On the various Ramanujan equations (mock theta functions and taxicab numbers) linked to some sectors of String Theory (black branes) and Black Hole Physics: Further new possible mathematical connections VII.

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Abstract

In this research thesis, we have analyzed and deepened further Ramanujan expressions (mock theta functions and taxicab numbers) applied to some sectors of String Theory (black branes) and Black Hole Physics. We have therefore described other new possible mathematical connections.

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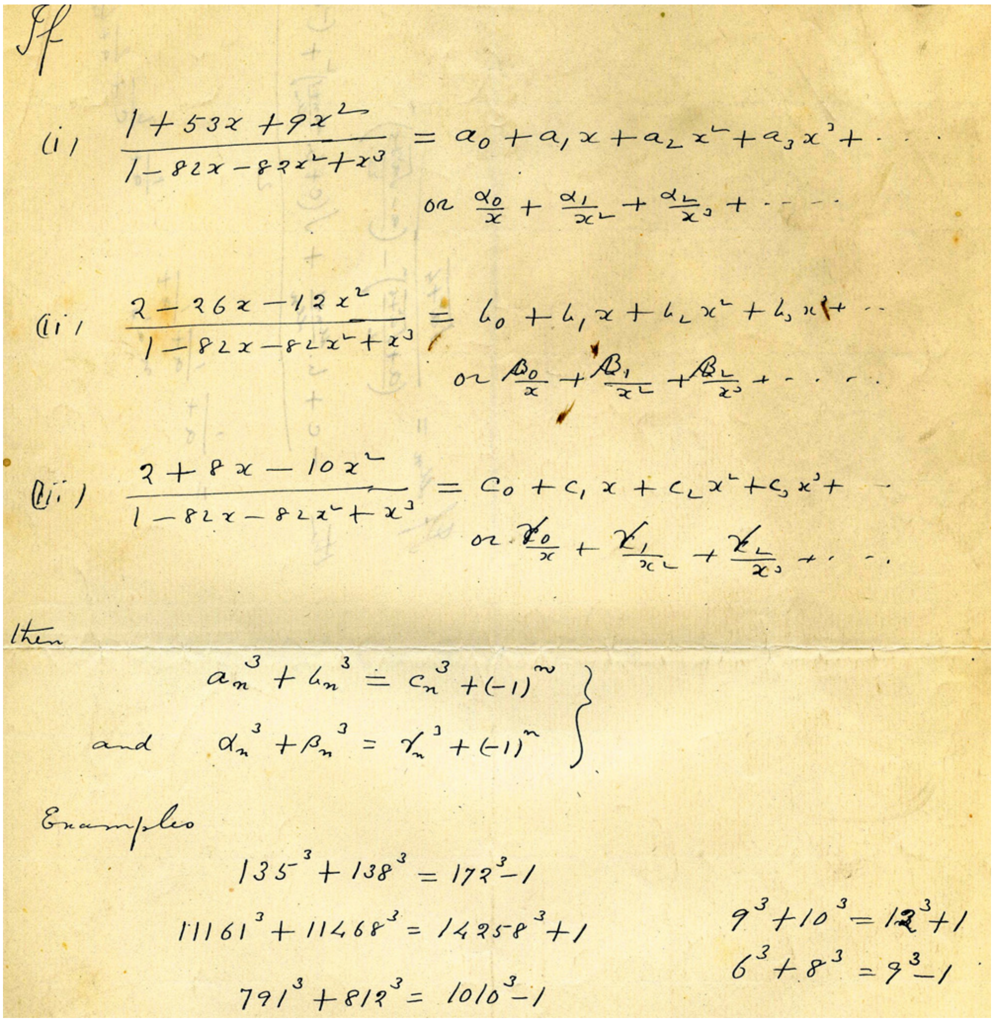
https://www.britannica.com/biography/Srinivasa-Ramanujan



If

(i) $$\frac{1+53x+9x^2}{1-82x-82x^2+x^3} = a_0+a_1x+a_2x^2+a_3x^3+\cdots$$
or $$\frac{\alpha_0}{x}+\frac{\alpha_1}{x^2}+\frac{\alpha_2}{x^3}+\cdots$$

(ii) $$\frac{2-26x-12x^2}{1-82x-82x^2+x^3} = b_0+b_1x+b_2x^2+b_3x^3+\cdots$$
or $$\frac{\beta_0}{x}+\frac{\beta_1}{x^2}+\frac{\beta_2}{x^3}+\cdots$$

(iii) $$\frac{2+8x-10x^2}{1-82x-82x^2+x^3} = c_0+c_1x+c_2x^2+c_3x^3+\cdots$$
or $$\frac{\gamma_0}{x}+\frac{\gamma_1}{x^2}+\frac{\gamma_2}{x^3}+\cdots$$

then

$$\left.\begin{aligned} & a_n^3+b_n^3=c_n^3+(-1)^n \\ \text{and}\quad & \alpha_n^3+\beta_n^3=\gamma_n^3+(-1)^n \end{aligned}\right\}$$

Examples

$135^3+138^3=172^3-1$

$11161^3+11468^3=14258^3+1$

$791^3+812^3=1010^3-1$

$9^3+10^3=12^3+1$

$6^3+8^3=9^3-1$

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

Ramanujan's manuscript

The representations of 1729 as the sum of two cubes appear in the bottom right corner. The equation expressing the near counter examples to Fermat's last theorem appears further up: $\alpha^3 + \beta^3 = \gamma^3 + (-1)^n$.

From Wikipedia

The ***taxicab number****, typically denoted Ta(n) or Taxicab(n), also called the nth* ***Hardy–Ramanujan number****, is defined as the smallest integer that can be expressed as a sum of two positive integer cubes in n distinct ways. The most famous taxicab number is* $1729 = Ta(2) = 1^3 + 12^3 = 9^3 + 10^3$.

From:

arXiv:1008.3801v2 [hep-th] 3 Apr 2012
Black Hole Microstate Counting and its Macroscopic Counterpart
Ipsita Mandal and Ashoke Sen

Since the right-moving modes are frozen into their ground state, the contribution to the partition function from the KK-monopole dynamics, after separating out the contribution from fermion zero modes which go into the helicity trace, is equal to that of 24 left-moving bosons [17]:

$$Z_{KK} = e^{-2\pi i\sigma} \prod_{n=1}^{\infty} \{(1 - e^{2\pi i n\sigma})^{-24}\} \ . \tag{2.5}$$

The overall factor of $e^{-2\pi i\sigma}$ is a reflection of the fact that the ground state of the Kaluza-Klein monopole carries a net momentum of 1 along S^1.

From

$$Z_{KK} = e^{-2\pi i\sigma} \prod_{n=1}^{\infty} \{(1 - e^{2\pi i n\sigma})^{-24}\} \ .$$

we obtain:

exp(-2Pi) product (((1-exp(2Pi*n))^-24)), n=1 to 1/12

Input interpretation:

$$\exp(-2\pi) \prod_{n=1}^{\frac{1}{12}} \frac{1}{(1-\exp(2\pi n))^{24}}$$

Result:

$e^{-2\pi} \approx 0.00186744$

1 + exp(-2Pi) (((product (((1-exp(2Pi*n))^-24)), n=1 to 1/12)))

Input interpretation:

$$1 + \exp(-2\pi) \prod_{n=1}^{\frac{1}{12}} \frac{1}{(1-\exp(2\pi n))^{24}}$$

Result:

$1 + e^{-2\pi} \approx 1.00187$

Alternate form:

$e^{-2\pi}(1 + e^{2\pi})$

e^(-2 π) (1 + e^(2 π))

Input:

$e^{-2\pi}\left(1+e^{2\pi}\right)$

Decimal approximation:

1.001867442731707988814430212934827030393422805002475317199...

1.00186744273…. result practically equal to the following Rogers-Ramanujan continued fraction:

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

Property:

$e^{-2\pi}\left(1+e^{2\pi}\right)$ is a transcendental number

Alternate form:

$1+e^{-2\pi}$

Alternative representations:

$$e^{-2\pi}\left(1+e^{2\pi}\right)=e^{-360^\circ}\left(1+e^{360^\circ}\right)$$

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

$$e^{-2\pi}\left(1+e^{2\pi}\right)=\exp^{-2\pi}(z)\left(1+\exp^{2\pi}(z)\right)\quad\text{for } z=1$$

Series representations:

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

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

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

$n!$ is the factorial function

Integral representations:

$$e^{-2\pi}\left(1+e^{2\pi}\right) = 1+e^{-8\int_0^1\sqrt{1-t^2}\,dt}$$

$$e^{-2\pi}\left(1+e^{2\pi}\right) = 1+e^{-4\int_0^1 1/\sqrt{1-t^2}\,dt}$$

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

The dynamics of the D1-D5 center of mass motion in the KK monopole background is described by a supersymmetric sigma model with Taub-NUT space as the target space. By taking the size of the Taub-NUT space to be large, we can take the oscillator modes to be those

of a free field theory, but the zero mode dynamics is described by a supersymmetric quantum mechanics problem. The contribution is found to be [17]

$$Z_{CM} = e^{-2\pi iv}\prod_{n=1}^{\infty}\left\{(1-e^{2\pi in\sigma})^4\,(1-e^{2\pi in\sigma+2\pi iv})^{-2}\,(1-e^{2\pi in\sigma-2\pi iv})^{-2}\right\}\,e^{-2\pi iv}\,(1-e^{-2\pi iv})^{-2}\,. \tag{2.6}$$

From

$$Z_{CM} = e^{-2\pi iv}\prod_{n=1}^{\infty}\left\{(1-e^{2\pi in\sigma})^4\,(1-e^{2\pi in\sigma+2\pi iv})^{-2}\,(1-e^{2\pi in\sigma-2\pi iv})^{-2}\right\}\,e^{-2\pi iv}\,(1-e^{-2\pi iv})^{-2}\,. \tag{2.6}$$

we obtain:

exp(-2Pi) product ((((1-exp(2Pi*n))^4)(1-exp(2Pi*n+2Pi))^-2 (1-exp(2Pi*n-2Pi))^-2))*(((exp(-2Pi) ((1-exp(-2Pi))^-2)))), n=1 to 1/12

Input interpretation:

$$\exp(-2\pi)\prod_{n=1}^{\frac{1}{12}}\frac{(1-\exp(2\pi n))^4}{(1-\exp(2\pi n+2\pi))^2\,(1-\exp(2\pi n-2\pi))^2}\times\frac{\exp(-2\pi)}{(1-\exp(-2\pi))^2}$$

Result:

$e^{-2\pi} \approx 0.00186744$

0.00186744   the similar result as above.

