞, with the ratio concerning the general asymptotically flat solution of the equations of motion of the p-brane and with the Karatsuba's equation concerning the zeros of a special type of function
connected with Dirichlet series.

1/((21+2)*3*8)[1/2*sqrt(((34+13(17)^(1/3)+5(17^2)^(1/3))))+1/2*sqrt(((30+13(17)^(1/3)+5(17^2)^(1/3))))]^6 -1

Input:

$$\frac{1}{(21+2)\times 3\times 8}\left(\frac{1}{2}\sqrt{34+13\sqrt[3]{17}+5\sqrt[3]{17^2}}+\frac{1}{2}\sqrt{30+13\sqrt[3]{17}+5\sqrt[3]{17^2}}\right)^6-1$$

Result:

$$\frac{1}{552}\left(\frac{1}{2}\sqrt{30+13\sqrt[3]{17}+5\times 17^{2/3}}+\frac{1}{2}\sqrt{34+13\sqrt[3]{17}+5\times 17^{2/3}}\right)^6-1$$

Decimal approximation:

1728.915974591225290240023981144141928907599191477387478428...

1728.9159745… ≈ 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. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number)

Alternate forms:

$$\frac{1}{552}\left(158\,601+99\,252\sqrt[6]{17}+61\,896\sqrt[3]{17}+38\,600\sqrt{17}+24\,072\times 17^{2/3}+15\,012\times 17^{5/6}\right)\frac{\left(10+5\sqrt[3]{17}+17^{2/3}+3\sqrt{34+13\sqrt[3]{17}+5\times 17^{2/3}}\right)^6}{25\,754\,112}-1$$

root of $28\,290\,098\,942\,705\,664\,x^6 - 48\,769\,978\,069\,696\,315\,392\,x^5 - 243\,885\,737\,342\,060\,531\,712\,x^4 - 487\,278\,497\,181\,521\,627\,136\,x^3 - 486\,645\,198\,398\,282\,816\,064\,x^2 - 242\,978\,223\,678\,632\,181\,360\,x - 48\,524\,053\,288\,449\,481\,775$ near $x = 1728.92$

Minimal polynomial:

$$28\,290\,098\,942\,705\,664\,x^6 - 48\,769\,978\,069\,696\,315\,392\,x^5 - 243\,885\,737\,342\,060\,531\,712\,x^4 - 487\,278\,497\,181\,521\,627\,136\,x^3 - 486\,645\,198\,398\,282\,816\,064\,x^2 - 242\,978\,223\,678\,632\,181\,360\,x - 48\,524\,053\,288\,449\,481\,775$$

1/(4Pi) * 1/((21+2)*3*8)[1/2*sqrt(((34+13(17)^(1/3)+5(17^2)^(1/3))))+1/2*sqrt(((30+13(17)^(1/3)+5(17^2)^(1/3))))]^6 -1/golden ratio

Input:

$$\frac{1}{4\pi} \times \frac{1}{(21+2)\times 3\times 8} \left(\frac{1}{2}\sqrt{34+13\sqrt[3]{17}+5\sqrt[3]{17^2}}+\frac{1}{2}\sqrt{30+13\sqrt[3]{17}+5\sqrt[3]{17^2}}\right)^6 - \frac{1}{\phi}$$

ϕ is the golden ratio

Result:

$$\frac{\left(\frac{1}{2}\sqrt{30+13\sqrt[3]{17}+5\times 17^{2/3}}+\frac{1}{2}\sqrt{34+13\sqrt[3]{17}+5\times 17^{2/3}}\right)^6}{2208\,\pi} - \frac{1}{\phi}$$

Decimal approximation:

137.044305256163664504458370168954587493810296170437255320 0...

137.044305256….

This result is very near to the inverse of fine-structure constant 137.035 and to the average rest mass of the two Pion mesons that is 137.2733

Property:

$$-\frac{1}{\phi}+\frac{\left(\frac{1}{2}\sqrt{30+13\sqrt[3]{17}+5\times 17^{2/3}}+\frac{1}{2}\sqrt{34+13\sqrt[3]{17}+5\times 17^{2/3}}\right)^6}{2208\,\pi}$$

is a transcendental number

Alternate forms:

$$\frac{1}{2208\,\pi}\left(159\,153+99\,252\sqrt[6]{17}+61\,896\sqrt[3]{17}+38\,600\sqrt{17}+24\,072\times 17^{2/3}+15\,012\times 17^{5/6}+1104\,\pi-1104\sqrt{5}\,\pi\right)$$

$$\frac{\left(10+5\sqrt[3]{17}+17^{2/3}+3\sqrt{34+13\sqrt[3]{17}+5\times 17^{2/3}}\right)^6}{103\,016\,448\,\pi}-\frac{1}{\phi}$$

$$-\frac{141\,312\,\pi-\left(\sqrt{30+13\sqrt[3]{17}+5\times 17^{2/3}}+\sqrt{34+13\sqrt[3]{17}+5\times 17^{2/3}}\right)^6\phi}{141\,312\,\pi\,\phi}$$

1/(4Pi) *
1/((21+2)*3*8)[1/2*sqrt(((34+13(17)^(1/3)+5(17^2)^(1/3))))+1/2*sqrt(((30+13(17)^(1/3)+5(17^2)^(1/3))))]^6 -11-golden ratio

Input:

$$\frac{1}{4\,\pi}\times\frac{1}{(21+2)\times 3\times 8}\left(\frac{1}{2}\sqrt{34+13\sqrt[3]{17}+5\sqrt[3]{17^2}}+\frac{1}{2}\sqrt{30+13\sqrt[3]{17}+5\sqrt[3]{17^2}}\right)^6-11-\phi$$

ϕ is the golden ratio

Result:

$$-\phi-11+\frac{\left(\frac{1}{2}\sqrt{30+13\sqrt[3]{17}+5\times 17^{2/3}}+\frac{1}{2}\sqrt{34+13\sqrt[3]{17}+5\times 17^{2/3}}\right)^6}{2208\,\pi}$$

Decimal approximation:

125.044305256163664504458370168954587493810296170437255320 0...

125.04430525… result very near to the Higgs boson mass 125.18 GeV

Property:

$$-11-\phi+\frac{\left(\frac{1}{2}\sqrt{30+13\sqrt[3]{17}+5\times 17^{2/3}}+\frac{1}{2}\sqrt{34+13\sqrt[3]{17}+5\times 17^{2/3}}\right)^6}{2208\,\pi}$$

is a transcendental number

Alternate forms:

$$\frac{1}{2208\,\pi}\left(159\,153+99\,252\sqrt[6]{17}+61\,896\sqrt[3]{17}+38\,600\sqrt{17}+24\,072\times 17^{2/3}+15\,012\times 17^{5/6}-25\,392\,\pi-1104\sqrt{5}\,\pi\right)$$

$$-\phi-11+\frac{\left(10+5\sqrt[3]{17}+17^{2/3}+3\sqrt{34+13\sqrt[3]{17}+5\times 17^{2/3}}\right)^6}{103\,016\,448\,\pi}$$

$$-\frac{1}{141\,312\,\pi}\left(141\,312\,\pi\,\phi-\left(\sqrt{30+13\sqrt[3]{17}+5\times 17^{2/3}}+\sqrt{34+13\sqrt[3]{17}+5\times 17^{2/3}}\right)^6+1\,554\,432\,\pi\right)$$

Series representations:

$$\frac{\left(\frac{1}{2}\sqrt{34+13\sqrt[3]{17}+5\sqrt[3]{17^2}}+\frac{1}{2}\sqrt{30+13\sqrt[3]{17}+5\sqrt[3]{17^2}}\right)^6}{((21+2)\,3\times 8)\,(4\,\pi)}-11-\phi=-11-\phi+\frac{1}{141\,312\,\pi}\left(\sum_{k=0}^{\infty}\left(\left(29+13\sqrt[3]{17}+5\times 17^{2/3}\right)^{-k}\binom{\frac{1}{2}}{k}\sqrt{29+13\sqrt[3]{17}+5\times 17^{2/3}}+\left(33+13\sqrt[3]{17}+5\times 17^{2/3}\right)^{-k}\binom{\frac{1}{2}}{k}\sqrt{33+13\sqrt[3]{17}+5\times 17^{2/3}}\right)\right)^6$$

$$\frac{\left(\frac{1}{2}\sqrt{34+13\sqrt[3]{17}+5\sqrt[3]{17^2}}+\frac{1}{2}\sqrt{30+13\sqrt[3]{17}+5\sqrt[3]{17^2}}\right)^6}{((21+2)\,3\times 8)\,(4\,\pi)}-11-\phi=-11-\phi+\frac{\sqrt{z_0}^6\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\left(30+13\sqrt[3]{17}+5\times 17^{2/3}-z_0\right)^k+\left(34+13\sqrt[3]{17}+5\times 17^{2/3}-z_0\right)^k\right)z_0^{-k}}{k!}\right)^6}{141\,312\,\pi}$$

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

$$\frac{\left(\frac{1}{2}\sqrt{34+13\sqrt[3]{17}+5\sqrt[3]{17^2}}+\frac{1}{2}\sqrt{30+13\sqrt[3]{17}+5\sqrt[3]{17^2}}\right)^6}{((21+2)\,3\times 8)\,(4\,\pi)}-11-\phi=-11-\phi+\frac{1}{2208\,\pi}\left(\sum_{k=0}^{\infty}\frac{1}{2\,k!}\left(-\frac{1}{2}\right)_k\left(\left(-\frac{1}{29+13\sqrt[3]{17}+5\times 17^{2/3}}\right)^k\sqrt{29+13\sqrt[3]{17}+5\times 17^{2/3}}+\left(-\frac{1}{33+13\sqrt[3]{17}+5\times 17^{2/3}}\right)^k\sqrt{33+13\sqrt[3]{17}+5\times 17^{2/3}}\right)\right)^6$$

Now, we have that:

Theorem 9.5.2 (p. 212).

$$\lambda_{169}=\left(\frac{2+\sqrt{13}}{2}+\frac{\sqrt{13+4\sqrt{13}}}{2}\right)^6.$$

From

$$\lambda_{169}=\left(\frac{2+\sqrt{13}}{2}+\frac{\sqrt{13+4\sqrt{13}}}{2}\right)^6.$$

we obtain:

(((1/2*(2+sqrt13)+1/2*(13+4sqrt13)^0.5)))^6

Input:

$$\left(\frac{1}{2}\left(2+\sqrt{13}\right)+\frac{1}{2}\sqrt{13+4\sqrt{13}}\right)^6$$

Decimal approximation:

25381.540450234530402993216223865824581056371404575521932 70...

25381.54045…

Alternate forms:

$$\frac{1}{64}\left(2+\sqrt{13}+\sqrt{13+4\sqrt{13}}\right)^6$$

$$6345+1760\sqrt{13}+12\sqrt{3\left(186\,407+51\,700\sqrt{13}\right)}$$

$$\frac{1}{512}\left(\sqrt{13-i\sqrt{39}}+\sqrt{2}\left(2+\sqrt{13}+\sqrt{\frac{1}{2}i\left(\sqrt{39}+-13\,i\right)}\right)\right)^6$$

Minimal polynomial:

$$x^4-25\,380\,x^3-39\,098\,x^2-25\,380\,x+1$$

1/21(((((1/2*(2+sqrt13)+1/2*(13+4sqrt13)^0.5)))^6))-11

Input:

$$\frac{1}{21}\left(\frac{1}{2}\left(2+\sqrt{13}\right)+\frac{1}{2}\sqrt{13+4\sqrt{13}}\right)^6-11$$

Decimal approximation:

1197.644783344501447761581724945991646716970066884548663462...

1197.6447833…. result practically equal to the rest mass of Sigma baryon 1197.449

Alternate forms:

$$\frac{\left(2+\sqrt{13}+\sqrt{13+4\sqrt{13}}\right)^6}{1344}-11$$

$$\frac{1}{42}\left(12\,228+3520\sqrt{13}+21\sqrt{\frac{35\,790\,144}{49}+\frac{9\,926\,400\sqrt{13}}{49}}\right)$$

$$\frac{4}{7}\sqrt{13+4\sqrt{13}}\left(101+28\sqrt{13}\right)+\frac{2}{21}\left(3057+880\sqrt{13}\right)$$

Minimal polynomial:

$$194481x^4-226487016x^3-7632506952x^2-84665482272x-312088578416$$

(((1/21(((((1/2*(2+sqrt13)+1/2*(13+4sqrt13)^0.5)))^6))-34)))^1/14

Input:

$$\sqrt[14]{\frac{1}{21}\left(\frac{1}{2}\left(2+\sqrt{13}\right)+\frac{1}{2}\sqrt{13+4\sqrt{13}}\right)^6-34}$$

Decimal approximation:

1.656834158057619003026917883414666781011736188057767590338...