Now, we have that:

Now, typically all the fermion zero modes associated with the broken supersymmetries are hair degrees of freedom, since we can generate these zero mode deformations by supersymmetry transformation parameters which go to constant at infinity and vanish below a certain radius. Thus the hair modes contain $2k$ fermion zero modes, and in order that the trace over these zero modes do not make the whole trace vanish, we need an insertion of $(2h_{hair})^k$ into the trace. In other words, if we expand the $(2h_{hor} + 2h_{hair})^k$ factor in a binomial expansion, then only the $(2h_{hair})^k$ term will contribute. This gives

$$B_{k;macro} = \frac{1}{k!} Tr\{(-1)^{2h_{hor}+2h_{hair}} (2h_{hair})^k\} = \sum B_{0;hor} B_{k;hair} . \tag{3.30}$$

This can be expanded in the spirit of (3.27) as

$$B_{k;macro}(\vec{Q}) = \sum_n \sum_{\substack{\{Q_i\}, Q_{hair} \\ \sum_{i=1}^n Q_i + Q_{hair} = Q}} \left\{ \prod_{i=1}^n B_{0;hor}(\vec{Q}_i) \right\} B_{k;hair}(\vec{Q}_{hair}; \{\vec{Q}_i\}) , \tag{3.31}$$

where now the vector $\vec{Q}$ no longer contains the angular momentum. A further simplification follows from the fact that in four dimensions, only the $h_{hor} = 0$ black holes are supersymmetric.

This is of course known to be true for a classical black hole, but more generally it follows from the fact that unbroken supersymmetries, together with the $SL(2,R)$ isometry of the near horizon geometry, generate the full $SU(1,1|2)$ supergroup which includes $SU(2)$ as a symmetry group. This implies a spherically symmetric horizon, and hence zero angular momentum since the partition function on AdS_2 computes the entropy in a fixed angular momentum sector (microcanonical ensemble). Thus $B_{0;hor} = Tr_{hor}(1) = d_{hor}$, and we can express (3.31) as

$$B_{k;macro}(\vec{Q}) = \sum_{n} \sum_{\substack{\{\vec{Q}_i\},\vec{Q}_{hair} \\ \sum_{i=1}^{n} \vec{Q}_i + \vec{Q}_{hair} = \vec{Q}}} \left\{ \prod_{i=1}^{n} d_{hor}(\vec{Q}_i) \right\} B_{k;hair}(\vec{Q}_{hair};\{\vec{Q}_i\}) . \qquad (3.32)$$

Most of our analysis involves 1/4-BPS black holes in $\mathcal{N}=4$ supersymmetric string theories in $D=4$ which preserves 4 out of 16 supersymmetries, i.e., such a black hole configuration breaks 12 supersymmetries. Thus the relevant helicity trace index is B_6. In these theories, the contribution from multi-centered black holes is known to be exponentially suppressed [26,38,48]. Furthermore, for single-centered black holes, often the only hair modes are the fermion zero modes. In this case, $\vec{Q}_{hair} = 0$. Furthermore, since for each pair of fermion zero modes $Tr\{(-1)^F(2h)\} = i$, we have $B_{6;hair} = i^6 = -1$. Thus

$$B_{6;macro}(\vec{Q}) = -d_{hor}(\vec{Q}) , \qquad (3.33)$$

We now, observe the following Table:

$(Q^2,P^2)\backslash Q.P$	-2	0	1	2	3	4
(2,2)	-209304	**50064**	**25353**	648	327	0
(2,4)	-2023536	**1127472**	**561576**	**50064**	8376	-648
(4,4)	-16620544	**32861184**	**18458000**	**3859456**	**561576**	12800
(2,6)	-15493728	**16491600**	8533821	**1127472**	130329	-15600
(4,6)	-53249700	**632078672**	**392427528**	**110910300**	**18458000**	**1127472**
(6,6)	2857656828	**16193130552**	**11232685725**	**4173501828**	**920577636**	**110910300**

Table 1: Some results for $-B_6$ in heterotic string theory on T^6 for different values of Q^2, P^2 and $Q.P$ in a particular chamber of the moduli space. The boldfaced entries are for charges for which only single centered black holes contribute to the index in the chamber in which B_6 is being computed.

We have that:

sqrt(16193130552)*1/1024+3-golden ratio

where 3 is a Lucas/Fibonacci number

Input:

$$\sqrt{16\,193\,130\,552} \times \frac{1}{1024} + 3 - \phi$$

ϕ is the golden ratio

Result:

$$-\phi + 3 + \frac{9\sqrt{\frac{24989399}{2}}}{256}$$

Decimal approximation:

125.6517238353311888527974497519860818668268878273888752711...

125.651723… result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0 and to the Higgs boson mass 125.18 GeV

Alternate forms:

$$\frac{2560 - 512\sqrt{5} + 18\sqrt{49\,978\,798}}{1024}$$

$$\frac{1}{512}\left(1280 - 256\sqrt{5} + 9\sqrt{49\,978\,798}\right)$$

$$\frac{1}{256}\left(3\left(256 + 3\sqrt{\frac{24\,989\,399}{2}}\right) - 256\,\phi\right)$$

Minimal polynomial:

$$17\,179\,869\,184\,x^4 - 171\,798\,691\,840\,x^3 - 530\,015\,206\,506\,496\,x^2 + 2\,652\,223\,516\,180\,480\,x + 4\,093\,168\,885\,015\,329\,841$$

Series representations:

$$\frac{\sqrt{16\,193\,130\,552}}{1024} + 3 - \phi = 3 - \phi + \frac{\sqrt{16\,193\,130\,551}\,\sum_{k=0}^{\infty} 16\,193\,130\,551^{-k}\binom{\frac{1}{2}}{k}}{1024}$$

$$\frac{\sqrt{16\,193\,130\,552}}{1024} + 3 - \phi = 3 - \phi + \frac{\sqrt{16\,193\,130\,551}\,\sum_{k=0}^{\infty} \frac{\left(-\frac{1}{16\,193\,130\,551}\right)^k \left(-\frac{1}{2}\right)_k}{k!}}{1024}$$

$$\frac{\sqrt{16193130552}}{1024}+3-\phi=3-\phi+\frac{\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}16193130551^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2048\sqrt{\pi}}$$

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

$n!$ is the factorial function

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

$\Gamma(x)$ is the gamma function

$\operatorname{Res}_{z=z_0} f$ is a complex residue

sqrt(11232685725)*1/1024+21+1/golden ratio

where 21 is a Fibonacci number

Input:

$$\sqrt{11232685725}\times\frac{1}{1024}+21+\frac{1}{\phi}$$

ϕ is the golden ratio

Result:

$$\frac{1}{\phi}+21+\frac{5\sqrt{449307429}}{1024}$$

Decimal approximation:

125.11839089729208793173530139040249765192867569823897600 58...

125.118390897… result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0 and to the Higgs boson mass 125.18 GeV

Alternate forms:

$$\frac{20992+512\sqrt{5}+5\sqrt{449307429}}{1024}$$

$$\frac{\left(21504+5\sqrt{449307429}\right)\phi+1024}{1024\,\phi}$$

$$\frac{20992+\sqrt{5\left(2246799289+1024\sqrt{2246537145}\right)}}{1024}$$

Minimal polynomial:

$$1\,099\,511\,627\,776\,x^4 - 90\,159\,953\,477\,632\,x^3 - 20\,786\,979\,543\,187\,456\,x^2 + 928\,045\,602\,168\,635\,392\,x + 116\,437\,132\,263\,409\,241\,161$$

Series representations:

$$\frac{\sqrt{11\,232\,685\,725}}{1024} + 21 + \frac{1}{\phi} = 21 + \frac{1}{\phi} + \frac{\sqrt{11\,232\,685\,724}\,\sum_{k=0}^{\infty} 11\,232\,685\,724^{-k} \binom{\frac{1}{2}}{k}}{1024}$$

$$\frac{\sqrt{11\,232\,685\,725}}{1024} + 21 + \frac{1}{\phi} = 21 + \frac{1}{\phi} + \frac{\sqrt{11\,232\,685\,724}\,\sum_{k=0}^{\infty} \frac{\left(-\frac{1}{11\,232\,685\,724}\right)^k \left(-\frac{1}{2}\right)_k}{k!}}{1024}$$

$$\frac{\sqrt{11\,232\,685\,725}}{1024} + 21 + \frac{1}{\phi} = 21 + \frac{1}{\phi} + \frac{\sum_{j=0}^{\infty} \operatorname{Res}_{s=-\frac{1}{2}+j} 11\,232\,685\,724^{-s}\, \Gamma\left(-\frac{1}{2} - s\right) \Gamma(s)}{2048\sqrt{\pi}}$$

sqrt(4173501828)*1/1024+55+8-1/golden ratio

where 55 and 8 are Fibonacci numbers

Input:

$$\sqrt{4\,173\,501\,828} \times \frac{1}{1024} + 55 + 8 - \frac{1}{\phi}$$

ϕ is the golden ratio

Result:

$$-\frac{1}{\phi} + 63 + \frac{\sqrt{1\,043\,375\,457}}{512}$$

Decimal approximation:

125.47048717665811763528024082757406256724513415618655402712...

125.47048717… result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0 and to the Higgs boson mass 125.18 GeV

Alternate forms:

$$\frac{1}{512}\left(32\,512-256\sqrt{5}+\sqrt{1\,043\,375\,457}\right)$$

$$\frac{1}{512}\left(32\,512+\sqrt{1\,043\,703\,137-512\sqrt{5\,216\,877\,285}}\right)$$

$$-\frac{\left(-32\,256-\sqrt{1\,043\,375\,457}\right)\phi+512}{512\,\phi}$$

Minimal polynomial:

$$68\,719\,476\,736\,x^4-17\,454\,747\,090\,944\,x^3+1\,115\,363\,630\,120\,960\,x^2-887\,373\,110\,444\,032\,x-1\,189\,963\,963\,420\,991$$

Series representations:

$$\frac{\sqrt{4\,173\,501\,828}}{1024}+55+8-\frac{1}{\phi}=63-\frac{1}{\phi}+\frac{\sqrt{4\,173\,501\,827}\sum_{k=0}^{\infty}4\,173\,501\,827^{-k}\binom{\frac{1}{2}}{k}}{1024}$$

$$\frac{\sqrt{4\,173\,501\,828}}{1024}+55+8-\frac{1}{\phi}=63-\frac{1}{\phi}+\frac{\sqrt{4\,173\,501\,827}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4\,173\,501\,827}\right)^k\left(-\frac{1}{2}\right)_k}{k!}}{1024}$$

$$\frac{\sqrt{4\,173\,501\,828}}{1024}+55+8-\frac{1}{\phi}=63-\frac{1}{\phi}+\frac{\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}4\,173\,501\,827^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2048\sqrt{\pi}}$$

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

$n!$ is the factorial function

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

$\Gamma(x)$ is the gamma function

$\operatorname{Res}_{z=z_0} f$ is a complex residue

sqrt(920577636)*1/1024+89+8-golden ratio where 89 and 8 are Fibonacci numbers

Input:

$$\sqrt{920577636} \times \frac{1}{1024} + 89 + 8 - \phi$$

ϕ is the golden ratio

Result:

$$-\phi + 97 + \frac{9\sqrt{2841289}}{512}$$

Decimal approximation:

125.01187062991504004120137172505267633612516563245077475 72...