1.656834158…. result very near to the 14th root of the following Ramanujan's class invariant $Q=\left(G_{505}/G_{101/5}\right)^3$ = 1164.2696 i.e. 1.65578...

Alternate forms:

$$\sqrt[14]{\frac{\left(2+\sqrt{13}+\sqrt{13+4\sqrt{13}}\right)^6}{1344}}-34$$

$$\frac{1}{\sqrt[14]{\frac{21}{5631+1760\sqrt{13}+12\sqrt{3\left(186407+51700\sqrt{13}\right)}}}}$$

$$\frac{1}{\sqrt[14]{\frac{21}{5631+1760\sqrt{13}+1212\sqrt{13+4\sqrt{13}}+336\sqrt{13\left(13+4\sqrt{13}\right)}}}}$$

Minimal polynomial:

$$194481x^{56}-208594764x^{42}-22642828362x^{28}-785730695148x^{14}-8998234614431$$

All 14th roots of 1/21 (1/2 (2 + sqrt(13)) + 1/2 sqrt(13 + 4 sqrt(13)))^6 - 34:

$$\sqrt[14]{\frac{1}{21}\left(\frac{1}{2}\left(2+\sqrt{13}\right)+\frac{1}{2}\sqrt{13+4\sqrt{13}}\right)^6-34}\ e^0\approx 1.6568 \text{ (real, principal root)}$$

$$\sqrt[14]{\frac{1}{21}\left(\frac{1}{2}\left(2+\sqrt{13}\right)+\frac{1}{2}\sqrt{13+4\sqrt{13}}\right)^6-34}\; e^{(i\pi)/7}\approx 1.4928+0.7189\,i$$

$$\sqrt[14]{\frac{1}{21}\left(\frac{1}{2}\left(2+\sqrt{13}\right)+\frac{1}{2}\sqrt{13+4\sqrt{13}}\right)^6-34}\; e^{(2i\pi)/7}\approx 1.0330+1.2954\,i$$

$$\sqrt[14]{\frac{1}{21}\left(\frac{1}{2}\left(2+\sqrt{13}\right)+\frac{1}{2}\sqrt{13+4\sqrt{13}}\right)^6-34}\; e^{(3i\pi)/7}\approx 0.3687+1.6153\,i$$

$$\sqrt[14]{\frac{1}{21}\left(\frac{1}{2}\left(2+\sqrt{13}\right)+\frac{1}{2}\sqrt{13+4\sqrt{13}}\right)^6-34}\; e^{(4i\pi)/7}\approx -0.3687+1.6153\,i$$

We have also:

1/144(((((1/2*(2+sqrt13)+1/2*(13+4sqrt13)^0.5)))^6))-34-3

Input:

$$\frac{1}{144}\left(\frac{1}{2}\left(2+\sqrt{13}\right)+\frac{1}{2}\sqrt{13+4\sqrt{13}}\right)^6-34-3$$

Exact result:

$$\frac{1}{144}\left(\frac{1}{2}\left(2+\sqrt{13}\right)+\frac{1}{2}\sqrt{13+4\sqrt{13}}\right)^6-37$$

Decimal approximation:

139.260697571073127798564001554623781812891468087330013421 5...

139.2606975… result practically equal to the rest mass of Pion meson 139.57 MeV

Alternate forms:

$$\frac{\left(2+\sqrt{13}+\sqrt{13+4\sqrt{13}}\right)^6}{9216}-37$$

$$\frac{1}{144}\left(1017+1760\sqrt{13}+72\sqrt{\frac{186\,407}{12}+\frac{12\,925\sqrt{13}}{3}}\right)$$

$$\frac{1}{12}\sqrt{13+4\sqrt{13}}\left(101+28\sqrt{13}\right)+\frac{1}{144}\left(1017+1760\sqrt{13}\right)$$

Minimal polynomial:

$$429\,981\,696\,x^4-12\,146\,982\,912\,x^3-4\,880\,995\,490\,304\,x^2-224\,186\,559\,727\,680\,x-3\,033\,955\,934\,496\,575$$

1/144(((((1/2*(2+sqrt13)+1/2*(13+4sqrt13)^0.5)))^6))-47-4

Input:

$$\frac{1}{144}\left(\frac{1}{2}\left(2+\sqrt{13}\right)+\frac{1}{2}\sqrt{13+4\sqrt{13}}\right)^6-47-4$$

Exact result:

$$\frac{1}{144}\left(\frac{1}{2}\left(2+\sqrt{13}\right)+\frac{1}{2}\sqrt{13+4\sqrt{13}}\right)^6-51$$

Decimal approximation:

125.260697571073127798564001554623781812891468087330013421 5...

125.2606975… result very near to the Higgs boson mass 125.18 GeV

Alternate forms:

$$\frac{\left(2+\sqrt{13}+\sqrt{13+4\sqrt{13}}\right)^6}{9216}-51$$

$$\frac{1}{144}\left(-999+1760\sqrt{13}+72\sqrt{\frac{186\,407}{12}+\frac{12\,925\sqrt{13}}{3}}\right)$$

$$\frac{1}{12}\sqrt{13+4\sqrt{13}}\left(101+28\sqrt{13}\right)+\frac{1}{144}\left(1760\sqrt{13}-999\right)$$

Minimal polynomial:

$$429\,981\,696\,x^4+11\,931\,992\,064\,x^3-4\,885\,510\,298\,112\,x^2-363\,277\,380\,313\,152\,x-7\,146\,056\,031\,060\,671$$

27*1/2(((1/144(((((1/2*(2+sqrt13)+1/2*(13+4sqrt13)^0.5)))^6))-47-1)))-e

Input:

$$27\times\frac{1}{2}\left(\frac{1}{144}\left(\frac{1}{2}\left(2+\sqrt{13}\right)+\frac{1}{2}\sqrt{13+4\sqrt{13}}\right)^6-47-1\right)-e$$

Exact result:

$$\frac{27}{2}\left(\frac{1}{144}\left(\frac{1}{2}\left(2+\sqrt{13}\right)+\frac{1}{2}\sqrt{13+4\sqrt{13}}\right)^6-48\right)-e$$

Decimal approximation:

1728.801135381028180045253733516068391976277572085255221616...

1728.801135…

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. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number)

Property:

$$\frac{27}{2}\left(-48+\frac{1}{144}\left(\frac{1}{2}\left(2+\sqrt{13}\right)+\frac{1}{2}\sqrt{13+4\sqrt{13}}\right)^6\right)-e \text{ is a transcendental number}$$

Alternate forms:

$$-\frac{1701}{32}+165\sqrt{13}+\frac{1}{2}\sqrt{\frac{45\,296\,901}{16}+\frac{3\,140\,775\sqrt{13}}{4}}-e$$

$$\frac{27}{2}\left(\frac{\left(2+\sqrt{13}+\sqrt{13+4\sqrt{13}}\right)^6}{9216}-48\right)-e$$

$$-\frac{1701}{32}+165\sqrt{13}+\frac{909}{8}\sqrt{13+4\sqrt{13}}+\frac{63}{2}\sqrt{13\left(13+4\sqrt{13}\right)}-e$$

Series representations:

$$\frac{27}{2}\left(\frac{1}{144}\left(\frac{1}{2}\left(2+\sqrt{13}\right)+\frac{1}{2}\sqrt{13+4\sqrt{13}}\right)^6-47-1\right)-e=$$
$$-e+\frac{27}{2}\left(-48+\frac{1}{144}\left(\frac{1}{2}\left(2+\sqrt{12}\sum_{k=0}^{\infty}12^{-k}\binom{\frac{1}{2}}{k}\right)+\frac{1}{2}\sqrt{13+4\sqrt{12}\sum_{k=0}^{\infty}12^{-k}\binom{\frac{1}{2}}{k}}\right)^6\right)$$

$$\frac{27}{2}\left(\frac{1}{144}\left(\frac{1}{2}\left(2+\sqrt{13}\right)+\frac{1}{2}\sqrt{13+4\sqrt{13}}\right)^6-47-1\right)-e=-e+\frac{27}{2}\left(-48+\right.$$
$$\left.\frac{1}{144}\left(\frac{1}{2}\left(2+\sqrt{12}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{12}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)+\frac{1}{2}\sqrt{13+4\sqrt{12}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{12}\right)^k\left(-\frac{1}{2}\right)_k}{k!}}\right)^6\right)$$

$$\frac{27}{2}\left(\frac{1}{144}\left(\frac{1}{2}\left(2+\sqrt{13}\right)+\frac{1}{2}\sqrt{13+4\sqrt{13}}\right)^6-47-1\right)-e=$$
$$-e+\frac{27}{2}\left(-48+\frac{1}{144}\left(\frac{1}{2}\left(2+\frac{\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}12^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)+\right.\right.$$
$$\left.\left.\frac{1}{2}\sqrt{13+\frac{2\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}12^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{\sqrt{\pi}}}\right)^6\right)$$

[27*1/2(((1/144(((((1/2*(2+sqrt13)+1/2*(13+4sqrt13)^0.5)))^6))-47-1)))-e]^1/15

Input:

$$\sqrt[15]{27\times\frac{1}{2}\left(\frac{1}{144}\left(\frac{1}{2}\left(2+\sqrt{13}\right)+\frac{1}{2}\sqrt{13+4\sqrt{13}}\right)^6-47-1\right)-e}$$

Exact result:

$$\sqrt[15]{\frac{27}{2}\left(\frac{1}{144}\left(\frac{1}{2}\left(2+\sqrt{13}\right)+\frac{1}{2}\sqrt{13+4\sqrt{13}}\right)^6-48\right)-e}$$

Decimal approximation:

1.643802623611404250848213505228364713290642061295728195286...

$1.643802623\ldots \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

Property:

$$\sqrt[15]{\frac{27}{2}\left(-48+\frac{1}{144}\left(\frac{1}{2}\left(2+\sqrt{13}\right)+\frac{1}{2}\sqrt{13+4\sqrt{13}}\right)^6\right)-e}$$

is a transcendental number

Alternate forms:

$$\sqrt[15]{-\frac{1701}{32}+165\sqrt{13}+\frac{1}{2}\sqrt{\frac{45\,296\,901}{16}+\frac{3\,140\,775\sqrt{13}}{4}}-e}$$

$$\sqrt[15]{\frac{27}{2}\left(\frac{\left(2+\sqrt{13}+\sqrt{13+4\sqrt{13}}\right)^6}{9216}-48\right)-e}$$

$$\frac{\sqrt[15]{-1701+5280\sqrt{13}+3636\sqrt{13+4\sqrt{13}}+1008\sqrt{13\left(13+4\sqrt{13}\right)}-32e}}{\sqrt[3]{2}}$$

All 15th roots of 27/2 (1/144 (1/2 (2 + sqrt(13)) + 1/2 sqrt(13 + 4 sqrt(13)))^6 - 48) - e:

$$\sqrt[15]{\frac{27}{2}\left(\frac{1}{144}\left(\frac{1}{2}\left(2+\sqrt{13}\right)+\frac{1}{2}\sqrt{13+4\sqrt{13}}\right)^6-48\right)-e}\ e^0 \approx 1.6438$$

(real, principal root)

$$\sqrt[15]{\frac{27}{2}\left(\frac{1}{144}\left(\frac{1}{2}\left(2+\sqrt{13}\right)+\frac{1}{2}\sqrt{13+4\sqrt{13}}\right)^6-48\right)-e}\ e^{(2i\pi)/15} \approx 1.5017+0.6686\,i$$

$$\sqrt[15]{\frac{27}{2}\left(\frac{1}{144}\left(\frac{1}{2}\left(2+\sqrt{13}\right)+\frac{1}{2}\sqrt{13+4\sqrt{13}}\right)^6-48\right)-e}\;e^{(4i\pi)/15}\approx 1.0999+1.2216\,i$$

$$\sqrt[15]{\frac{27}{2}\left(\frac{1}{144}\left(\frac{1}{2}\left(2+\sqrt{13}\right)+\frac{1}{2}\sqrt{13+4\sqrt{13}}\right)^6-48\right)-e}\;e^{(2i\pi)/5}\approx 0.5080+1.5633\,i$$

$$\sqrt[15]{\frac{27}{2}\left(\frac{1}{144}\left(\frac{1}{2}\left(2+\sqrt{13}\right)+\frac{1}{2}\sqrt{13+4\sqrt{13}}\right)^6-48\right)-e}\;e^{(8i\pi)/15}$$
$$\approx -0.17182+1.6348\,i$$

Series representations:

$$\sqrt[15]{\frac{27}{2}\left(\frac{1}{144}\left(\frac{1}{2}\left(2+\sqrt{13}\right)+\frac{1}{2}\sqrt{13+4\sqrt{13}}\right)^6-47-1\right)-e}=$$
$$\left(-e+\frac{27}{2}\left(-48+\frac{1}{144}\left(\frac{1}{2}\left(2+\sqrt{12}\sum_{k=0}^{\infty}12^{-k}\binom{\frac{1}{2}}{k}\right)+\right.\right.\right.$$
$$\left.\left.\left.\frac{1}{2}\sqrt{13+4\sqrt{12}\sum_{k=0}^{\infty}12^{-k}\binom{\frac{1}{2}}{k}}\right)^6\right)\right)\text{^}(1/15)$$

$$\sqrt[15]{\frac{27}{2}\left(\frac{1}{144}\left(\frac{1}{2}\left(2+\sqrt{13}\right)+\frac{1}{2}\sqrt{13+4\sqrt{13}}\right)^6-47-1\right)-e}=$$
$$\left(-e+\frac{27}{2}\left(-48+\frac{1}{144}\left(\frac{1}{2}\left(2+\sqrt{12}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{12}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)+\right.\right.\right.$$
$$\left.\left.\left.\frac{1}{2}\sqrt{13+4\sqrt{12}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{12}\right)^k\left(-\frac{1}{2}\right)_k}{k!}}\right)^6\right)\right)\text{^}(1/15)$$

$$\sqrt[15]{\frac{27}{2}\left(\frac{1}{144}\left(\frac{1}{2}\left(2+\sqrt{13}\right)+\frac{1}{2}\sqrt{13+4\sqrt{13}}\right)^6-47-1\right)-e} =$$
$$\left(-e+\frac{27}{2}\left(-48+\frac{1}{144}\left(\frac{1}{2}\left(2+\frac{\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}\,12^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)+\right.\right.$$
$$\left.\left.\frac{1}{2}\sqrt{13+\frac{2\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}\,12^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{\sqrt{\pi}}}\right)^6\right)\right)\text{^}(1/15)$$

Integral representation:

$$(1+z)^a=\frac{\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{\Gamma(s)\,\Gamma(-a-s)}{z^s}\,ds}{(2\pi i)\,\Gamma(-a)} \quad \text{for } (0<\gamma<-\operatorname{Re}(a) \text{ and } |\arg(z)|<\pi)$$

Now, we have that:

$$\lambda_{193}^{1/3}+\frac{1}{\lambda_{193}^{1/3}}=\frac{1}{4}\left(39+3\sqrt{193}+\sqrt{2690+194\sqrt{193}}\right). \qquad (9.7.6)$$

From which:

1/4(39+3sqrt193+(2690+194sqrt193)^0.5)

Input:

$$\frac{1}{4}\left(39+3\sqrt{193}+\sqrt{2690+194\sqrt{193}}\right)$$

Decimal approximation:

38.515201283669490422880634035122999645674063598421698227 39...

38.5152012…

Alternate forms:

$$\frac{1}{4}\left(39+3\sqrt{193}+\sqrt{2\left(1345+97\sqrt{193}\right)}\right)$$

$$\frac{39}{4}+\frac{3\sqrt{193}}{4}+\frac{1}{4}\sqrt{2690+194\sqrt{193}}$$

$$\frac{1}{4}\left(39+3\sqrt{193}+2\sqrt{\frac{1345}{2}+\frac{97\sqrt{193}}{2}}\right)$$

Minimal polynomial:

$$x^4-39x^3+17x^2+63x+54$$

4(((1/4(39+3sqrt193+(2690+194sqrt193)^0.5))))-13-golden ratio

Input:

$$4\left(\frac{1}{4}\left(39+3\sqrt{193}+\sqrt{2690+194\sqrt{193}}\right)\right)-13-\phi$$

ϕ is the golden ratio

Exact result:

$$-\phi+26+3\sqrt{193}+\sqrt{2690+194\sqrt{193}}$$

Decimal approximation:

139.442771145928066843317949306126360464975945213881030047 4...

139.4427711… result practically equal to the rest mass of Pion meson 139.57 MeV

Alternate forms:

$$\frac{51}{2}-\frac{\sqrt{5}}{2}+3\sqrt{193}+\sqrt{2\left(1345+97\sqrt{193}\right)}$$

$$26+3\sqrt{193}+\frac{1}{2}\left(-1-\sqrt{5}\right)+\sqrt{2690+194\sqrt{193}}$$

$$\frac{1}{2}\left(51-\sqrt{5}+6\sqrt{193}+2\sqrt{2\left(1345+97\sqrt{193}\right)}\right)$$

Minimal polynomial:

$$x^8-204x^7+494x^6+882\,924x^5+37\,106\,483x^4+679\,306\,908x^3+6\,346\,564\,874x^2+29\,217\,323\,232x+51\,951\,500\,749$$

Series representations:

$$\frac{4}{4}\left(39+3\sqrt{193}+\sqrt{2690+194\sqrt{193}}\right)-13-\phi=$$
$$26-\phi+3\sqrt{192}\sum_{k=0}^{\infty}192^{-k}\binom{\frac{1}{2}}{k}+\sqrt{2}\sqrt{1345+97\sqrt{192}\sum_{k=0}^{\infty}192^{-k}\binom{\frac{1}{2}}{k}}$$

$$\frac{4}{4}\left(39+3\sqrt{193}+\sqrt{2690+194\sqrt{193}}\right)-13-\phi=$$
$$26-\phi+3\sqrt{192}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{192}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\sqrt{2}\sqrt{1345+97\sqrt{192}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{192}\right)^k\left(-\frac{1}{2}\right)_k}{k!}}$$

$$\frac{4}{4}\left(39+3\sqrt{193}+\sqrt{2690+194\sqrt{193}}\right)-13-\phi=$$
$$26-\phi+3\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(193-z_0)^k z_0^{-k}}{k!}+$$
$$\sqrt{2}\sqrt{1345+97\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(193-z_0)^k z_0^{-k}}{k!}}$$
for $(\text{not}\ (z_0\in\mathbb{R}\ \text{and}\ -\infty<z_0\le 0))$

4(((1/4(39+3sqrt193+(2690+194sqrt193)^0.5))))-21-5-golden ratio^2

Input:

$$4\left(\frac{1}{4}\left(39+3\sqrt{193}+\sqrt{2690+194\sqrt{193}}\right)\right)-21-5-\phi^2$$

ϕ is the golden ratio

Exact result:

$$-\phi^2+13+3\sqrt{193}+\sqrt{2690+194\sqrt{193}}$$

Decimal approximation:

125.442771145928066843317949306126360464975945213881030047 4...

125.442771145…… result very near to the Higgs boson mass 125.18 GeV

Alternate forms:

$$\frac{23}{2}-\frac{\sqrt{5}}{2}+3\sqrt{193}+\sqrt{2\left(1345+97\sqrt{193}\right)}$$

$$13+3\sqrt{193}-\frac{1}{4}\left(1+\sqrt{5}\right)^2+\sqrt{2690+194\sqrt{193}}$$

$$\frac{1}{2}\left(23-\sqrt{5}+6\sqrt{193}+2\sqrt{2\left(1345+97\sqrt{193}\right)}\right)$$

Minimal polynomial:

$$x^8-92x^7-14\,010x^6+238\,420x^5+83\,460\,483x^4+4\,270\,739\,620x^3+100\,933\,565\,130x^2+1\,174\,911\,641\,896x+5\,452\,970\,290\,181$$

Series representations:

$$\frac{4}{4}\left(39+3\sqrt{193}+\sqrt{2690+194\sqrt{193}}\right)-21-5-\phi^2=13-\phi^2+3\sqrt{192}\sum_{k=0}^{\infty}192^{-k}\binom{\frac{1}{2}}{k}+\sqrt{2}\sqrt{1345+97\sqrt{192}\sum_{k=0}^{\infty}192^{-k}\binom{\frac{1}{2}}{k}}$$

$$\frac{4}{4}\left(39+3\sqrt{193}+\sqrt{2690+194\sqrt{193}}\right)-21-5-\phi^2=13-\phi^2+3\sqrt{192}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{192}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\sqrt{2}\sqrt{1345+97\sqrt{192}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{192}\right)^k\left(-\frac{1}{2}\right)_k}{k!}}$$

$$\frac{4}{4}\left(39+3\sqrt{193}+\sqrt{2690+194\sqrt{193}}\right)-21-5-\phi^2=$$
$$13-\phi^2+3\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(193-z_0)^k z_0^{-k}}{k!}+$$
$$\sqrt{2}\sqrt{1345+97\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(193-z_0)^k z_0^{-k}}{k!}}$$
for $(\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$

27*1/2((4(((1/4(39+3sqrt193+(2690+194sqrt193)^0.5))))-21-5))

Input:

$$27\times\frac{1}{2}\left(4\left(\frac{1}{4}\left(39+3\sqrt{193}+\sqrt{2690+194\sqrt{193}}\right)\right)-21-5\right)$$

Exact result:

$$\frac{27}{2}\left(13+3\sqrt{193}+\sqrt{2690+194\sqrt{193}}\right)$$

Decimal approximation:

1728.820869318152482835554237896641980866399434314771704279...

1728.820869…..

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. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number)

Alternate forms:

$$\frac{27}{2}\left(13+3\sqrt{193}+\sqrt{2\left(1345+97\sqrt{193}\right)}\right)$$
$$\frac{351}{2}+\frac{81\sqrt{193}}{2}+\frac{27}{2}\sqrt{2690+194\sqrt{193}}$$
$$\frac{351}{2}+\frac{81\sqrt{193}}{2}+27\sqrt{\frac{1}{2}\left(1345+97\sqrt{193}\right)}$$

Minimal polynomial:

$x^4 - 702\,x^3 - 1\,428\,840\,x^2 - 560\,689\,938\,x - 65\,843\,945\,577$

[27*1/2((4(((1/4(39+3sqrt193+(2690+194sqrt193)^0.5))))-21-5))]^1/15

Input:

$$\sqrt[15]{27 \times \frac{1}{2}\left(4\left(\frac{1}{4}\left(39+3\sqrt{193}+\sqrt{2690+194\sqrt{193}}\right)\right)-21-5\right)}$$

Exact result:

$$\sqrt[5]{3}\,\sqrt[15]{\frac{1}{2}\left(13+3\sqrt{193}+\sqrt{2690+194\sqrt{193}}\right)}$$

Decimal approximation:

1.643803874517756189799654858198692000623780638942571276638...