125.011870629… result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0 and to the Higgs boson mass 125.18 GeV

Alternate forms:

$$\frac{98816 - 512\sqrt{5} + 18\sqrt{2841289}}{1024}$$

$$\frac{1}{512}\left(-512\,\phi + 49664 + 9\sqrt{2841289}\right)$$

$$\frac{1}{512}\left(49408 + \sqrt{230472089 - 4608\sqrt{14206445}}\right)$$

Minimal polynomial:

$$68719476736\,x^4 - 26525718020096\,x^3 + 3718763932811264\,x^2 - 223693203767296000\,x + 4886797222812876145$$

Series representations:

$$\frac{\sqrt{920577636}}{1024} + 89 + 8 - \phi = 97 - \phi + \frac{\sqrt{920577635}\,\sum_{k=0}^{\infty} 920577635^{-k}\binom{\frac{1}{2}}{k}}{1024}$$

$$\frac{\sqrt{920577636}}{1024} + 89 + 8 - \phi = 97 - \phi + \frac{\sqrt{920577635}\,\sum_{k=0}^{\infty} \frac{\left(-\frac{1}{920577635}\right)^k \left(-\frac{1}{2}\right)_k}{k!}}{1024}$$

$$\frac{\sqrt{920577636}}{1024}+89+8-\phi=97-\phi+\frac{\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j} 920577635^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2048\sqrt{\pi}}$$

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

$n!$ is the factorial function

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

$\Gamma(x)$ is the gamma function

$\operatorname{Res}_{z=z_0} f$ is a complex residue

sqrt(110910300)*1/1024+89+21+Pi+golden ratio

where 21 is a Fibonacci number

Input:

$$\sqrt{110910300}\times\frac{1}{1024}+89+21+\pi+\phi$$

ϕ is the golden ratio

Result:

$$\phi+110+\frac{5\sqrt{1109103}}{512}+\pi$$

Decimal approximation:

125.0441929693615576741489388044783609990542214612580634705...

125.04419296… result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0 and to the Higgs boson mass 125.18 GeV

Property:

$110+\frac{5\sqrt{1109103}}{512}+\phi+\pi$ is a transcendental number

Alternate forms:

$$\frac{1}{512}\left(56576+256\sqrt{5}+5\sqrt{1109103}+512\pi\right)$$

$$\frac{1}{512}\left(512\phi+5\left(11264+\sqrt{1109103}\right)+512\pi\right)$$

$$\frac{221}{2}+\frac{\sqrt{5}}{2}+\frac{5\sqrt{1109103}}{512}+\pi$$

Series representations:

$$\frac{\sqrt{110910300}}{1024}+89+21+\pi+\phi=110+\phi+\pi+\frac{\sqrt{110910299}\sum_{k=0}^{\infty}110910299^{-k}\binom{\frac{1}{2}}{k}}{1024}$$

$$\frac{\sqrt{110910300}}{1024}+89+21+\pi+\phi=110+\phi+\pi+\frac{\sqrt{110910299}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{110910299}\right)^k\left(-\frac{1}{2}\right)_k}{k!}}{1024}$$

$$\frac{\sqrt{110910300}}{1024}+89+21+\pi+\phi=110+\phi+\pi+\frac{\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}110910299^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2048\sqrt{\pi}}$$

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

$n!$ is the factorial function

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

$\Gamma(x)$ is the gamma function

$\operatorname{Res}_{z=z_0} f$ is a complex residue

With regard the following number 1127472 (see Table 1), from the formula of coefficients of the '5th order' mock theta function $\psi_1(q)$: (A053261 OEIS Sequence)

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

for n = 486 +1/12, we obtain:

Input:

$$\sqrt{\phi} \times \frac{\exp\left(\pi\sqrt{\frac{1}{15}\left(486+\frac{1}{12}\right)}\right)}{2\sqrt[4]{5}\sqrt{486+\frac{1}{12}}} - 233$$

ϕ is the golden ratio

Exact result:

$$\frac{e^{1/6\sqrt{5833/5}\,\pi}\sqrt{\frac{3\phi}{5833}}}{\sqrt[4]{5}} - 233$$

Decimal approximation:

1.12747875672836137950859116784733361750836779507634539... × 10^6

1127478.75672836137950859116784733361750836779507634539

Property:

$-233 + \frac{e^{1/6\sqrt{5833/5}\,\pi}\sqrt{\frac{3\phi}{5833}}}{\sqrt[4]{5}}$ is a transcendental number

Alternate forms:

$$\sqrt{\frac{3\left(5+\sqrt{5}\right)}{58\,330}}\, e^{1/6\sqrt{5833/5}\,\pi} - 233$$

$$\frac{\sqrt{\frac{3\left(1+\sqrt{5}\right)}{11\,666}}\, e^{1/6\sqrt{5833/5}\,\pi}}{\sqrt[4]{5}} - 233$$

$$\frac{e^{1/6\sqrt{5833/5}\,\pi}\sqrt{\frac{3\phi}{5833}} - 233\sqrt[4]{5}}{\sqrt[4]{5}}$$

Series representations:

$$\frac{\sqrt{\phi}\exp\left(\pi\sqrt{\frac{1}{15}\left(486+\frac{1}{12}\right)}\right)}{2\sqrt[4]{5}\sqrt{486+\frac{1}{12}}}-233=\left(-2330\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{5833}{12}-z_0\right)^k z_0^{-k}}{k!}+5^{3/4}\exp\left(\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{5833}{180}-z_0\right)^k z_0^{-k}}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(\phi-z_0)^k z_0^{-k}}{k!}\right)\Bigg/\left(10\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{5833}{12}-z_0\right)^k z_0^{-k}}{k!}\right)\quad \text{for not } ((z_0\in\mathbb{R} \text{ and } -\infty<z_0\leq 0))$$

From the following number 561576 (see Table 1), we obtain:

sqrt(golden ratio) * exp(Pi*sqrt((447-1/3)/15)) / (2*5^(1/4)*sqrt((447-1/3)))+521+11

Input:

$$\sqrt{\phi}\times\frac{\exp\left(\pi\sqrt{\frac{1}{15}\left(447-\frac{1}{3}\right)}\right)}{2\sqrt[4]{5}\sqrt{447-\frac{1}{3}}}+521+11$$

ϕ is the golden ratio

Exact result:

$$\frac{e^{(2\sqrt{67}\,\pi)/3}\sqrt{\frac{3\phi}{67}}}{4\times 5^{3/4}}+532$$

Decimal approximation:

561576.6147313838523797793225958367443790572829711970292728...

561576.61473…

Property:

$$532+\frac{e^{(2\sqrt{67}\,\pi)/3}\sqrt{\frac{3\phi}{67}}}{4\,5^{3/4}} \text{ is a transcendental number}$$

Alternate forms:

$$532+\frac{1}{20}\sqrt{\frac{3}{134}\left(5+\sqrt{5}\right)}\ e^{\left(2\sqrt{67}\,\pi\right)/3}$$

$$532+\frac{\sqrt{\frac{3}{134}\left(1+\sqrt{5}\right)}\ e^{\left(2\sqrt{67}\,\pi\right)/3}}{4\times 5^{3/4}}$$

$$\frac{1425760+\sqrt[4]{5}\ \sqrt{402\left(1+\sqrt{5}\right)}\ e^{\left(2\sqrt{67}\,\pi\right)/3}}{2680}$$

Series representations:

$$\frac{\sqrt{\phi}\ \exp\left(\pi\sqrt{\frac{1}{15}\left(447-\frac{1}{3}\right)}\right)}{2\sqrt[4]{5}\ \sqrt{447-\frac{1}{3}}}+521+11=$$
$$\left(5320\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{1340}{3}-z_0\right)^k z_0^{-k}}{k!}+5^{3/4}\exp\left(\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{268}{9}-z_0\right)^k z_0^{-k}}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(\phi-z_0)^k z_0^{-k}}{k!}\right)\Bigg/$$
$$\left(10\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{1340}{3}-z_0\right)^k z_0^{-k}}{k!}\right)\quad\text{for not}\left(\left(z_0\in\mathbb{R}\text{ and }-\infty<z_0\le 0\right)\right)$$

$$\frac{\sqrt{\phi}\ \exp\left(\pi\sqrt{\frac{1}{15}\left(447-\frac{1}{3}\right)}\right)}{2\sqrt[4]{5}\ \sqrt{447-\frac{1}{3}}}+521+11=$$
$$\left(5320\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{1340}{3}-x\right)}{2\pi}\right\rfloor\right)\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{1340}{3}-x\right)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}+5^{3/4}\exp\left(i\pi\left\lfloor\frac{\arg(\phi-x)}{2\pi}\right\rfloor\right)\exp\left(\pi\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{268}{9}-x\right)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{268}{9}-x\right)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k(\phi-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\Bigg/$$
$$\left(10\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{1340}{3}-x\right)}{2\pi}\right\rfloor\right)\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{1340}{3}-x\right)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)$$
$$\text{for }(x\in\mathbb{R}\text{ and }x<0)$$

$$\frac{\sqrt{\phi}\ \exp\left(\pi\sqrt{\frac{1}{15}\left(447-\frac{1}{3}\right)}\right)}{2\sqrt[4]{5}\ \sqrt{447-\frac{1}{3}}}+521+11=$$

$$\left(\left(\frac{1}{z_0}\right)^{-1/2\left\lfloor\arg\left(\frac{1340}{3}-z_0\right)/(2\pi)\right\rfloor} z_0^{-1/2\left\lfloor\arg\left(\frac{1340}{3}-z_0\right)/(2\pi)\right\rfloor}\right.$$

$$\left(5320\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(\frac{1340}{3}-z_0\right)/(2\pi)\right\rfloor} z_0^{1/2\left\lfloor\arg\left(\frac{1340}{3}-z_0\right)/(2\pi)\right\rfloor}\right.$$

$$\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{1340}{3}-z_0\right)^k z_0^{-k}}{k!}+5^{3/4}\exp\left(\pi\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(\frac{268}{9}-z_0\right)/(2\pi)\right\rfloor}\right.$$

$$\left.z_0^{1/2\left(1+\left\lfloor\arg\left(\frac{268}{9}-z_0\right)/(2\pi)\right\rfloor\right)}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{268}{9}-z_0\right)^k z_0^{-k}}{k!}\right)$$