$1.6438038745\ldots\ldots \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

Alternate forms:

$$\sqrt[5]{3}\,\sqrt[15]{\frac{1}{2}\left(13+3\sqrt{193}+\sqrt{2\left(1345+97\sqrt{193}\right)}\right)}$$

$$\frac{\sqrt[5]{3}\,\sqrt[15]{\sqrt{2690-96\,i\sqrt{3}}+\sqrt{2}\left(13+3\sqrt{193}+\sqrt{i\left(48\sqrt{3}+-1345\,i\right)}\right)}}{\sqrt[10]{2}}$$

Minimal polynomial:

$x^{60} - 702\,x^{45} - 1\,428\,840\,x^{30} - 560\,689\,938\,x^{15} - 65\,843\,945\,577$

All 15th roots of 27/2 (13 + 3 sqrt(193) + sqrt(2690 + 194 sqrt(193))):

$$\sqrt[5]{3}\,\sqrt[15]{\frac{1}{2}\left(13+3\sqrt{193}+\sqrt{2690+194\sqrt{193}}\right)}\;e^0 \approx 1.64380 \text{ (real, principal root)}$$

$$\sqrt[5]{3}\ \sqrt[15]{\frac{1}{2}\left(13+3\sqrt{193}+\sqrt{2690+194\sqrt{193}}\right)}\ e^{(2i\pi)/15}\approx 1.5017+0.6686\,i$$

$$\sqrt[5]{3}\ \sqrt[15]{\frac{1}{2}\left(13+3\sqrt{193}+\sqrt{2690+194\sqrt{193}}\right)}\ e^{(4i\pi)/15}\approx 1.0999+1.2216\,i$$

$$\sqrt[5]{3}\ \sqrt[15]{\frac{1}{2}\left(13+3\sqrt{193}+\sqrt{2690+194\sqrt{193}}\right)}\ e^{(2i\pi)/5}\approx 0.5080+1.5634\,i$$

$$\sqrt[5]{3}\ \sqrt[15]{\frac{1}{2}\left(13+3\sqrt{193}+\sqrt{2690+194\sqrt{193}}\right)}\ e^{(8i\pi)/15}\approx -0.17182+1.63480\,i$$

Now, we have that:

$$\lambda_{217}=\left(\sqrt{\frac{1901+129\sqrt{217}}{8}}+\sqrt{\frac{1893+129\sqrt{217}}{8}}\right)^{3/2}$$
$$\times\left(\sqrt{\frac{1597+108\sqrt{217}}{4}}+\sqrt{\frac{1593+108\sqrt{217}}{4}}\right)^{3/2}.$$

we obtain:

((((1/8*(1901+129sqrt217))^0.5+(1/8*(1893+129sqrt217))^0.5)))^1.5 *
((((1/4*(1597+108sqrt217))^0.5+(1/4*(1593+108sqrt217))^0.5)))^1.5

Input:

$$\left(\sqrt{\frac{1}{8}\left(1901+129\sqrt{217}\right)}+\sqrt{\frac{1}{8}\left(1893+129\sqrt{217}\right)}\right)^{1.5}$$
$$\left(\sqrt{\frac{1}{4}\left(1597+108\sqrt{217}\right)}+\sqrt{\frac{1}{4}\left(1593+108\sqrt{217}\right)}\right)^{1.5}$$

Result:

$1.21972\ldots\times 10^5$

1.21972…*10^5

ln(((((((1/8*(1901+129sqrt217))^0.5+(1/8*(1893+129sqrt217))^0.5)))^1.5 *
((((1/4*(1597+108sqrt217))^0.5+(1/4*(1593+108sqrt217))^0.5)))^1.5)))

Input:

$$\log\left(\left(\sqrt{\frac{1}{8}\left(1901+129\sqrt{217}\right)}+\sqrt{\frac{1}{8}\left(1893+129\sqrt{217}\right)}\right)^{1.5}\left(\sqrt{\frac{1}{4}\left(1597+108\sqrt{217}\right)}+\sqrt{\frac{1}{4}\left(1593+108\sqrt{217}\right)}\right)^{1.5}\right)$$

$\log(x)$ is the natural logarithm

Result:

11.7115...

11.7115 result very near to the black hole entropy 11.8458, that is equal to ln(139503)

Alternative representations:

$$\log\left(\left(\sqrt{\frac{1}{8}\left(1901+129\sqrt{217}\right)}+\sqrt{\frac{1}{8}\left(1893+129\sqrt{217}\right)}\right)^{1.5}\left(\sqrt{\frac{1}{4}\left(1597+108\sqrt{217}\right)}+\sqrt{\frac{1}{4}\left(1593+108\sqrt{217}\right)}\right)^{1.5}\right)=\log_e\left(\left(\sqrt{\frac{1}{4}\left(1593+108\sqrt{217}\right)}+\sqrt{\frac{1}{4}\left(1597+108\sqrt{217}\right)}\right)^{1.5}\left(\sqrt{\frac{1}{8}\left(1893+129\sqrt{217}\right)}+\sqrt{\frac{1}{8}\left(1901+129\sqrt{217}\right)}\right)^{1.5}\right)$$

$$\log\left(\left(\sqrt{\frac{1}{8}\left(1901+129\sqrt{217}\right)}+\sqrt{\frac{1}{8}\left(1893+129\sqrt{217}\right)}\right)^{1.5}\left(\sqrt{\frac{1}{4}\left(1597+108\sqrt{217}\right)}+\sqrt{\frac{1}{4}\left(1593+108\sqrt{217}\right)}\right)^{1.5}\right)=\log(a)\log_a\left(\left(\sqrt{\frac{1}{4}\left(1593+108\sqrt{217}\right)}+\sqrt{\frac{1}{4}\left(1597+108\sqrt{217}\right)}\right)^{1.5}\left(\sqrt{\frac{1}{8}\left(1893+129\sqrt{217}\right)}+\sqrt{\frac{1}{8}\left(1901+129\sqrt{217}\right)}\right)^{1.5}\right)$$

$$\log\left(\left(\sqrt{\frac{1}{8}\left(1901+129\sqrt{217}\right)}+\sqrt{\frac{1}{8}\left(1893+129\sqrt{217}\right)}\right)^{1.5}\left(\sqrt{\frac{1}{4}\left(1597+108\sqrt{217}\right)}+\sqrt{\frac{1}{4}\left(1593+108\sqrt{217}\right)}\right)^{1.5}\right)=-\text{Li}_1\left(1-\left(\sqrt{\frac{1}{4}\left(1593+108\sqrt{217}\right)}+\sqrt{\frac{1}{4}\left(1597+108\sqrt{217}\right)}\right)^{1.5}\left(\sqrt{\frac{1}{8}\left(1893+129\sqrt{217}\right)}+\sqrt{\frac{1}{8}\left(1901+129\sqrt{217}\right)}\right)^{1.5}\right)$$

Series representations:

$$\log\left(\left(\sqrt{\frac{1}{8}\left(1901+129\sqrt{217}\right)}+\sqrt{\frac{1}{8}\left(1893+129\sqrt{217}\right)}\right)^{1.5}\left(\sqrt{\frac{1}{4}\left(1597+108\sqrt{217}\right)}+\sqrt{\frac{1}{4}\left(1593+108\sqrt{217}\right)}\right)^{1.5}\right)=\log\left(-1+0.0743254\left(3\sqrt{3}\ \sqrt{59+4\sqrt{217}}+\sqrt{1597+108\sqrt{217}}\right)^{1.5}\left(\sqrt{3}\ \sqrt{631+43\sqrt{217}}+\sqrt{1901+129\sqrt{217}}\right)^{1.5}\right)-\sum_{k=1}^{\infty}\frac{1}{k}(-1)^k\left(-1+0.0743254\left(3\sqrt{3}\ \sqrt{59+4\sqrt{217}}+\sqrt{1597+108\sqrt{217}}\right)^{1.5}\left(\sqrt{3}\ \sqrt{631+43\sqrt{217}}+\sqrt{1901+129\sqrt{217}}\right)^{1.5}\right)^{-k}$$

$$\log\left(\left(\sqrt{\frac{1}{8}\left(1901+129\sqrt{217}\right)}+\sqrt{\frac{1}{8}\left(1893+129\sqrt{217}\right)}\right)^{1.5}\left(\sqrt{\frac{1}{4}\left(1597+108\sqrt{217}\right)}+\sqrt{\frac{1}{4}\left(1593+108\sqrt{217}\right)}\right)^{1.5}\right)=\log\left(-1+\left(\frac{1}{2}\sqrt{1593+108\sqrt{217}}+\frac{1}{2}\sqrt{1597+108\sqrt{217}}\right)^{1.5}\left(\frac{\sqrt{1893+129\sqrt{217}}}{2\sqrt{2}}+\frac{\sqrt{1901+129\sqrt{217}}}{2\sqrt{2}}\right)^{1.5}\right)-\sum_{k=1}^{\infty}\frac{1}{k}(-1)^k\left(-1+\left(\frac{1}{2}\sqrt{1593+108\sqrt{217}}+\frac{1}{2}\sqrt{1597+108\sqrt{217}}\right)^{1.5}\left(\frac{\sqrt{1893+129\sqrt{217}}}{2\sqrt{2}}+\frac{\sqrt{1901+129\sqrt{217}}}{2\sqrt{2}}\right)^{1.5}\right)^{-k}$$

$$\log\left(\left(\sqrt{\frac{1}{8}\left(1901+129\sqrt{217}\right)}+\sqrt{\frac{1}{8}\left(1893+129\sqrt{217}\right)}\right)^{1.5}\left(\sqrt{\frac{1}{4}\left(1597+108\sqrt{217}\right)}+\sqrt{\frac{1}{4}\left(1593+108\sqrt{217}\right)}\right)^{1.5}\right)=\log\left(-1+\left(\frac{1}{2}\sqrt{1593+108\sqrt{217}}+\frac{1}{2}\sqrt{1597+108\sqrt{217}}\right)^{1.5}\left(\frac{\sqrt{1893+129\sqrt{217}}}{2\sqrt{2}}+\frac{\sqrt{1901+129\sqrt{217}}}{2\sqrt{2}}\right)^{1.5}\right)-\sum_{k=1}^{\infty}\frac{1}{k}(-1)^k\left(-1+0.0743254\left(3\sqrt{3}\sqrt{59+4\sqrt{217}}+\sqrt{1597+108\sqrt{217}}\right)^{1.5}\left(\sqrt{3}\sqrt{631+43\sqrt{217}}+\sqrt{1901+129\sqrt{217}}\right)^{1.5}\right)^{-k}$$

Integral representations:

$$\log\left(\left(\sqrt{\frac{1}{8}\left(1901+129\sqrt{217}\right)}+\sqrt{\frac{1}{8}\left(1893+129\sqrt{217}\right)}\right)^{1.5}\left(\sqrt{\frac{1}{4}\left(1597+108\sqrt{217}\right)}+\sqrt{\frac{1}{4}\left(1593+108\sqrt{217}\right)}\right)^{1.5}\right)=\int_1^{\left(\frac{1}{2}\sqrt{1593+108\sqrt{217}}+\frac{1}{2}\sqrt{1597+108\sqrt{217}}\right)^{1.5}\left(\frac{\sqrt{1893+129\sqrt{217}}}{2\sqrt{2}}+\frac{\sqrt{1901+129\sqrt{217}}}{2\sqrt{2}}\right)^{1.5}}\frac{1}{t}\,dt$$

$$\log\left(\left(\sqrt{\frac{1}{8}\left(1901+129\sqrt{217}\right)}+\sqrt{\frac{1}{8}\left(1893+129\sqrt{217}\right)}\right)^{1.5}\left(\sqrt{\frac{1}{4}\left(1597+108\sqrt{217}\right)}+\sqrt{\frac{1}{4}\left(1593+108\sqrt{217}\right)}\right)^{1.5}\right)=\frac{1}{2i\pi}\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{1}{\Gamma(1-s)}\Gamma(-s)^2\,\Gamma(1+s)\left(-1+\left(\frac{1}{2}\sqrt{1593+108\sqrt{217}}+\frac{1}{2}\sqrt{1597+108\sqrt{217}}\right)^{1.5}\left(\frac{\sqrt{1893+129\sqrt{217}}}{2\sqrt{2}}+\frac{\sqrt{1901+129\sqrt{217}}}{2\sqrt{2}}\right)^{1.5}\right)^{-s}ds \quad \text{for } -1<\gamma<0$$

[ln(((((((1/8*(1901+129sqrt217))^0.5+(1/8*(1893+129sqrt217))^0.5)))^1.5 * ((((1/4*(1597+108sqrt217))^0.5+(1/4*(1593+108sqrt217))^0.5)))^1.5))))]^1/5

Input:

$$\log\left(\left(\sqrt{\frac{1}{8}\left(1901+129\sqrt{217}\right)}+\sqrt{\frac{1}{8}\left(1893+129\sqrt{217}\right)}\right)^{1.5}\left(\sqrt{\frac{1}{4}\left(1597+108\sqrt{217}\right)}+\sqrt{\frac{1}{4}\left(1593+108\sqrt{217}\right)}\right)^{1.5}\right)\text{^}(1/5)$$

$\log(x)$ is the natural logarithm

Result:

1.635772...

$1.635772\ldots \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

[ln(((((((1/8*(1901+129sqrt217))^0.5+(1/8*(1893+129sqrt217))^0.5)))^1.5 * ((((1/4*(1597+108sqrt217))^0.5+(1/4*(1593+108sqrt217))^0.5)))^1.5))))]^2

Input:

$$\log^2\left(\left(\sqrt{\frac{1}{8}\left(1901+129\sqrt{217}\right)}+\sqrt{\frac{1}{8}\left(1893+129\sqrt{217}\right)}\right)^{1.5}\left(\sqrt{\frac{1}{4}\left(1597+108\sqrt{217}\right)}+\sqrt{\frac{1}{4}\left(1593+108\sqrt{217}\right)}\right)^{1.5}\right)$$

$\log(x)$ is the natural logarithm

Result:

137.160359080103214297899908083801633617581656086338195044...

137.160359…

This result is very near to the inverse of fine-structure constant 137.035

[ln(((((((1/8*(1901+129sqrt217))^0.5+(1/8*(1893+129sqrt217))^0.5)))^1.5 * ((((1/4*(1597+108sqrt217))^0.5+(1/4*(1593+108sqrt217))^0.5)))^1.5)))]^2 - 11 – 1

Input:

$$\log^2\left(\left(\sqrt{\frac{1}{8}\left(1901+129\sqrt{217}\right)}+\sqrt{\frac{1}{8}\left(1893+129\sqrt{217}\right)}\right)^{1.5}\left(\sqrt{\frac{1}{4}\left(1597+108\sqrt{217}\right)}+\sqrt{\frac{1}{4}\left(1593+108\sqrt{217}\right)}\right)^{1.5}\right)-11-1$$

$\log(x)$ is the natural logarithm

Result:

125.160...

125.160… result practically equal to the Higgs boson mass 125.18 GeV

Alternative representations:

$$\log^2\left(\left(\sqrt{\frac{1}{8}\left(1901+129\sqrt{217}\right)}+\sqrt{\frac{1}{8}\left(1893+129\sqrt{217}\right)}\right)^{1.5}\left(\sqrt{\frac{1}{4}\left(1597+108\sqrt{217}\right)}+\sqrt{\frac{1}{4}\left(1593+108\sqrt{217}\right)}\right)^{1.5}\right)-11-1=$$

$$-12+\log_e^2\left(\left(\sqrt{\frac{1}{4}\left(1593+108\sqrt{217}\right)}+\sqrt{\frac{1}{4}\left(1597+108\sqrt{217}\right)}\right)^{1.5}\left(\sqrt{\frac{1}{8}\left(1893+129\sqrt{217}\right)}+\sqrt{\frac{1}{8}\left(1901+129\sqrt{217}\right)}\right)^{1.5}\right)$$

$$\log^2\left(\left(\sqrt{\frac{1}{8}\left(1901+129\sqrt{217}\right)}+\sqrt{\frac{1}{8}\left(1893+129\sqrt{217}\right)}\right)^{1.5}\left(\sqrt{\frac{1}{4}\left(1597+108\sqrt{217}\right)}+\sqrt{\frac{1}{4}\left(1593+108\sqrt{217}\right)}\right)^{1.5}\right)-11-1=$$
$$-12+\left(\log(a)\log_a\left(\left(\sqrt{\frac{1}{4}\left(1593+108\sqrt{217}\right)}+\sqrt{\frac{1}{4}\left(1597+108\sqrt{217}\right)}\right)^{1.5}\left(\sqrt{\frac{1}{8}\left(1893+129\sqrt{217}\right)}+\sqrt{\frac{1}{8}\left(1901+129\sqrt{217}\right)}\right)^{1.5}\right)\right)^2$$

$$\log^2\left(\left(\sqrt{\frac{1}{8}\left(1901+129\sqrt{217}\right)}+\sqrt{\frac{1}{8}\left(1893+129\sqrt{217}\right)}\right)^{1.5}\left(\sqrt{\frac{1}{4}\left(1597+108\sqrt{217}\right)}+\sqrt{\frac{1}{4}\left(1593+108\sqrt{217}\right)}\right)^{1.5}\right)-11-1=$$
$$-12+\left(-\mathrm{Li}_1\left(1-\left(\sqrt{\frac{1}{4}\left(1593+108\sqrt{217}\right)}+\sqrt{\frac{1}{4}\left(1597+108\sqrt{217}\right)}\right)^{1.5}\left(\sqrt{\frac{1}{8}\left(1893+129\sqrt{217}\right)}+\sqrt{\frac{1}{8}\left(1901+129\sqrt{217}\right)}\right)^{1.5}\right)\right)^2$$

Series representations:

$$\log^2\left(\left(\sqrt{\frac{1}{8}\left(1901+129\sqrt{217}\right)}+\sqrt{\frac{1}{8}\left(1893+129\sqrt{217}\right)}\right)^{1.5}\left(\sqrt{\frac{1}{4}\left(1597+108\sqrt{217}\right)}+\sqrt{\frac{1}{4}\left(1593+108\sqrt{217}\right)}\right)^{1.5}\right)-11-1=$$
$$-12+\left(\log\left(-1+0.0743254\left(3\sqrt{3}\sqrt{59+4\sqrt{217}}+\sqrt{1597+108\sqrt{217}}\right)^{1.5}\left(\sqrt{3}\sqrt{631+43\sqrt{217}}+\sqrt{1901+129\sqrt{217}}\right)^{1.5}\right)-\sum_{k=1}^{\infty}\frac{1}{k}(-1)^k\left(-1+0.0743254\left(3\sqrt{3}\sqrt{59+4\sqrt{217}}+\sqrt{1597+108\sqrt{217}}\right)^{1.5}\left(\sqrt{3}\sqrt{631+43\sqrt{217}}+\sqrt{1901+129\sqrt{217}}\right)^{1.5}\right)^{-k}\right)^2$$

$$\log^2\left(\left(\sqrt{\frac{1}{8}\left(1901+129\sqrt{217}\right)}+\sqrt{\frac{1}{8}\left(1893+129\sqrt{217}\right)}\right)^{1.5}\left(\sqrt{\frac{1}{4}\left(1597+108\sqrt{217}\right)}+\sqrt{\frac{1}{4}\left(1593+108\sqrt{217}\right)}\right)^{1.5}\right)-11-1=$$

$$-12+\left(\log\left(-1+\left(\frac{1}{2}\sqrt{1593+108\sqrt{217}}+\frac{1}{2}\sqrt{1597+108\sqrt{217}}\right)^{1.5}\left(\frac{\sqrt{1893+129\sqrt{217}}}{2\sqrt{2}}+\frac{\sqrt{1901+129\sqrt{217}}}{2\sqrt{2}}\right)^{1.5}\right)-\sum_{k=1}^{\infty}\frac{1}{k}(-1)^k\left(-1+\left(\frac{1}{2}\sqrt{1593+108\sqrt{217}}+\frac{1}{2}\sqrt{1597+108\sqrt{217}}\right)^{1.5}\left(\frac{\sqrt{1893+129\sqrt{217}}}{2\sqrt{2}}+\frac{\sqrt{1901+129\sqrt{217}}}{2\sqrt{2}}\right)^{1.5}\right)^{-k}\right)^2$$

$$\log^2\left(\left(\sqrt{\frac{1}{8}\left(1901+129\sqrt{217}\right)}+\sqrt{\frac{1}{8}\left(1893+129\sqrt{217}\right)}\right)^{1.5}\left(\sqrt{\frac{1}{4}\left(1597+108\sqrt{217}\right)}+\sqrt{\frac{1}{4}\left(1593+108\sqrt{217}\right)}\right)^{1.5}\right)-11-1=$$

$$-12+\left(\log\left(-1+\left(\frac{1}{2}\sqrt{1593+108\sqrt{217}}+\frac{1}{2}\sqrt{1597+108\sqrt{217}}\right)^{1.5}\left(\frac{\sqrt{1893+129\sqrt{217}}}{2\sqrt{2}}+\frac{\sqrt{1901+129\sqrt{217}}}{2\sqrt{2}}\right)^{1.5}\right)-\sum_{k=1}^{\infty}\frac{1}{k}(-1)^k\left(-1+0.0743254\left(3\sqrt{3}\sqrt{59+4\sqrt{217}}+\sqrt{1597+108\sqrt{217}}\right)^{1.5}\left(\sqrt{3}\sqrt{631+43\sqrt{217}}+\sqrt{1901+129\sqrt{217}}\right)^{1.5}\right)^{-k}\right)^2$$

Integral representations:

$$\log^2\left(\left(\sqrt{\frac{1}{8}\left(1901+129\sqrt{217}\right)}+\sqrt{\frac{1}{8}\left(1893+129\sqrt{217}\right)}\right)^{1.5}\left(\sqrt{\frac{1}{4}\left(1597+108\sqrt{217}\right)}+\sqrt{\frac{1}{4}\left(1593+108\sqrt{217}\right)}\right)^{1.5}\right)-11-1=-12+\left(\int_1^{\left(\frac{1}{2}\sqrt{1593+108\sqrt{217}}+\frac{1}{2}\sqrt{1597+108\sqrt{217}}\right)^{1.5}\left(\frac{\sqrt{1893+129\sqrt{217}}}{2\sqrt{2}}+\frac{\sqrt{1901+129\sqrt{217}}}{2\sqrt{2}}\right)^{1.5}}\frac{1}{t}\,dt\right)^2$$

$$\log^2\left(\left(\sqrt{\frac{1}{8}\left(1901+129\sqrt{217}\right)}+\sqrt{\frac{1}{8}\left(1893+129\sqrt{217}\right)}\right)^{1.5}\left(\sqrt{\frac{1}{4}\left(1597+108\sqrt{217}\right)}+\sqrt{\frac{1}{4}\left(1593+108\sqrt{217}\right)}\right)^{1.5}\right)-11-1=$$
$$-12+\frac{1}{4i^2\pi^2}\left(\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{1}{\Gamma(1-s)}\Gamma(-s)^2\,\Gamma(1+s)\left(-1+\left(\frac{1}{2}\sqrt{1593+108\sqrt{217}}+\frac{1}{2}\sqrt{1597+108\sqrt{217}}\right)^{1.5}\left(\frac{\sqrt{1893+129\sqrt{217}}}{2\sqrt{2}}+\frac{\sqrt{1901+129\sqrt{217}}}{2\sqrt{2}}\right)^{1.5}\right)^{-s}ds\right)^2 \quad \text{for } -1<\gamma<0$$

27*1/2((([ln(((((((1/8*(1901+129sqrt217))^0.5+(1/8*(1893+129sqrt217))^0.5)))^1.5 * ((((1/4*(1597+108sqrt217))^0.5+(1/4*(1593+108sqrt217))^0.5)))^1.5)))]^2 - 7-2)))-1

Input:

$$27\times\frac{1}{2}\left(\log^2\left(\left(\sqrt{\frac{1}{8}\left(1901+129\sqrt{217}\right)}+\sqrt{\frac{1}{8}\left(1893+129\sqrt{217}\right)}\right)^{1.5}\left(\sqrt{\frac{1}{4}\left(1597+108\sqrt{217}\right)}+\sqrt{\frac{1}{4}\left(1593+108\sqrt{217}\right)}\right)^{1.5}\right)-7-2\right)-1$$

$\log(x)$ is the natural logarithm

Result:

1729.16...

1729.16….