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

$$\left(10\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{1340}{3}-z_0\right)^k z_0^{-k}}{k!}\right)$$

$n!$ is the factorial function

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

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

$\arg(z)$ is the complex argument

$\lfloor x\rfloor$ is the floor function

i is the imaginary unit

$$\frac{\sqrt{\phi}\,\exp\left(\pi\sqrt{\frac{1}{15}\left(486+\frac{1}{12}\right)}\right)}{2\sqrt[4]{5}\,\sqrt{486+\frac{1}{12}}}-233=$$

$$\left(-2330\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{5833}{12}-x\right)}{2\pi}\right\rfloor\right)\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{5833}{12}-x\right)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}+\right.$$
$$5^{3/4}\exp\left(i\pi\left\lfloor\frac{\arg(\phi-x)}{2\pi}\right\rfloor\right)\exp\left(\pi\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{5833}{180}-x\right)}{2\pi}\right\rfloor\right)\sqrt{x}\right.$$
$$\left.\left.\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{5833}{180}-x\right)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k(\phi-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\Big/$$
$$\left(10\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{5833}{12}-x\right)}{2\pi}\right\rfloor\right)\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{5833}{12}-x\right)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)$$

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

$$\frac{\sqrt{\phi}\,\exp\left(\pi\sqrt{\frac{1}{15}\left(486+\frac{1}{12}\right)}\right)}{2\sqrt[4]{5}\,\sqrt{486+\frac{1}{12}}}-233=$$

$$\left(\left(\frac{1}{z_0}\right)^{-1/2\left\lfloor\arg\left(\frac{5833}{12}-z_0\right)/(2\pi)\right\rfloor} z_0^{-1/2\left\lfloor\arg\left(\frac{5833}{12}-z_0\right)/(2\pi)\right\rfloor}\left(-2330\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(\frac{5833}{12}-z_0\right)/(2\pi)\right\rfloor}\right.\right.$$
$$z_0^{1/2\left\lfloor\arg\left(\frac{5833}{12}-z_0\right)/(2\pi)\right\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{5833}{12}-z_0\right)^k z_0^{-k}}{k!}+$$
$$5^{3/4}\exp\left(\pi\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(\frac{5833}{180}-z_0\right)/(2\pi)\right\rfloor} z_0^{1/2\left(1+\left\lfloor\arg\left(\frac{5833}{180}-z_0\right)/(2\pi)\right\rfloor\right)}\right.$$
$$\left.\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{5833}{180}-z_0\right)^k z_0^{-k}}{k!}\right)\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(\phi-z_0)/(2\pi)\rfloor}$$
$$\left.\left.z_0^{1/2\lfloor\arg(\phi-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(\phi-z_0)^k z_0^{-k}}{k!}\right)\right)\Big/$$
$$\left(10\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{5833}{12}-z_0\right)^k z_0^{-k}}{k!}\right)$$

$n!$ is the factorial function

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

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

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From the following number 18458000 (see Table 1), we obtain:

sqrt(golden ratio) * exp(Pi*sqrt((659+1/2)/15)) / (2*5^(1/4)*sqrt((659+1/2)))+64^2*2+64*2^5+233+89*2

Input:

$$\sqrt{\phi} \times \frac{\exp\left(\pi \sqrt{\frac{1}{15}\left(659+\frac{1}{2}\right)}\right)}{2\sqrt[4]{5}\sqrt{659+\frac{1}{2}}} + 64^2 \times 2 + 64 \times 2^5 + 233 + 89 \times 2$$

ϕ is the golden ratio

Exact result:

$$\frac{e^{\sqrt{1319/30}\,\pi}\sqrt{\phi}}{\sqrt[4]{5}\sqrt{2638}} + 10651$$

Decimal approximation:

$1.845800264501401758060367553608088228209525922842766 19... \times 10^7$

18458002.64501401758060367553608088228209525922842766 19

Property:

$$10651 + \frac{e^{\sqrt{1319/30}\,\pi}\sqrt{\phi}}{\sqrt[4]{5}\sqrt{2638}} \text{ is a transcendental number}$$

Alternate forms:

$$10651 + \frac{1}{2}\sqrt{\frac{5+\sqrt{5}}{6595}}\, e^{\sqrt{1319/30}\,\pi}$$

$$10651+\frac{\sqrt{\frac{1+\sqrt{5}}{1319}}\ e^{\sqrt{1319/30}\ \pi}}{2\sqrt[4]{5}}$$

$$\frac{140486690+5^{3/4}\sqrt{1319\left(1+\sqrt{5}\right)}\ e^{\sqrt{1319/30}\ \pi}}{13190}$$

Series representations:

$$\frac{\sqrt{\phi}\ \exp\left(\pi\sqrt{\frac{1}{15}\left(659+\frac{1}{2}\right)}\right)}{2\sqrt[4]{5}\ \sqrt{659+\frac{1}{2}}}+64^2\times 2+64\times 2^5+233+89\times 2=$$

$$\left(106510\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{1319}{2}-z_0\right)^k z_0^{-k}}{k!}+5^{3/4}\right.$$
$$\left.\exp\left(\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{1319}{30}-z_0\right)^k z_0^{-k}}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(\phi-z_0)^k z_0^{-k}}{k!}\right)\Bigg/$$
$$\left(10\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{1319}{2}-z_0\right)^k z_0^{-k}}{k!}\right)\quad \text{for not } ((z_0\in\mathbb{R} \text{ and } -\infty<z_0\leq 0))$$

$$\frac{\sqrt{\phi}\ \exp\left(\pi\sqrt{\frac{1}{15}\left(659+\frac{1}{2}\right)}\right)}{2\sqrt[4]{5}\ \sqrt{659+\frac{1}{2}}} + 64^2\times 2 + 64\times 2^5 + 233 + 89\times 2 =$$

$$\left(106510\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{1319}{2}-x\right)}{2\pi}\right\rfloor\right)\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{1319}{2}-x\right)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!} + 5^{3/4}\exp\left(i\pi\left\lfloor\frac{\arg(\phi-x)}{2\pi}\right\rfloor\right)\exp\left(\pi\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{1319}{30}-x\right)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{1319}{30}-x\right)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k(\phi-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right) \Big/ \left(10\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{1319}{2}-x\right)}{2\pi}\right\rfloor\right)\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{1319}{2}-x\right)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)$$

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

$$\frac{\sqrt{\phi}\ \exp\left(\pi\sqrt{\frac{1}{15}\left(659+\frac{1}{2}\right)}\right)}{2\sqrt[4]{5}\ \sqrt{659+\frac{1}{2}}} + 64^2\times 2 + 64\times 2^5 + 233 + 89\times 2 =$$

$$\left(\left(\frac{1}{z_0}\right)^{-1/2\left\lfloor\arg\left(\frac{1319}{2}-z_0\right)/(2\pi)\right\rfloor} z_0^{-1/2\left\lfloor\arg\left(\frac{1319}{2}-z_0\right)/(2\pi)\right\rfloor}\left(106510\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(\frac{1319}{2}-z_0\right)/(2\pi)\right\rfloor} z_0^{1/2\left\lfloor\arg\left(\frac{1319}{2}-z_0\right)/(2\pi)\right\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{1319}{2}-z_0\right)^k z_0^{-k}}{k!} + 5^{3/4}\exp\left(\pi\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(\frac{1319}{30}-z_0\right)/(2\pi)\right\rfloor} z_0^{1/2\left(1+\left\lfloor\arg\left(\frac{1319}{30}-z_0\right)/(2\pi)\right\rfloor\right)}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{1319}{30}-z_0\right)^k z_0^{-k}}{k!}\right)\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(\phi-z_0)/(2\pi)\rfloor} z_0^{1/2\lfloor\arg(\phi-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(\phi-z_0)^k z_0^{-k}}{k!}\right)\right) \Big/ \left(10\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{1319}{2}-z_0\right)^k z_0^{-k}}{k!}\right)$$

$n!$ is the factorial function

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

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

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

We have the following numbers: 561576, 1127472 and 18458000. If we perform the *ln* of the sum, we obtain:

ln(561576 +1127472+18458000)

Input:

$\log(561576 + 1127472 + 18458000)$

$\log(x)$ is the natural logarithm

Exact result:

$\log(20147048)$

Decimal approximation:

16.818568334383916326006124746941792647717641080576946234 22...

16.818568334… result very near to the black hole entropy 16.8741

Property:

$\log(20147048)$ is a transcendental number

Alternate forms:

$3\log(2) + \log(2518381)$

$3\log(2) + \log(43) + \log(58567)$

Alternative representations:

$\log(561576 + 1127472 + 18458000) = \log_e(20147048)$

$\log(561576 + 1127472 + 18458000) = \log(a)\log_a(20147048)$

$\log(561576 + 1127472 + 18458000) = -\text{Li}_1(-20147047)$

Integral representations:

$$\log(561576 + 1127472 + 18458000) = \int_1^{20147048} \frac{1}{t}\, dt$$

$$\log(561576 + 1127472 + 18458000) = -\frac{i}{2\pi} \int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{20147047^{-s}\, \Gamma(-s)^2\, \Gamma(1+s)}{\Gamma(1-s)}\, ds$$

for $-1 < \gamma < 0$

$\Gamma(x)$ is the gamma function

Now, we have that:

Applying the above procedure, first of all we find that, for large charges, $-B_6(Q,P)$ is positive [28] (i.e., $B_6(Q,P)$ is negative). Furthermore [9,69]:

$$\ln|B_6(Q,P)| = \pi\sqrt{Q^2P^2-(Q.P)^2} - \phi\left(\frac{Q.P}{P^2}, \frac{\sqrt{Q^2P^2-(Q.P)^2}}{P^2}\right) + \mathcal{O}\left(\frac{1}{Q^2, P^2, Q.P}\right), \tag{2.17}$$

where

$$\phi(\tau_1,\tau_2) \equiv 12\ln\tau_2 + 24\ln\eta(\tau_1+i\tau_2) + 24\ln\eta(-\tau_1+i\tau_2). \tag{2.18}$$

The first term, $\pi\sqrt{Q^2P^2-(Q\cdot P)^2}$, is indeed the Bekenstein-Hawking entropy of the black hole [70–72]. The macroscopic origin of the other terms will be discussed in §3.4.