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. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number)

Alternative representations:

$$\frac{27}{2}\left(\log^2\left(\left(\sqrt{\frac{1}{8}\left(1901+129\sqrt{217}\right)}+\sqrt{\frac{1}{8}\left(1893+129\sqrt{217}\right)}\right)^{1.5}\left(\sqrt{\frac{1}{4}\left(1597+108\sqrt{217}\right)}+\sqrt{\frac{1}{4}\left(1593+108\sqrt{217}\right)}\right)^{1.5}\right)-7-2\right)-1=$$
$$-1+\frac{27}{2}\left(-9+\log_e^2\left(\left(\sqrt{\frac{1}{4}\left(1593+108\sqrt{217}\right)}+\sqrt{\frac{1}{4}\left(1597+108\sqrt{217}\right)}\right)^{1.5}\left(\sqrt{\frac{1}{8}\left(1893+129\sqrt{217}\right)}+\sqrt{\frac{1}{8}\left(1901+129\sqrt{217}\right)}\right)^{1.5}\right)\right)$$

$$\frac{27}{2}\left(\log^2\left(\left(\sqrt{\frac{1}{8}\left(1901+129\sqrt{217}\right)}+\sqrt{\frac{1}{8}\left(1893+129\sqrt{217}\right)}\right)^{1.5}\left(\sqrt{\frac{1}{4}\left(1597+108\sqrt{217}\right)}+\sqrt{\frac{1}{4}\left(1593+108\sqrt{217}\right)}\right)^{1.5}\right)-7-2\right)-1=$$
$$-1+\frac{27}{2}\left(-9+\left(\log(a)\log_a\left(\left(\sqrt{\frac{1}{4}\left(1593+108\sqrt{217}\right)}+\sqrt{\frac{1}{4}\left(1597+108\sqrt{217}\right)}\right)^{1.5}\left(\sqrt{\frac{1}{8}\left(1893+129\sqrt{217}\right)}+\sqrt{\frac{1}{8}\left(1901+129\sqrt{217}\right)}\right)^{1.5}\right)\right)^2\right)$$

$$\frac{27}{2}\left(\log^2\left(\left(\sqrt{\frac{1}{8}\left(1901+129\sqrt{217}\right)}+\sqrt{\frac{1}{8}\left(1893+129\sqrt{217}\right)}\right)^{1.5}\left(\sqrt{\frac{1}{4}\left(1597+108\sqrt{217}\right)}+\sqrt{\frac{1}{4}\left(1593+108\sqrt{217}\right)}\right)^{1.5}\right)-7-2\right)-1=$$
$$-1+\frac{27}{2}\left(-9+\left(-\text{Li}_1\left(1-\left(\sqrt{\frac{1}{4}\left(1593+108\sqrt{217}\right)}+\sqrt{\frac{1}{4}\left(1597+108\sqrt{217}\right)}\right)^{1.5}\left(\sqrt{\frac{1}{8}\left(1893+129\sqrt{217}\right)}+\sqrt{\frac{1}{8}\left(1901+129\sqrt{217}\right)}\right)^{1.5}\right)\right)^2\right)$$

Series representations:

$$\frac{27}{2}\left(\log^2\left(\left(\sqrt{\frac{1}{8}\left(1901+129\sqrt{217}\right)}+\sqrt{\frac{1}{8}\left(1893+129\sqrt{217}\right)}\right)^{1.5}\left(\sqrt{\frac{1}{4}\left(1597+108\sqrt{217}\right)}+\sqrt{\frac{1}{4}\left(1593+108\sqrt{217}\right)}\right)^{1.5}\right)-7-2\right)-1=-1+\frac{27}{2}$$
$$\left(-9+\left(\log\left(-1+0.0743254\left(3\sqrt{3}\sqrt{59+4\sqrt{217}}+\sqrt{1597+108\sqrt{217}}\right)^{1.5}\left(\sqrt{3}\sqrt{631+43\sqrt{217}}+\sqrt{1901+129\sqrt{217}}\right)^{1.5}\right)-\sum_{k=1}^{\infty}\frac{1}{k}(-1)^k\left(-1+0.0743254\left(3\sqrt{3}\sqrt{59+4\sqrt{217}}+\sqrt{1597+108\sqrt{217}}\right)^{1.5}\left(\sqrt{3}\sqrt{631+43\sqrt{217}}+\sqrt{1901+129\sqrt{217}}\right)^{1.5}\right)^{-k}\right)^2\right)$$

$$\frac{27}{2}\left(\log^2\left(\left(\sqrt{\frac{1}{8}\left(1901+129\sqrt{217}\right)}+\sqrt{\frac{1}{8}\left(1893+129\sqrt{217}\right)}\right)^{1.5}\right.\right.$$
$$\left.\left.\left(\sqrt{\frac{1}{4}\left(1597+108\sqrt{217}\right)}+\sqrt{\frac{1}{4}\left(1593+108\sqrt{217}\right)}\right)^{1.5}\right)-7-2\right)-1=$$
$$-1+\frac{27}{2}\left(-9+\left(\log\left(-1+\left(\frac{1}{2}\sqrt{1593+108\sqrt{217}}+\frac{1}{2}\sqrt{1597+108\sqrt{217}}\right)^{1.5}\right.\right.\right.$$
$$\left.\left.\left.\left(\frac{\sqrt{1893+129\sqrt{217}}}{2\sqrt{2}}+\frac{\sqrt{1901+129\sqrt{217}}}{2\sqrt{2}}\right)^{1.5}\right)-\right.\right.$$
$$\left.\left.\sum_{k=1}^{\infty}\frac{1}{k}(-1)^k\left(-1+\left(\frac{1}{2}\sqrt{1593+108\sqrt{217}}+\right.\right.\right.\right.$$
$$\left.\left.\left.\left.\frac{1}{2}\sqrt{1597+108\sqrt{217}}\right)^{1.5}\right.\right.\right.$$
$$\left.\left.\left.\left(\frac{\sqrt{1893+129\sqrt{217}}}{2\sqrt{2}}+\right.\right.\right.\right.$$
$$\left.\left.\left.\left.\left.\left.\frac{\sqrt{1901+129\sqrt{217}}}{2\sqrt{2}}\right)^{1.5}\right)^{-k}\right)^2\right)\right)$$

$$\frac{27}{2}\left(\log^2\left(\left(\sqrt{\frac{1}{8}\left(1901+129\sqrt{217}\right)}+\sqrt{\frac{1}{8}\left(1893+129\sqrt{217}\right)}\right)^{1.5}\right.\right.$$
$$\left.\left.\left(\sqrt{\frac{1}{4}\left(1597+108\sqrt{217}\right)}+\sqrt{\frac{1}{4}\left(1593+108\sqrt{217}\right)}\right)^{1.5}\right)-7-2\right)-1=$$
$$-1+\frac{27}{2}\left(-9+\left(\log\left(-1+\left(\frac{1}{2}\sqrt{1593+108\sqrt{217}}+\frac{1}{2}\sqrt{1597+108\sqrt{217}}\right)^{1.5}\right.\right.\right.$$
$$\left.\left.\left.\left(\frac{\sqrt{1893+129\sqrt{217}}}{2\sqrt{2}}+\frac{\sqrt{1901+129\sqrt{217}}}{2\sqrt{2}}\right)^{1.5}\right)-\right.\right.$$
$$\left.\left.\sum_{k=1}^{\infty}\frac{1}{k}(-1)^k\left(-1+0.0743254\left(3\sqrt{3}\sqrt{59+4\sqrt{217}}+\right.\right.\right.\right.$$
$$\left.\left.\left.\left.\sqrt{1597+108\sqrt{217}}\right)^{1.5}\right.\right.\right.$$
$$\left.\left.\left.\left(\sqrt{3}\sqrt{631+43\sqrt{217}}+\right.\right.\right.\right.$$
$$\left.\left.\left.\left.\left.\left.\sqrt{1901+129\sqrt{217}}\right)^{1.5}\right)^{-k}\right)^2\right)\right)$$

Integral representations:

$$\frac{27}{2}\left(\log^2\left(\left(\sqrt{\frac{1}{8}\left(1901+129\sqrt{217}\right)}+\sqrt{\frac{1}{8}\left(1893+129\sqrt{217}\right)}\right)^{1.5}\left(\sqrt{\frac{1}{4}\left(1597+108\sqrt{217}\right)}+\sqrt{\frac{1}{4}\left(1593+108\sqrt{217}\right)}\right)^{1.5}\right)-7-2\right)-1=-\frac{245}{2}+\frac{27}{2}\left(\int_1^{\left(\frac{1}{2}\sqrt{1593+108\sqrt{217}}+\frac{1}{2}\sqrt{1597+108\sqrt{217}}\right)^{1.5}\left(\frac{\sqrt{1893+129\sqrt{217}}}{2\sqrt{2}}+\frac{\sqrt{1901+129\sqrt{217}}}{2\sqrt{2}}\right)^{1.5}}\frac{1}{t}\,dt\right)^2$$

$$\frac{27}{2}\left(\log^2\left(\left(\sqrt{\frac{1}{8}\left(1901+129\sqrt{217}\right)}+\sqrt{\frac{1}{8}\left(1893+129\sqrt{217}\right)}\right)^{1.5}\left(\sqrt{\frac{1}{4}\left(1597+108\sqrt{217}\right)}+\sqrt{\frac{1}{4}\left(1593+108\sqrt{217}\right)}\right)^{1.5}\right)-7-2\right)-1=-\frac{245}{2}+\frac{1}{8\,i^2\,\pi^2}\,27\left(\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{1}{\Gamma(1-s)}\,\Gamma(-s)^2\,\Gamma(1+s)\left(-1+\left(\frac{1}{2}\sqrt{1593+108\sqrt{217}}+\frac{1}{2}\sqrt{1597+108\sqrt{217}}\right)^{1.5}\left(\frac{\sqrt{1893+129\sqrt{217}}}{2\sqrt{2}}+\frac{\sqrt{1901+129\sqrt{217}}}{2\sqrt{2}}\right)^{1.5}\right)^{-s}ds\right)^2\quad\text{for}\ -1<\gamma<0$$

[27*1/2((([ln(((((((1/8*(1901+129sqrt217))^0.5+(1/8*(1893+129sqrt217))^0.5)))^1.5 * ((((1/4*(1597+108sqrt217))^0.5+(1/4*(1593+108sqrt217))^0.5)))^1.5)))]^2 - 7-2)))-1]^1/15

Input:

$$\left(27\times\frac{1}{2}\left(\log^2\left(\left(\sqrt{\frac{1}{8}\left(1901+129\sqrt{217}\right)}+\sqrt{\frac{1}{8}\left(1893+129\sqrt{217}\right)}\right)^{1.5}\left(\sqrt{\frac{1}{4}\left(1597+108\sqrt{217}\right)}+\sqrt{\frac{1}{4}\left(1593+108\sqrt{217}\right)}\right)^{1.5}\right)-7-2\right)-1\right)\text{ ^ }(1/15)$$

$\log(x)$ is the natural logarithm

Result:

1.643826...

$1.643826\ldots \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

From:

Axion as a non-WIMP dark matter candidate
Ken'ichi Saikawa - arXiv:1709.07091v2 [hep-ph] 29 Jan 2018

> The detailed investigation of the parameter space showed that there exits a loophole if the order of the operators (3.2) is $N = 9$ or 10 [18]. In such cases, the axion can explain the observed dark matter abundance in higher mass ranges, $5.6 \times 10^{-4}\,\text{eV} \lesssim m_a \lesssim 1.3 \times 10^{-1}\,\text{eV}$ (for $N_{\text{DW}} = 6$), if we allow a mild tuning of the symmetry breaking parameter g. Intriguingly, such higher mass ranges are compatible with those preferred by stellar cooling anomaly observations [19].

With regard the axion energy ranges, from $E = mc^2$, we obtain:

(1.3e-1)(9e+16)

Input interpretation:

$1.3\times 10^{-1}\times 9\times 10^{16}$

Result:

11 700 000 000 000 000

Scientific notation:

1.17×10^{16}

$1.17*10^{16}$

and:

(5.6e-4)(9e+16)

Input interpretation:

$5.6 \times 10^{-4} \times 9 \times 10^{16}$

Result:

50 400 000 000 000

Scientific notation:

5.04×10^{13}

$5.04*10^{13}$

Now, we performing the sum of the ln and the 7th roots of the two results, and dividing by 2, we obtain:

1/2((((((ln(50400000000000))))^1/7+((ln(11700000000000000)))^1/7)))

Input:

$$\frac{1}{2}\left(\sqrt[7]{\log(50\,400\,000\,000\,000)} + \sqrt[7]{\log(11\,700\,000\,000\,000\,000)}\right)$$

$\log(x)$ is the natural logarithm

Decimal approximation:

1.656202817934555053910993682983214806240615097283709530546...

1.6562028179…. result very near to the 14th root of the following Ramanujan's class invariant $Q = \left(G_{505}/G_{101/5}\right)^3$ = 1164.2696 i.e. 1.65578...

Alternate forms:

$$\frac{1}{2}\sqrt[7]{\log(50\,400\,000\,000\,000)} + \frac{1}{2}\sqrt[7]{\log(11\,700\,000\,000\,000\,000)}$$

$$\frac{1}{2}\left(\sqrt[7]{14\log(10)+\log(117)} + \sqrt[7]{\log(50\,400\,000\,000\,000)}\right)$$

$$\frac{1}{2}\left(\sqrt[7]{14\log(2)+2\log(3)+11\log(5)+\log(7)} + \sqrt[7]{14\log(2)+2\log(3)+14\log(5)+\log(13)}\right)$$

Alternative representations:

$$\frac{1}{2}\left(\sqrt[7]{\log(50\,400\,000\,000\,000)} + \sqrt[7]{\log(11\,700\,000\,000\,000\,000)}\right) = \frac{1}{2}\left(\sqrt[7]{\log_e(50\,400\,000\,000\,000)} + \sqrt[7]{\log_e(11\,700\,000\,000\,000\,000)}\right)$$

$$\frac{1}{2}\left(\sqrt[7]{\log(50\,400\,000\,000\,000)} + \sqrt[7]{\log(11\,700\,000\,000\,000\,000)}\right) = \frac{1}{2}\left(\sqrt[7]{\log(a)\log_a(50\,400\,000\,000\,000)} + \sqrt[7]{\log(a)\log_a(11\,700\,000\,000\,000\,000)}\right)$$

$$\frac{1}{2}\left(\sqrt[7]{\log(50\,400\,000\,000\,000)} + \sqrt[7]{\log(11\,700\,000\,000\,000\,000)}\right) = \frac{1}{2}\left(\sqrt[7]{-\mathrm{Li}_1(-11\,699\,999\,999\,999\,999)} + \sqrt[7]{-\mathrm{Li}_1(-50\,399\,999\,999\,999)}\right)$$

Series representations:

$$\frac{1}{2}\left(\sqrt[7]{\log(50\,400\,000\,000\,000)} + \sqrt[7]{\log(11\,700\,000\,000\,000\,000)}\right) = \frac{1}{2}\left(\sqrt[7]{\log(50\,399\,999\,999\,999) - \sum_{k=1}^{\infty}\frac{\left(-\frac{1}{50\,399\,999\,999\,999}\right)^k}{k}} + \sqrt[7]{\log(11\,699\,999\,999\,999\,999) - \sum_{k=1}^{\infty}\frac{\left(-\frac{1}{11\,699\,999\,999\,999\,999}\right)^k}{k}}\right)$$

$$\frac{1}{2}\left(\sqrt[7]{\log(50\,400\,000\,000\,000)}+\sqrt[7]{\log(11\,700\,000\,000\,000\,000)}\right)=$$
$$\frac{1}{2}\left(\left(2\,i\,\pi\left\lfloor\frac{\arg(50\,400\,000\,000\,000-x)}{2\,\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k\,(50\,400\,000\,000\,000-x)^k\,x^{-k}}{k}\right)\text{^}(1/7)+\left(2\,i\,\pi\left\lfloor\frac{\arg(11\,700\,000\,000\,000\,000-x)}{2\,\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k\,(11\,700\,000\,000\,000\,000-x)^k\,x^{-k}}{k}\right)\text{^}(1/7)\right)\text{ for } x<0$$

$$\frac{1}{2}\left(\sqrt[7]{\log(50\,400\,000\,000\,000)}+\sqrt[7]{\log(11\,700\,000\,000\,000\,000)}\right)=\frac{1}{2}\left(\sqrt[7]{2\,i\,\pi\left\lfloor\frac{\pi-\arg\left(\frac{1}{z_0}\right)-\arg(z_0)}{2\,\pi}\right\rfloor+\log(z_0)-\sum_{k=1}^{\infty}\frac{(-1)^k\,(50\,400\,000\,000\,000-z_0)^k\,z_0^{-k}}{k}}+\left(2\,i\,\pi\left\lfloor\frac{\pi-\arg\left(\frac{1}{z_0}\right)-\arg(z_0)}{2\,\pi}\right\rfloor+\log(z_0)-\sum_{k=1}^{\infty}\frac{(-1)^k\,(11\,700\,000\,000\,000\,000-z_0)^k\,z_0^{-k}}{k}\right)\text{^}(1/7)\right)$$

Integral representations:

$$\frac{1}{2}\left(\sqrt[7]{\log(50\,400\,000\,000\,000)}+\sqrt[7]{\log(11\,700\,000\,000\,000\,000)}\right)=\frac{1}{2}\left(\sqrt[7]{\int_1^{50\,400\,000\,000\,000}\frac{1}{t}\,dt}+\sqrt[7]{\int_1^{11\,700\,000\,000\,000\,000}\frac{1}{t}\,dt}\right)$$

$$\frac{1}{2}\left(\sqrt[7]{\log(50\,400\,000\,000\,000)}+\sqrt[7]{\log(11\,700\,000\,000\,000\,000)}\right)=\frac{1}{2\sqrt[7]{2\,\pi}}\left(\sqrt[7]{-i\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{50\,399\,999\,999\,999^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds}+\sqrt[7]{-i\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{11\,699\,999\,999\,999\,999^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds}\right)\text{ for } -1<\gamma<0$$

and :

1/2(((((((50400000000000))))^1/7+(((11700000000000000)))^1/7)))

Input:

$$\frac{1}{2}\left(\sqrt[7]{50\,400\,000\,000\,000}+\sqrt[7]{11\,700\,000\,000\,000\,000}\right)$$

Result:

$$\frac{1}{2}\left(20\times 3^{2/7}\times 5^{4/7}\sqrt[7]{7}+100\times 3^{2/7}\sqrt[7]{13}\right)$$

Decimal approximation:

144.062304230581857187739340117082658636360213732588762641 5...

144.0623042…. result practically equal to 144, that is a Fibonacci numbers

Alternate forms:

$$10\times 3^{2/7}\left(5^{4/7}\sqrt[7]{7}+5\sqrt[7]{13}\right)$$

$$3^{2/7}\left(10\times 5^{4/7}\sqrt[7]{7}+50\sqrt[7]{13}\right)$$

$$10\times 3^{2/7}\times 5^{4/7}\sqrt[7]{7}+50\times 3^{2/7}\sqrt[7]{13}$$

Multiplying the expression by 12, we obtain:

6(((((((504000000000000))))^1/7+(((11700000000000000)))^1/7)))

Input:

$$6\left(\sqrt[7]{50\,400\,000\,000\,000}+\sqrt[7]{11\,700\,000\,000\,000\,000}\right)$$

Result:

$$6\left(20\times 3^{2/7}\times 5^{4/7}\sqrt[7]{7}+100\times 3^{2/7}\sqrt[7]{13}\right)$$

Decimal approximation:

1728.747650766982286252872081404991903636322564791065151698...

1728.74765076…

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. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number)

Alternate forms:

$$120 \times 3^{2/7}\left(5^{4/7}\sqrt[7]{7}+5\sqrt[7]{13}\right)$$
$$3^{2/7}\left(120 \times 5^{4/7}\sqrt[7]{7}+600\sqrt[7]{13}\right)$$
$$120 \times 3^{2/7} \times 5^{4/7}\sqrt[7]{7}+600 \times 3^{2/7}\sqrt[7]{13}$$

Performing the 15th root, we obtain:

[6(((((((504000000000000)))))^1/7+(((11700000000000000)))^1/7)))]^1/15

Input:

$$\sqrt[15]{6\left(\sqrt[7]{50\,400\,000\,000\,000}+\sqrt[7]{11\,700\,000\,000\,000\,000}\right)}$$

Exact result:

$$\sqrt[15]{6\left(20 \times 3^{2/7} \times 5^{4/7}\sqrt[7]{7}+100 \times 3^{2/7}\sqrt[7]{13}\right)}$$

Decimal approximation:

1.643799233230388887927011075508266753725466785228776461059...

$1.6437992332\ldots \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

Alternate forms:

$$3^{2/105}\sqrt[15]{120 \times 5^{4/7}\sqrt[7]{7}+600\sqrt[7]{13}}$$
$$\sqrt[5]{2}\ 3^{3/35}\sqrt[15]{5\left(5^{4/7}\sqrt[7]{7}+5\sqrt[7]{13}\right)}$$

All 15th roots of 6 (20 3^(2/7) 5^(4/7) 7^(1/7) + 100 3^(2/7) 13^(1/7)):

$$\sqrt[15]{6\left(20\times 3^{2/7}\times 5^{4/7}\sqrt[7]{7}+100\times 3^{2/7}\sqrt[7]{13}\right)}\; e^{0} \approx 1.64380 \text{ (real, principal root)}$$

$$\sqrt[15]{6\left(20\times 3^{2/7}\times 5^{4/7}\sqrt[7]{7}+100\times 3^{2/7}\sqrt[7]{13}\right)}\; e^{(2i\pi)/15} \approx 1.50169+0.6686\,i$$

$$\sqrt[15]{6\left(20\times 3^{2/7}\times 5^{4/7}\sqrt[7]{7}+100\times 3^{2/7}\sqrt[7]{13}\right)}\; e^{(4i\pi)/15} \approx 1.0999+1.2216\,i$$

$$\sqrt[15]{6\left(20\times 3^{2/7}\times 5^{4/7}\sqrt[7]{7}+100\times 3^{2/7}\sqrt[7]{13}\right)}\; e^{(2i\pi)/5} \approx 0.5080+1.5633\,i$$

$$\sqrt[15]{6\left(20\times 3^{2/7}\times 5^{4/7}\sqrt[7]{7}+100\times 3^{2/7}\sqrt[7]{13}\right)}\; e^{(8i\pi)/15} \approx -0.17182+1.63479\,i$$

From which:

1/2(((((((504000000000000))))+(((11700000000000000)))))))*(1/x) = 1.6562028179

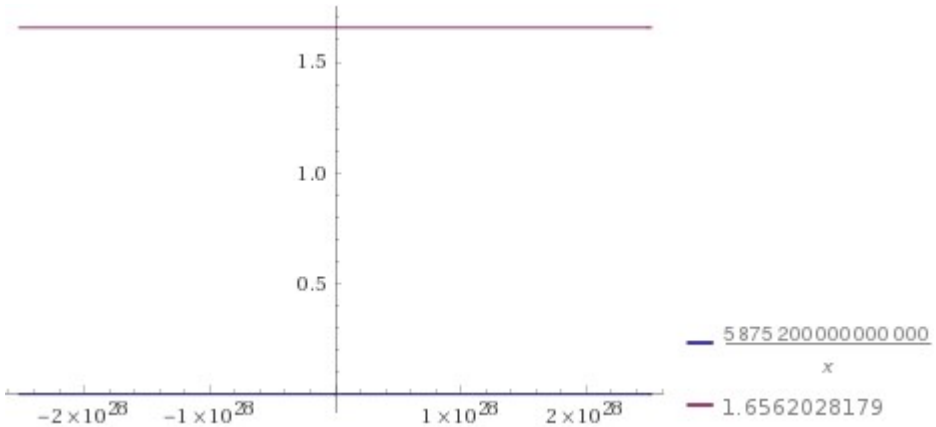
Input interpretation:

$$\frac{1}{2}\,(50\,400\,000\,000\,000 + 11\,700\,000\,000\,000\,000)\times\frac{1}{x} = 1.6562028179$$

Result:

$$\frac{5\,875\,200\,000\,000\,000}{x} = 1.6562028179$$

Plot:



Alternate form assuming x is real:

$$\frac{3.547391622\times10^{15}}{x} = 1.0000000000$$

Alternate form assuming x is positive:

$1.0000000000\,x = 3.547391622\times10^{15}$ (for $x \neq 0$)

Solution:

$x = 3547391621667159$

Integer solution:

$x = 3547391621667159$

$3.547391622 * 10^{15}$

Dividing for c^2, we obtain:

(3547391621667159)/9e+16

Input interpretation:

$$\frac{3547391621667159}{9\times10^{16}}$$

Exact result:

$$\frac{1182463873889053}{30000000000000000}$$

Decimal approximation:

0.039415462462968433333333333333333333333333333333333333333...

$3.941546246296843333333333333333333333333333333333333333\times10^{-2}$

$3.941546…*10^{-2}$

and:

1+1/(1/0.039415462462968433333)^1/7 - (11+1)1/10^3

Input interpretation:

$$1+\frac{1}{\sqrt[7]{\frac{1}{0.039415462462968433333}}}-(11+1)\times\frac{1}{10^3}$$

Result:

1.618058604048352142 98...

1.618058…. result that is a very good approximation to the value of the golden ratio 1.618033988749...

Input interpretation:

1.618058

Rational form:

$$\frac{809\,029}{500\,000}=1+\frac{309\,029}{500\,000}$$

Possible closed forms:

$$\sqrt{\frac{3\,\mathcal{K}_{-1}}{2}}\approx 1.61805\,70118$$

$$\Phi+1\approx 1.618\,03398\,8$$

Now, we observe that:

> Recently, it was pointed out that the prediction for the axion dark matter mass is potentially affected by the fact that strings have large tension, which cannot be realized in the conventional simulation method [16]. A modified method including the effects of large string tension was proposed in Ref. [17], which results in a smaller value of the axion dark matter mass, $m_a = (2.62 \pm 0.34) \times 10^{-5}$ eV. Remarkably, the results of the modified simulations showed that the axion production is less efficient than a naive estimate based on the realignment mechanism, despite of the fact that strings become denser than those observed in the conventional field theoretic simulations. This fact implies that more energetic axions are produced, and that dynamics at smaller scales might be more important. More detailed studies are required to confirm whether such shorter distance physics has a large impact on the axion production efficiency.