If

The first term, $\pi\sqrt{Q^2P^2-(Q\cdot P)^2}$, is indeed the Bekenstein-Hawking entropy

If we can compute the B_6 index for these dyons, we can use this to compute the B_6 index of any other dyon. This has not yet been done from first principles, but a guess has been made by requiring that wall crossing is controlled by the residues at the poles of the partition function as in the $r = 1$ case. In the domain of the moduli space where 2-centered black holes are absent, the proposal for the B_6 index for these dyons is [35]

$$\sum_{s|r} s\, B_6\left(\widetilde{Q}_1 \frac{r}{s}, n, J\frac{r}{s}\right) , \tag{2.24}$$

where $B_6(\widetilde{Q}_1, n, J)$ is the function defined in (2.12). An effective string model for arriving at this result has been suggested in [37], but this has not been derived completely from first principles. Note that for large charges, the contribution from the $s > 1$ terms grow as $\exp(\pi\sqrt{Q^2P^2 - (Q \cdot P)^2}/s)$ and hence are exponentially suppressed compared to the leading $s = 1$ term. Thus the result for the index reduces to that for the $r = 1$ case up to exponentially suppressed corrections.

Quantum entropy function has also been used to explain several other features of the microscopic formula. For example, we see from the microscopic formula (2.24) that for charge vectors (Q, P) with $r(Q, P) > 1$, there are additional contributions to the B_6 index whose leading term takes the form $\exp\left(\pi\sqrt{Q^2P^2 - (Q \cdot P)^2}/s\right)$, where s is a factor of r. It turns out that precisely for $r(Q, P) > 1$, the functional integral for Z_{AdS_2} receives extra contribution from saddle points obtained by taking a freely acting $\mathbb{Z}_s$ quotient – for $s|r$ – of the original near horizon geometry. The leading semi-classical contribution from such a saddle point is given by $\exp(S_{wald}/s) = \exp\left(\pi\sqrt{Q^2P^2 - (Q \cdot P)^2}/s\right)$, precisely in agreement with the microscopic results [86, 120].

For $r = 1$, the result for B_6 for large charges takes the form of a sum of the contributions from different poles. The leading asymptotic expansion comes from a specific pole and is given by (2.15). It turns out that the contributions from the other poles have the leading term of the form $\exp\left(\pi\sqrt{Q^2P^2 - (Q \cdot P)^2}/N\right)$, for $N \in \mathbb{Z}$, $N > 1$. On the other hand, Z_{AdS_2} receives contribution from, besides the original near horizon geometry, its $\mathbb{Z}_N$ orbifolds which do not change the boundary condition at infinity. The leading semiclassical contribution from these saddle points is given by $\exp\left(\pi\sqrt{Q^2P^2 - (Q \cdot P)^2}/N\right)$, precisely in correspondence with the leading contribution from the subleading poles in the microscopic formula [46, 133].

For s = 2 and

$\pi\sqrt{Q^2P^2 - (Q.P)^2}$ = 12.5664 , we obtain:

exp(12.5664/2)

Input interpretation:

$$\exp\left(\frac{12.5664}{2}\right)$$

Result:

535.500...

535.5...

From which:

1/(((exp(12.5664/2))))

Input interpretation:

$$\frac{1}{\exp\left(\frac{12.5664}{2}\right)}$$

Result:

0.00186742...

0.00186742...

1+1/(((exp(12.5664/2))))

Input interpretation:

$$1 + \frac{1}{\exp\left(\frac{12.5664}{2}\right)}$$

Result:

1.001867415293908869111105449940828366850956810826248780193...

1.001867415293… result practically equal to the following Rogers-Ramanujan continued fraction:

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

We have also:

(((exp(12.5664/2))))+13-1/golden ratio

where 13 is a Fibonacci number

Input interpretation:

$$\exp\left(\frac{12.5664}{2}\right)+13-\frac{1}{\phi}$$

ϕ is the golden ratio

Result:

547.881...

547.881... result practically equal to the rest mass of Eta meson 547.862

And:

Pi*((((((exp(12.5664/2))))+13-1/golden ratio)))+7

where 7 is a Lucas number

Input interpretation:

$$\pi\left(\exp\left(\frac{12.5664}{2}\right)+13-\frac{1}{\phi}\right)+7$$

ϕ is the golden ratio

Result:

1728.22...

1728.22...

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

1/4((((exp(12.5664/2)))))+5+1/golden ratio

where 5 is a Fibonacci number

Input interpretation:

$$\frac{1}{4}\exp\left(\frac{12.5664}{2}\right)+5+\frac{1}{\phi}$$

ϕ is the golden ratio

Result:

139.493...

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

1/4((((exp(12.5664/2)))))-7-golden ratio

where 7 is a Lucas number

Input interpretation:

$$\frac{1}{4}\exp\left(\frac{12.5664}{2}\right)-7-\phi$$

ϕ is the golden ratio

Result:

125.257...

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

We have the following black holes entropies: 31.3460, 25.1327 and 18.7328

For 31.3460 for s = 4, we obtain:

(((exp(31.3460/4))))-13

where 13 is a Fibonacci number

Input interpretation:

$$\exp\left(\frac{31.3460}{4}\right) - 13$$

Result:

2518.33...

2518.33... result practically equal to the rest mass of charmed Sigma baryon 2518.8

For 25.1327 and s = 4, we obtain:

(((exp(25.1327/4))))+13-1/golden ratio

where 13 is a Fibonacci number

Input interpretation:

$$\exp\left(\frac{25.1327}{4}\right) + 13 - \frac{1}{\phi}$$

ϕ is the golden ratio

Result:

547.868...

547.868... result equal to the rest mass of Eta meson 547.862

For 18.7328 and s = 4, we obtain:

(((exp(18.7328/4))))+13+5-1/golden ratio

where 13 and 5 are Fibonacci numbers

Input interpretation:

$$\exp\left(\frac{18.7328}{4}\right)+13+5-\frac{1}{\phi}$$

ϕ is the golden ratio

Result:

125.497...

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

From:

Deformed AdS4-Reissner-Nordstrom black branes and shear viscosity-to entropy density ratio

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$$\beta=-5+\frac{3\times 2^{1/3}}{\left(-7-27Q^2+3\sqrt{3}\sqrt{3+14Q^2+27Q^4}\right)^{1/3}}+\frac{3\left(7+27Q^2-3\sqrt{3}\sqrt{3+14Q^2+27Q^4}\right)^{1/3}}{3\times 2^{1/3}}\,. \qquad (11)$$

For Q = √5

-5+(3*2^1/3)/((((-7-27*(sqrt5)^2+3sqrt3*((3+14*(sqrt5)^2+27*(sqrt5)^4))^1/2))))^1/3

Input:

$$-5+\frac{3\sqrt[3]{2}}{\sqrt[3]{-7-27\sqrt{5}^{2}+3\sqrt{3}\sqrt{3+14\sqrt{5}^{2}+27\sqrt{5}^{4}}}}$$

Result:

$$3\sqrt[3]{\frac{2}{6\sqrt{561}-142}}-5$$

Decimal approximation:

2.8266895566313216697438288431681039279104720896999165002 89...

2.8266895566…

Alternate forms:

$$\frac{1}{2}\left(3\sqrt[3]{71+3\sqrt{561}}-10\right)$$

$$\frac{3}{\sqrt[3]{3\sqrt{561}-71}}-5$$

$$\frac{3}{2}\sqrt[3]{71+3\sqrt{561}}-5$$

Minimal polynomial:

$$8x^6+240x^5+3000x^4+16\,166x^3+17\,490x^2-137\,550x-354\,979$$

1/(3*2^1/3) 3*((((7+27*(sqrt5)^2-
3sqrt3*((3+14*(sqrt5)^2+27*(sqrt5)^4))^1/2))))^1/3

Input:

$$\frac{1}{3\sqrt[3]{2}}\times 3\sqrt[3]{7+27\sqrt{5}^2-3\sqrt{3}\sqrt{3+14\sqrt{5}^2+27\sqrt{5}^4}}$$

Result:

$$\sqrt[3]{\frac{1}{2}\left(142-6\sqrt{561}\right)}$$

Decimal approximation:

0.1916519096798843309547132816144848950692265495254928505 1... +
0.3319508449331611867748254132238890994741273762148639736 2... i

Polar coordinates:

$r \approx 0.383304$ (radius), $\theta = 60°$ (angle)

0.383304

Alternate forms:

$$\sqrt[3]{71 - 3\sqrt{561}}$$

$$2\sqrt[3]{-\frac{1}{71 + 3\sqrt{561}}}$$

$$\frac{1}{2}\sqrt[3]{\frac{1}{2}\left(6\sqrt{561} - 142\right)} + \frac{1}{2}\,i\sqrt{3}\sqrt[3]{\frac{1}{2}\left(6\sqrt{561} - 142\right)}$$

Minimal polynomial:

$$x^6 - 142x^3 - 8$$

From

$$\sqrt[3]{\frac{1}{2}\left(142 - 6\sqrt{561}\right)}$$

We obtain, in conclusion:

-5+(3*2^1/3)/((((-7-27*(sqrt5)^2+3sqrt3*((3+14*(sqrt5)^2+27*(sqrt5)^4))^1/2))))^1/3 + (1/2 (142 - 6 sqrt(561)))^(1/3)

Input:

$$-5 + \frac{3\sqrt[3]{2}}{\sqrt[3]{-7 - 27\sqrt{5}^2 + 3\sqrt{3}\sqrt{3 + 14\sqrt{5}^2 + 27\sqrt{5}^4}}} + \sqrt[3]{\frac{1}{2}\left(142 - 6\sqrt{561}\right)}$$

Result:

$$-5 + \sqrt[3]{\frac{1}{2}\left(142 - 6\sqrt{561}\right)} + 3\sqrt[3]{\frac{2}{6\sqrt{561} - 142}}$$

Decimal approximation:

3.0183414663112060006985421247825888229796986392254093508... +
0.3319508449331611867748254132238890994741273762148639736 2... i

Polar coordinates:

$r \approx 3.03654$ (radius), $\theta \approx 6.27605°$ (angle)

3.03654

Alternate forms:

$$\frac{1}{2}\left(2\sqrt[3]{71-3\sqrt{561}}+3\sqrt[3]{71+3\sqrt{561}}-10\right)$$

$$-5+\sqrt[3]{71-3\sqrt{561}}+\frac{3}{\sqrt[3]{3\sqrt{561}-71}}$$

$$-5+\sqrt[3]{71-3\sqrt{561}}+\frac{3}{2}\sqrt[3]{71+3\sqrt{561}}$$

Minimal polynomial:

$$64x^{12}+3840x^{11}+104\,448x^{10}+1\,622\,880x^9+14\,941\,152x^8+71\,247\,600x^7+19\,612\,260x^6-1\,547\,219\,880x^5-5\,388\,478\,344x^4+8\,017\,362\,180x^3+50\,760\,364\,284x^2-55\,733\,325\,750x+28\,192\,464\,639$$

5i+2(((-5 + (71 - 3 sqrt(561))^(1/3) + 3/(-71 + 3 sqrt(561))^(1/3))))^4

Input:

$$5i+2\left(-5+\sqrt[3]{71-3\sqrt{561}}+\frac{3}{\sqrt[3]{-71+3\sqrt{561}}}\right)^4$$

i is the imaginary unit

Decimal approximation:

153.975892311547103407579942189546291147048259566977514333... +
77.1413057632150552889245203696489650504075705513051014662... i

Polar coordinates:

$r \approx 172.213$ (radius), $\theta \approx 26.6107°$ (angle)

172.213

Alternate forms:

$$\left(\left(-5\sqrt[3]{3\sqrt{561}-71}+\sqrt[3]{-1}\left(3\sqrt{561}-71\right)^{2/3}+3\right)^4+i\,5\sqrt[3]{25\,452\,017-1\,074\,585\sqrt{561}}\right)\Big/\left(\sqrt[3]{25\,452\,017-1\,074\,585\sqrt{561}}\right)$$

root of 16 777 216 x^{24} + 4 159 004 737 536 x^{23} +
499 665 378 767 536 128 x^{22} + 38 193 029 663 338 040 131 584 x^{21} +
2 069 659 396 571 609 276 803 448 832 x^{20} +
84 169 621 104 039 457 155 412 540 784 640 x^{19} +
2 659 285 945 200 125 961 653 009 543 520 157 696 x^{18} +
66 739 298 662 107 481 073 684 922 809 475 616 604 160 x^{17} +
1 349 430 672 363 206 980 918 696 819 979 949 104 647 864 320 x^{16} +
22 146 790 126 126 216 326 616 210 359 157 331 266 159 378 053 120 x^{15} +
295 432 988 088 229 590 804 363 169 061 751 859 831 651 697 811 591 168 x^{14} +
3 186 582 847 752 497 282 048 249 446 595 671 970 361 645 001 013 120 016 384
x^{13} +
27 436 165 727 341 768 729 185 188 967 028 028 926 721 695 461 252 636 361 $\ddots$
525 776 x^{12} +
183 640 567 456 157 559 637 824 698 948 811 071 771 430 845 245 482 896 920 $\ddots$
082 793 216 x^{11} +
913 746 667 225 448 206 348 053 073 960 627 232 486 253 270 655 450 225 685 $\ddots$
061 694 574 688 x^{10} +
3 023 190 263 275 185 611 431 712 369 063 326 426 074 006 941 059 387 369 $\ddots$
415 553 417 378 870 240 x^{9} +
5 181 202 250 574 597 852 407 285 088 484 901 091 092 693 202 877 316 239 $\ddots$
275 547 300 870 558 518 000 x^{8} −
3 922 013 875 692 230 407 593 924 133 173 691 285 421 424 650 457 387 096 $\ddots$
818 428 463 478 910 905 044 160 x^{7} +
1 036 418 642 516 406 809 787 941 669 940 797 120 713 397 427 912 214 008 $\ddots$
098 654 762 272 114 972 915 855 576 x^{6} −
124 356 712 495 802 469 102 608 302 154 687 777 185 625 625 846 497 953 498 $\ddots$
549 643 587 687 633 046 656 232 640 x^{5} +
5 869 440 052 997 362 975 788 815 123 851 697 120 320 204 138 454 746 495 $\ddots$
040 503 382 467 477 053 649 947 991 272 x^{4} +
5 838 363 834 587 663 435 139 060 191 551 045 737 977 391 495 057 107 294 $\ddots$
909 592 041 538 546 483 714 867 042 936 x^{3} +
307 123 738 869 334 361 713 935 253 558 582 636 257 063 467 121 614 943 972 $\ddots$
926 755 547 887 951 931 704 581 690 888 x^{2} +
229 989 402 369 606 184 102 375 626 411 912 287 612 159 836 251 747 430 527 $\ddots$
022 757 361 104 851 940 783 368 809 864 x +
3 872 843 706 896 294 769 247 870 972 202 206 706 322 468 121 536 968 710 $\ddots$
194 209 031 377 222 641 985 759 770 270 681
near $x = 153.976 + 77.1413\, i$

$$\frac{1}{\left(3\sqrt{561}-71\right)^{4/3}}$$

$$\Big(-28998+1224\sqrt{561}-127800\sqrt[3]{71-3\sqrt{561}}+5400\sqrt{561}\sqrt[3]{71-3\sqrt{561}}+$$
$$25560\left(71-3\sqrt{561}\right)^{2/3}-1080\sqrt{561}\left(71-3\sqrt{561}\right)^{2/3}-$$
$$1080\sqrt[3]{3\sqrt{561}-71}+2700\left(3\sqrt{561}-71\right)^{2/3}+$$
$$216\sqrt[3]{-1}\left(3\sqrt{561}-71\right)^{2/3}-1080\sqrt[3]{71-3\sqrt{561}}\left(3\sqrt{561}-71\right)^{2/3}-$$
$$(1590-5\,i)\left(3\sqrt{561}-71\right)^{4/3}+108\,(-1)^{2/3}\left(3\sqrt{561}-71\right)^{4/3}+$$
$$120\sqrt{561}\left(3\sqrt{561}-71\right)^{4/3}-1000\sqrt[3]{71-3\sqrt{561}}\left(3\sqrt{561}-71\right)^{4/3}+$$
$$300\left(71-3\sqrt{561}\right)^{2/3}\left(3\sqrt{561}-71\right)^{4/3}-2\sqrt[3]{-1}\left(3\sqrt{561}-71\right)^{8/3}\Big)$$

Minimal polynomial:

$$
\begin{aligned}
&16\,777\,216\,x^{24} + 4\,159\,004\,737\,536\,x^{23} + 499\,665\,378\,767\,536\,128\,x^{22} + \\
&\quad 38\,193\,029\,663\,338\,040\,131\,584\,x^{21} + 2\,069\,659\,396\,571\,609\,276\,803\,448\,832\,x^{20} + \\
&\quad 84\,169\,621\,104\,039\,457\,155\,412\,540\,784\,640\,x^{19} + \\
&\quad 2\,659\,285\,945\,200\,125\,961\,653\,009\,543\,520\,157\,696\,x^{18} + \\
&\quad 66\,739\,298\,662\,107\,481\,073\,684\,922\,809\,475\,616\,604\,160\,x^{17} + \\
&\quad 1\,349\,430\,672\,363\,206\,980\,918\,696\,819\,979\,949\,104\,647\,864\,320\,x^{16} + \\
&\quad 22\,146\,790\,126\,126\,216\,326\,616\,210\,359\,157\,331\,266\,159\,378\,053\,120\,x^{15} + \\
&\quad 295\,432\,988\,088\,229\,590\,804\,363\,169\,061\,751\,859\,831\,651\,697\,811\,591\,168\,x^{14} + \\
&\quad 3\,186\,582\,847\,752\,497\,282\,048\,249\,446\,595\,671\,970\,361\,645\,001\,013\,120\,016\,384 \\
&\qquad x^{13} + \\
&\quad 27\,436\,165\,727\,341\,768\,729\,185\,188\,967\,028\,028\,926\,721\,695\,461\,252\,636\,361\,525 \ddots \\
&\qquad 776\,x^{12} + \\
&\quad 183\,640\,567\,456\,157\,559\,637\,824\,698\,948\,811\,071\,771\,430\,845\,245\,482\,896\,920\,082 \ddots \\
&\qquad 793\,216\,x^{11} + \\
&\quad 913\,746\,667\,225\,448\,206\,348\,053\,073\,960\,627\,232\,486\,253\,270\,655\,450\,225\,685\,061 \ddots \\
&\qquad 694\,574\,688\,x^{10} + \\
&\quad 3\,023\,190\,263\,275\,185\,611\,431\,712\,369\,063\,326\,426\,074\,006\,941\,059\,387\,369\,415 \ddots \\
&\qquad 553\,417\,378\,870\,240\,x^{9} + \\
&\quad 5\,181\,202\,250\,574\,597\,852\,407\,285\,088\,484\,901\,091\,092\,693\,202\,877\,316\,239\,275 \ddots \\
&\qquad 547\,300\,870\,558\,518\,000\,x^{8} - \\
&\quad 3\,922\,013\,875\,692\,230\,407\,593\,924\,133\,173\,691\,285\,421\,424\,650\,457\,387\,096\,818 \ddots \\
&\qquad 428\,463\,478\,910\,905\,044\,160\,x^{7} + \\
&\quad 1\,036\,418\,642\,516\,406\,809\,787\,941\,669\,940\,797\,120\,713\,397\,427\,912\,214\,008\,098 \ddots \\
&\qquad 654\,762\,272\,114\,972\,915\,855\,576\,x^{6} - \\
&\quad 124\,356\,712\,495\,802\,469\,102\,608\,302\,154\,687\,777\,185\,625\,625\,846\,497\,953\,498\,549 \ddots \\
&\qquad 643\,587\,687\,633\,046\,656\,232\,640\,x^{5} + \\
&\quad 5\,869\,440\,052\,997\,362\,975\,788\,815\,123\,851\,697\,120\,320\,204\,138\,454\,746\,495\,040 \ddots \\
&\qquad 503\,382\,467\,477\,053\,649\,947\,991\,272\,x^{4} + \\
&\quad 5\,838\,363\,834\,587\,663\,435\,139\,060\,191\,551\,045\,737\,977\,391\,495\,057\,107\,294\,909 \ddots \\
&\qquad 592\,041\,538\,546\,483\,714\,867\,042\,936\,x^{3} + \\
&\quad 307\,123\,738\,869\,334\,361\,713\,935\,253\,558\,582\,636\,257\,063\,467\,121\,614\,943\,972\,926 \ddots \\
&\qquad 755\,547\,887\,951\,931\,704\,581\,690\,888\,x^{2} + \\
&\quad 229\,989\,402\,369\,606\,184\,102\,375\,626\,411\,912\,287\,612\,159\,836\,251\,747\,430\,527\,022 \ddots \\
&\qquad 757\,361\,104\,851\,940\,783\,368\,809\,864\,x + \\
&\quad 3\,872\,843\,706\,896\,294\,769\,247\,870\,972\,202\,206\,706\,322\,468\,121\,536\,968\,710\,194 \ddots \\
&\qquad 209\,031\,377\,222\,641\,985\,759\,770\,270\,681
\end{aligned}
$$