For m = 2.62 * 10^{-5} eV , we obtain the following Energy:

(2.62e-5)(9e+16)

Input interpretation:

$2.62 \times 10^{-5} \times 9 \times 10^{16}$

Result:

2 358 000 000 000

Scientific notation:

2.358×10^{12}

$2.358*10^{12}$

From which:

(2358000000000)/1024

where 1024 = 64 * 16

Input:

$$\frac{2\,358\,000\,000\,000}{1024}$$

Exact result:

2 302 734 375

Scientific notation:

$2.302734375 \times 10^{9}$

$2.302734375*10^{9}$

Performing the 45th root, we obtain:

(((2358000000000)/1024))^1/45

Input:

$$\sqrt[45]{\frac{2\,358\,000\,000\,000}{1024}}$$

Result:

$3^{2/45}\sqrt[5]{5}\ \sqrt[45]{131}$

Decimal approximation:

1.614543918861942590251206166801349042554819440808259210041...

1.61454391886….. result that is a good approximation to the value of the golden ratio 1.618033988749...

and:

1/28((2358000000000)/1024)^1/2 + 13 + 2

Where 13 and 2 are Fibonacci numbers

Input:

$$\frac{1}{28}\sqrt{\frac{2\,358\,000\,000\,000}{1024}}+13+2$$

Result:

$$15+\frac{1875\sqrt{655}}{28}$$

Decimal approximation:

1728.814806973624211815388676952462132891173399513265948014...

1728.8148069….

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. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number)

Alternate forms:

$$\frac{15}{28}\left(28+125\sqrt{655}\right)$$
$$\frac{1}{28}\left(420+1875\sqrt{655}\right)$$

Minimal polynomial:

$784x^2-23520x-2302557975$

(((((2358000000000)/1024)^1/3)))^1/14

Input:

$$\sqrt[14]{\sqrt[3]{\frac{2\,358\,000\,000\,000}{1024}}}$$

Result:

$$\sqrt[21]{3}\ 5^{3/14}\ \sqrt[42]{131}$$

Decimal approximation:

1.6707465296674767040667830397168865341618588656038066512 32...

1.6707465296…… result near to the 14th root of the following Ramanujan's class invariant $Q = \left(G_{505}/G_{101/5}\right)^3$ = 1164.2696 i.e. 1.65578...

Alternate form:

root of $x^{42} - 2\,302\,734\,375$ near $x = 1.67075$

All 14th roots of 125 3^(2/3) 131^(1/3):

$\sqrt[21]{3}\ 5^{3/14}\ \sqrt[42]{131}\ e^{0} \approx 1.67075$ (real, principal root)

$\sqrt[21]{3}\ 5^{3/14}\ \sqrt[42]{131}\ e^{(i\pi)/7} \approx 1.5053 + 0.7249\,i$

$\sqrt[21]{3}\ 5^{3/14}\ \sqrt[42]{131}\ e^{(2i\pi)/7} \approx 1.0417 + 1.3062\,i$

$\sqrt[21]{3}\ 5^{3/14}\ \sqrt[42]{131}\ e^{(3i\pi)/7} \approx 0.37178 + 1.62886\,i$

$\sqrt[21]{3}\ 5^{3/14}\ \sqrt[42]{131}\ e^{(4i\pi)/7} \approx -0.3718 + 1.62886\,i$

From the following Class Invariant

$$G_n = \left(\sqrt{\frac{18+9\sqrt{3}}{4}} + \sqrt{\frac{14+9\sqrt{3}}{4}}\right)^{1/2} \times \left(\sqrt{31420+18144\sqrt{3}} + \sqrt{31419+18144\sqrt{3}}\right)^{1/12}$$

we obtain:

((((1/4(18+9sqrt3))^0.5+(1/4(14+9sqrt3))^0.5)))^0.5 *
(((((31420+18144sqrt3)^0.5+(31419+18144sqrt3)^0.5))))^(1/12)

Input:

$$\frac{\sqrt{\sqrt{\frac{1}{4}\left(18+9\sqrt{3}\right)}+\sqrt{\frac{1}{4}\left(14+9\sqrt{3}\right)}}}{\sqrt[12]{\sqrt{31420+18144\sqrt{3}}+\sqrt{31419+18144\sqrt{3}}}}$$

Exact result:

$$\frac{\sqrt{\frac{1}{2}\sqrt{14+9\sqrt{3}}+\frac{1}{2}\sqrt{18+9\sqrt{3}}}}{\sqrt[12]{\sqrt{31419+18144\sqrt{3}}+\sqrt{31420+18144\sqrt{3}}}}$$

Decimal approximation:

3.979121034534874033441931737098433405528284789190802589842...

3.97912103453….

Alternate forms:

$$\frac{\sqrt{\sqrt[12]{\text{root of } x^8-15\,756\,048\,x^7+858\,399\,836\,x^6+7\,703\,310\,384\,x^5+24\,620\,595\,270\,x^4-7\,703\,310\,384\,x^3+858\,399\,836\,x^2+15\,756\,048\,x+1 \text{ near } x=1.5756\times10^7}\sqrt[4]{8+\frac{9\sqrt{3}}{2}}+\frac{3}{2}\sqrt{55+32\sqrt{3}}\;\sqrt[12]{3\sqrt{3491+2016\sqrt{3}}+2\sqrt{7855+4536\sqrt{3}}}}}{\sqrt[12]{3\sqrt{3491+2016\sqrt{3}}+2\sqrt{7855+4536\sqrt{3}}}}}{\sqrt{\frac{2}{3\sqrt{2+\sqrt{3}}+\sqrt{14+9\sqrt{3}}}}}$$

Minimal polynomial:

$$x^{96}-15\,756\,048\,x^{84}+858\,399\,836\,x^{72}+7\,703\,310\,384\,x^{60}+24\,620\,595\,270\,x^{48}-7\,703\,310\,384\,x^{36}+858\,399\,836\,x^{24}+15\,756\,048\,x^{12}+1$$

1+1/(((((((1/4(18+9sqrt3))^0.5+(1/4(14+9sqrt3))^0.5)))^0.5 *
(((((31420+18144sqrt3)^0.5+(31419+18144sqrt3)^0.5))))^(1/12))))^1/3

Input:

$$1+1\Big/\left(\left(\sqrt{\sqrt{\frac{1}{4}\left(18+9\sqrt{3}\right)}+\sqrt{\frac{1}{4}\left(14+9\sqrt{3}\right)}}\;\sqrt[12]{\sqrt{31420+18144\sqrt{3}}+\sqrt{31419+18144\sqrt{3}}}\right)\text{^}(1/3)\right)$$

Exact result:

$$1+1\Big/\left(\left(\sqrt{\frac{1}{2}\sqrt{14+9\sqrt{3}}+\frac{1}{2}\sqrt{18+9\sqrt{3}}}\;\sqrt[12]{\sqrt{31419+18144\sqrt{3}}+\sqrt{31420+18144\sqrt{3}}}\right)\text{^}(1/3)\right)$$

Decimal approximation:

1.631060431662531627983005257939720149084420484308858138531...

$1.631060431\ldots \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

Alternate forms:

$$1+\frac{\sqrt[6]{\frac{2}{3\sqrt{2+\sqrt{3}}+\sqrt{14+9\sqrt{3}}}}}{\sqrt[36]{3\sqrt{3491+2016\sqrt{3}}+2\sqrt{7855+4536\sqrt{3}}}}$$

$$1+1\Big/\left(\sqrt[6]{\frac{1}{2}\left(3\sqrt{\frac{3}{2}}+\frac{3}{\sqrt{2}}\right)+\frac{1}{2}\sqrt{14+9\sqrt{3}}}\;\sqrt[36]{\sqrt{31419+18144\sqrt{3}}+\sqrt{31420+18144\sqrt{3}}}\right)$$

$$1+2^{19/72}\Big/\left(\left(\sqrt{3+3\sqrt{3}+\sqrt{14-i\sqrt{47}}+\sqrt{i\left(\sqrt{47}+-14\,i\right)}}\left(\sqrt{31420-92\,i\sqrt{47}}+\sqrt{31419-99\,i\sqrt{47}}+\sqrt{2}\left(3\sqrt{\frac{1}{2}i\left(11\sqrt{47}+-3491\,i\right)}+\sqrt{2\,i\left(23\sqrt{47}+-7855\,i\right)}\right)\right)\text{^}(1/12)\right)\text{^}(1/3)\right)$$

1+1/(((((((1/4(18+9sqrt3))^0.5+(1/4(14+9sqrt3))^0.5)))^0.5 *
(((((31420+18144sqrt3)^0.5+(31419+18144sqrt3)^0.5))))^(1/12))))^1/3-13/10^3

Input:

$$1+1\Big/\left(\left(\sqrt{\sqrt{\frac{1}{4}\left(18+9\sqrt{3}\right)}+\sqrt{\frac{1}{4}\left(14+9\sqrt{3}\right)}}\;\sqrt[12]{\sqrt{31420+18144\sqrt{3}}+\sqrt{31419+18144\sqrt{3}}}\right)\text{^}(1/3)\right)-\frac{13}{10^3}$$

Exact result:

$$\frac{987}{1000}+1\Big/\left(\left(\sqrt{\frac{1}{2}\sqrt{14+9\sqrt{3}}+\frac{1}{2}\sqrt{18+9\sqrt{3}}}\;\sqrt[12]{\sqrt{31419+18144\sqrt{3}}+\sqrt{31420+18144\sqrt{3}}}\right)\text{^}(1/3)\right)$$

Decimal approximation:

1.618060431662531627983005257939720149084420484308858138531...

1.61806043…. result that is a very good approximation to the value of the golden ratio 1.618033988749...

Input interpretation:

Rational form:

$$\frac{80\,903}{50\,000}=1+\frac{30\,903}{50\,000}$$

Possible closed forms:

$$\phi \approx 1.618033988$$

$$\frac{25\,e}{42} \approx 1.618024897$$

$$-e! + 5 - \frac{5}{e} + e \approx 1.6180641462$$

Alternate forms:

$$\frac{987}{1000} + \frac{\sqrt[6]{\frac{2}{3\sqrt{2+\sqrt{3}}+\sqrt{14+9\sqrt{3}}}}}{\sqrt[36]{3\sqrt{3491+2016\sqrt{3}}+2\sqrt{7855+4536\sqrt{3}}}}$$

$$\frac{987}{1000} + 1 \Big/ \left(\sqrt[6]{\frac{1}{2}\left(3\sqrt{\frac{3}{2}}+\frac{3}{\sqrt{2}}\right)+\frac{1}{2}\sqrt{14+9\sqrt{3}}}\;\sqrt[36]{\sqrt{31419+18144\sqrt{3}}+\sqrt{31420+18144\sqrt{3}}}\right)$$

$$\frac{987}{1000} + 2^{19/72} \Big/ \left(\left(\sqrt{3+3\sqrt{3}+\sqrt{14-i\sqrt{47}}+\sqrt{i\left(\sqrt{47}+-14\,i\right)}}\left(\sqrt{31420-92\,i\sqrt{47}}+\sqrt{31419-99\,i\sqrt{47}}+\sqrt{2}\left(3\sqrt{\frac{1}{2}i\left(11\sqrt{47}+-3491\,i\right)}+\sqrt{2\,i\left(23\sqrt{47}+-7855\,i\right)}\right)\right)\text{^}(1/12)\right)\text{^}(1/3)\right)$$

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 observe that 1728 and 1729 are results 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).

Furthermore, we obtain as results of our computations, always values very near to the Higgs boson mass 125.18 GeV and practically equals to the rest mass of Pion meson 139.57 MeV. In conclusion we obtain also many results that are very good approximations to the value of the golden ratio 1.618033988749... and to ζ(2) = $\frac{\pi^2}{6} = 1.644934 \ldots$

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.

References

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DOI 10.1007/978-0-387-77766-5_10, © Springer Science+Business Media, LLC 2009

Axion as a non-WIMP dark matter candidate
Ken'ichi Saikawa - arXiv:1709.07091v2 [hep-ph] 29 Jan 2018