(((-5 + (71 - 3 sqrt(561))^(1/3) + 3/(-71 + 3 sqrt(561))^(1/3))))^6

Input:

$$\left(-5+\sqrt[3]{71-3\sqrt{561}}+\frac{3}{\sqrt[3]{-71+3\sqrt{561}}}\right)^{6}$$

Decimal approximation:

620.625106997640121180908208522233696132729383199881606940... + 478.917627531455536558084857038651479113391141513486462090... i

Polar coordinates:

$r \approx 753.617$ (radius), $\theta \approx 37.6563°$ (angle)

753.617

Alternate forms:

$$\frac{1}{32}\left(-5\sqrt[3]{3\sqrt{561}-71}+\sqrt[3]{-1}\left(3\sqrt{561}-71\right)^{2/3}+3\right)^6\left(5045+213\sqrt{561}\right)$$

$$\left(-5+\sqrt[3]{71-3\sqrt{561}}+\frac{3}{2}\sqrt[3]{71+3\sqrt{561}}\right)^6$$

$$\frac{\left(3-5\sqrt[3]{3\sqrt{561}-71}+\sqrt[3]{-1}\left(3\sqrt{561}-71\right)^{2/3}\right)^6}{\left(3\sqrt{561}-71\right)^2}$$

Minimal polynomial:

$$68\,719\,476\,736\,x^{12}+567\,633\,915\,905\,310\,720\,x^{11}+2\,160\,677\,962\,598\,543\,096\,020\,992\,x^{10}+4\,671\,393\,394\,963\,491\,210\,614\,104\,129\,536\,x^9+6\,148\,898\,522\,199\,886\,782\,304\,907\,322\,561\,921\,024\,x^8+4\,865\,803\,814\,673\,900\,783\,788\,152\,662\,016\,076\,839\,256\,064\,x^7+2\,211\,370\,855\,762\,502\,658\,821\,509\,282\,650\,529\,989\,419\,193\,176\,064\,x^6+523\,855\,462\,288\,163\,692\,026\,271\,428\,514\,905\,451\,527\,241\,077\,211\,256\,832\,x^5+49\,657\,744\,054\,063\,997\,352\,005\,527\,740\,382\,709\,052\,418\,957\,750\,013\,447\,139\,072\,x^4-62\,123\,153\,603\,401\,660\,773\,824\,949\,502\,007\,220\,857\,869\,011\,170\,914\,523\,870\,729\,472\,x^3+30\,916\,707\,687\,137\,302\,155\,199\,615\,240\,776\,591\,097\,572\,956\,529\,689\,894\,258\,345\,150\,064\,x^2+345\,024\,757\,056\,292\,298\,627\,519\,836\,719\,061\,236\,423\,050\,874\,776\,419\,028\,275\,190\,808\,x+502\,109\,301\,045\,626\,223\,150\,567\,440\,844\,222\,745\,512\,851\,012\,964\,233\,904\,277\,276\,161$$

Expanded form:

$$-152\,217+24\,300\sqrt[3]{-1}+14\,850\,(-1)^{2/3}+7074\sqrt{561}+$$

$$1350\sqrt[3]{-1}\sqrt{561}-8100\sqrt[3]{71-3\sqrt{561}}-14\,148\sqrt[3]{-1}\sqrt[3]{71-3\sqrt{561}}-$$

$$1080\,(-1)^{2/3}\sqrt[3]{71-3\sqrt{561}}-450\sqrt{561}\sqrt[3]{71-3\sqrt{561}}-$$

$$36\sqrt[3]{-1}\sqrt{561}\sqrt[3]{71-3\sqrt{561}}+7245\left(71-3\sqrt{561}\right)^{2/3}+$$

$$3600\sqrt[3]{-1}\left(71-3\sqrt{561}\right)^{2/3}+36\,(-1)^{2/3}\left(71-3\sqrt{561}\right)^{2/3}+$$

$$90\sqrt{561}\left(71-3\sqrt{561}\right)^{2/3}-39\,888\sqrt[3]{-\frac{1}{-71+3\sqrt{561}}}-$$

$$216\sqrt{561}\sqrt[3]{-\frac{1}{-71+3\sqrt{561}}}+5400\sqrt[3]{71-3\sqrt{561}}\sqrt[3]{-\frac{1}{-71+3\sqrt{561}}}-$$

$$1080\left(71-3\sqrt{561}\right)^{2/3}\sqrt[3]{-\frac{1}{-71+3\sqrt{561}}}+324\left(-\frac{1}{-71+3\sqrt{561}}\right)^{2/3}+$$

$$\frac{729}{\left(-71+3\sqrt{561}\right)^{2}}-\frac{7290}{\left(-71+3\sqrt{561}\right)^{5/3}}+\frac{486\sqrt[3]{71-3\sqrt{561}}}{\left(-71+3\sqrt{561}\right)^{5/3}}+$$

$$\frac{30\,375}{\left(-71+3\sqrt{561}\right)^{4/3}}+\frac{972\sqrt[3]{-1}}{\left(-71+3\sqrt{561}\right)^{4/3}}-\frac{2430\sqrt[3]{71-3\sqrt{561}}}{\left(-71+3\sqrt{561}\right)^{4/3}}+$$

$$\frac{243\left(71-3\sqrt{561}\right)^{2/3}}{\left(-71+3\sqrt{561}\right)^{4/3}}-\frac{59\,832}{-71+3\sqrt{561}}-\frac{9720\sqrt[3]{-1}}{-71+3\sqrt{561}}-$$

$$\frac{324\sqrt{561}}{-71+3\sqrt{561}}+\frac{8100\sqrt[3]{71-3\sqrt{561}}}{-71+3\sqrt{561}}+\frac{648\sqrt[3]{-1}\sqrt[3]{71-3\sqrt{561}}}{-71+3\sqrt{561}}-$$

$$\frac{1620\left(71-3\sqrt{561}\right)^{2/3}}{-71+3\sqrt{561}}+\frac{46\,035}{\left(-71+3\sqrt{561}\right)^{2/3}}+\frac{32\,400\sqrt[3]{-1}}{\left(-71+3\sqrt{561}\right)^{2/3}}+$$

$$\frac{1620\sqrt{561}}{\left(-71+3\sqrt{561}\right)^{2/3}}-\frac{21\,222\sqrt[3]{71-3\sqrt{561}}}{\left(-71+3\sqrt{561}\right)^{2/3}}-\frac{3240\sqrt[3]{-1}\sqrt[3]{71-3\sqrt{561}}}{\left(-71+3\sqrt{561}\right)^{2/3}}-$$

$$\frac{54\sqrt{561}\sqrt[3]{71-3\sqrt{561}}}{\left(-71+3\sqrt{561}\right)^{2/3}}+\frac{7650}{\sqrt[3]{-71+3\sqrt{561}}}-\frac{3240\,(-1)^{2/3}}{\sqrt[3]{-71+3\sqrt{561}}}-$$

$$\frac{2700\sqrt{561}}{\sqrt[3]{-71+3\sqrt{561}}}-\frac{7074\left(71-3\sqrt{561}\right)^{2/3}}{\sqrt[3]{-71+3\sqrt{561}}}-\frac{18\sqrt{561}\left(71-3\sqrt{561}\right)^{2/3}}{\sqrt[3]{-71+3\sqrt{561}}}-$$

$$9\sqrt[3]{-1}\left(-71+3\sqrt{561}\right)^{2/3}-225\sqrt[3]{-1}\left(-71+3\sqrt{561}\right)^{4/3}$$

(620.62510699764+ 478.91762753145i)-(89+8+1/golden ratio)i

Input interpretation:

$$(620.62510699764 + 478.91762753145\, i) - \left(89 + 8 + \frac{1}{\phi}\right) i$$

i is the imaginary unit

ϕ is the golden ratio

Result:

620.62510699764... +
381.29959354270... i

Polar coordinates:

$r = 728.39886289839$ (radius), $\theta = 31.565729834770°$ (angle)

728.39886289839

Alternative representations:

$$(620.625106997640000 + 478.917627531450000\, i) - i\left(89 + 8 + \frac{1}{\phi}\right) = 620.625106997640000 + 478.917627531450000\, i - i\left(97 + \frac{1}{2\sin(54°)}\right)$$

$$(620.625106997640000 + 478.917627531450000\, i) - i\left(89 + 8 + \frac{1}{\phi}\right) = 620.625106997640000 + 478.917627531450000\, i - i\left(97 + -\frac{1}{2\cos(216°)}\right)$$

$$(620.625106997640000 + 478.917627531450000\, i) - i\left(89 + 8 + \frac{1}{\phi}\right) = 620.625106997640000 + 478.917627531450000\, i - i\left(97 + -\frac{1}{2\sin(666°)}\right)$$

2(620.62510699764+ 478.91762753145i)+(233+13)i

Input interpretation:

$$2\,(620.62510699764 + 478.91762753145\, i) + (233 + 13)\, i$$

i is the imaginary unit

Result:

1241.2502139953... +
1203.8352550629... i

Polar coordinates:

$r = 1729.1389230122$ (radius), $\theta = 44.123322285610°$ (angle)

1729.1389230122

(1/golden ratio)+11i+(620.62510699764012118 + 478.91762753145553656558084i)

Input interpretation:

$$\frac{1}{\phi} + 11\,i + (620.62510699764012118 + 478.917627531455536558084\,i)$$

ϕ is the golden ratio

i is the imaginary unit

Result:

621.24314098639001603... +
489.91762753145553656... i

Polar coordinates:

$r = 791.17780681000251535$ (radius), $\theta = 38.259612665184303426°$ (angle)

791.17780681000251535

Alternative representations:

$$\frac{1}{\phi} + 11\,i + (620.625106997640121180000 + 478.917627531455536558084000\,i) = 620.625106997640121180000 + 489.917627531455536558084000\,i + \frac{1}{2\sin(54\,°)}$$

$$\frac{1}{\phi} + 11\,i + (620.625106997640121180000 + 478.917627531455536558084000\,i) = 620.625106997640121180000 + 489.917627531455536558084000\,i + -\frac{1}{2\cos(216\,°)}$$

$$\frac{1}{\phi} + 11 i + (620.62510699764012118000 + 478.917627531455536558084000\, i) =$$

$$620.62510699764012118000 + 489.917627531455536558084000\, i + -\frac{1}{2 \sin(666°)}$$

2((((((-5 + (71 - 3 sqrt(561))^(1/3) + 3/(-71 + 3 sqrt(561))^(1/3))))^6)))

Input:

$$2\left(-5 + \sqrt[3]{71 - 3\sqrt{561}} + \frac{3}{\sqrt[3]{-71 + 3\sqrt{561}}}\right)^6$$

Decimal approximation:

1241.2502139952802423618164170444673922654587663997632138 8... +
957.83525506291107311616971407730295822678228302697292418 0... i

(1241.250213995280242+ 957.83525506291i)-(521+199+123+76)

Input interpretation:

$(1241.250213995280242 + 957.83525506291\, i) - (521 + 199 + 123 + 76)$

i is the imaginary unit

Result:

322.25021399528... +
957.83525506291... i

Polar coordinates:

$r = 1010.59070659760$ (radius), $\theta = 71.405210212510°$ (angle)

1010.59070659760

We have obtained the following results

791.17780681000251535, 1729.1389230122, 728.39886289839, 172.213 and

1010.59070659760. They are very near to the Ramanujan's taxicab numbers

Now,

$$\alpha = \sqrt{9 + 42Q^2 + 81Q^4},$$

$$\frac{\eta}{s} = \frac{1}{4\pi}\left[\frac{6}{2 - \frac{2^{7/3}}{\chi_Q} + 2^{2/3}\chi_Q}\right]^2 \left(\frac{3 - Q^2}{|3 - Q^2|}\right) , \qquad (49)$$

for $\chi_Q = -\left(7 + 27Q^2 - 3\alpha\right)^{1/3}$, where the β parameter

Q = √5

-[(7+27*5-3*(((sqrt((9+42*5+81*(sqrt5)^4))))))]^1/3

Input:

$$-\sqrt[3]{7 + 27 \times 5 - 3\sqrt{9 + 42 \times 5 + 81\sqrt{5}^4}}$$

Result:

$$-\sqrt[3]{142 - 6\sqrt{561}}$$

Decimal approximation:

$-0.241466275258237271404043225672957865576879462276206018\ldots - 0.418231857061678680479910490479775403738885921442737763\ldots i$

Polar coordinates:

$r \approx 0.482933$ (radius), $\theta = -120°$ (angle)

0.482933

Alternate forms:

$$-\sqrt[3]{2\left(71 - 3\sqrt{561}\right)}$$

$$-\sqrt[3]{-2\left(3\sqrt{561} - 71\right)}$$

root of $x^6 + 284x^3 - 32$ near $x = -0.241466 - 0.418232 i$

Minimal polynomial:

$x^6 + 284 x^3 - 32$

1/(4Pi)*(((6/(2-((2^(7/3)/0.482933))+2^(2/3)*0.482933))))^2 * ((3-5)/(3-5))

Input interpretation:

$$\frac{1}{4\pi}\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2\times\frac{3-5}{3-5}$$

Result:

0.0487101...

0.0487101…

Alternative representations:

$$\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2(3-5)}{(3-5)(4\pi)}=\frac{\left(\frac{6}{2+0.482933\times 2^{2/3}-\frac{2^{7/3}}{0.482933}}\right)^2}{720\,°}$$

$$\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2(3-5)}{(3-5)(4\pi)}=-\frac{\left(\frac{6}{2+0.482933\times 2^{2/3}-\frac{2^{7/3}}{0.482933}}\right)^2}{4\,i\log(-1)}$$

$$\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2(3-5)}{(3-5)(4\pi)}=\frac{\left(\frac{6}{2+0.482933\times 2^{2/3}-\frac{2^{7/3}}{0.482933}}\right)^2}{4\cos^{-1}(-1)}$$

Series representations:

$$\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2(3-5)}{(3-5)(4\pi)}=\frac{0.0382568}{\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}}$$

$$\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2 (3-5)}{(3-5)(4\pi)} = \frac{0.0765136}{-1+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}}$$

$$\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2 (3-5)}{(3-5)(4\pi)} = \frac{0.153027}{\sum_{k=0}^{\infty}\frac{2^{-k}(-6+50k)}{\binom{3k}{k}}}$$

Integral representations:

$$\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2 (3-5)}{(3-5)(4\pi)} = \frac{0.0765136}{\int_0^{\infty}\frac{1}{1+t^2}\,dt}$$

$$\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2 (3-5)}{(3-5)(4\pi)} = \frac{0.0382568}{\int_0^{1}\sqrt{1-t^2}\,dt}$$

$$\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2 (3-5)}{(3-5)(4\pi)} = \frac{0.0765136}{\int_0^{\infty}\frac{\sin(t)}{t}\,dt}$$

We note that:

34 * 1/(4Pi)*(((6/(2-((2^(7/3)/0.482933))+2^(2/3)*0.482933))))^2 * ((3-5)/(3-5))

where 34 is a Fibonacci number

Input interpretation:

$$34\times\frac{1}{4\pi}\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2\times\frac{3-5}{3-5}$$

Result:

1.656142496884550761765915792394646393091799168324072087369...

1.656142496… 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...

Alternative representations:

$$\frac{\left(34\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2\right)(3-5)}{(4\pi)(3-5)} = \frac{34\left(\frac{6}{2+0.482933\times 2^{2/3}-\frac{2^{7/3}}{0.482933}}\right)^2}{720^\circ}$$

$$\frac{\left(34\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2\right)(3-5)}{(4\pi)(3-5)} = -\frac{34\left(\frac{6}{2+0.482933\times 2^{2/3}-\frac{2^{7/3}}{0.482933}}\right)^2}{4\,i\log(-1)}$$

$$\frac{\left(34\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2\right)(3-5)}{(4\pi)(3-5)} = \frac{34\left(\frac{6}{2+0.482933\times 2^{2/3}-\frac{2^{7/3}}{0.482933}}\right)^2}{4\cos^{-1}(-1)}$$

Series representations:

$$\frac{\left(34\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2\right)(3-5)}{(4\pi)(3-5)} = \frac{1.30073}{\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}}$$

$$\frac{\left(34\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2\right)(3-5)}{(4\pi)(3-5)} = \frac{2.60146}{-1+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}}$$

$$\frac{\left(34\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2\right)(3-5)}{(4\pi)(3-5)} = \frac{5.20293}{\sum_{k=0}^{\infty}\frac{2^{-k}(-6+50k)}{\binom{3k}{k}}}$$

Integral representations:

$$\frac{\left(34\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2\right)(3-5)}{(4\pi)(3-5)} = \frac{2.60146}{\int_0^\infty \frac{1}{1+t^2}\,dt}$$

$$\frac{\left(34\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2\right)(3-5)}{(4\pi)(3-5)} = \frac{1.30073}{\int_0^1 \sqrt{1-t^2}\,dt}$$

$$\frac{\left(34\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2\right)(3-5)}{(4\pi)(3-5)} = \frac{2.60146}{\int_0^\infty \frac{\sin(t)}{t}\,dt}$$

Now, we have that:

(((1/[1/(4Pi)*(((6/(2-((2^(7/3)/0.482933))+2^(2/3)*0.482933))))^2 * ((3-5)/(3-5))]))^golden ratio + 7

where 7 is a Lucas number

Input interpretation:

$$\left(\frac{1}{\frac{1}{4\pi}\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2\times\frac{3-5}{3-5}}\right)^{\phi}+7$$

ϕ is the golden ratio

Result:

139.885...

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

Alternative representations:

$$\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2 (3-5)}{(3-5)(4\pi)}}\right)^{\phi}+7=7+\left(\frac{1}{\frac{\left(\frac{6}{2+0.482933\times 2^{2/3}-\frac{2^{7/3}}{0.482933}}\right)^2}{4\pi}}\right)^{-2\cos(216^\circ)}$$

$$\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2 (3-5)}{(3-5)(4\pi)}}\right)^{\phi}+7=7+\left(\frac{1}{\frac{\left(\frac{6}{2+0.482933\times 2^{2/3}-\frac{2^{7/3}}{0.482933}}\right)^2}{720^\circ}}\right)^{-2\cos(216^\circ)}$$

$$\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2 (3-5)}{(3-5)(4\pi)}}\right)^{\phi}+7=7+\left(\frac{1}{\frac{\left(\frac{6}{2+0.482933\times 2^{2/3}-\frac{2^{7/3}}{0.482933}}\right)^2}{4\pi}}\right)^{2\cos(\pi/5)}$$

Series representations:

$$\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2 (3-5)}{(3-5)(4\pi)}}\right)^{\phi}+7=7+26.1391^{\phi}\left(\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}\right)^{\phi}$$

$$\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2 (3-5)}{(3-5)(4\pi)}}\right)^{\phi}+7=7+\left(-13.0696+13.0696\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}\right)^{\phi}$$

$$\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2 (3-5)}{(3-5)(4\pi)}}\right)^\phi + 7 = 7 + 6.53479^\phi \left(\sum_{k=0}^{\infty} \frac{2^{-k}(-6+50k)}{\binom{3k}{k}}\right)^\phi$$

Integral representations:

$$\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2 (3-5)}{(3-5)(4\pi)}}\right)^\phi + 7 = 7 + 13.0696^\phi \left(\int_0^\infty \frac{1}{1+t^2}\,dt\right)^\phi$$

$$\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2 (3-5)}{(3-5)(4\pi)}}\right)^\phi + 7 = 7 + 26.1391^\phi \left(\int_0^1 \sqrt{1-t^2}\,dt\right)^\phi$$

$$\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2 (3-5)}{(3-5)(4\pi)}}\right)^\phi + 7 = 7 + 13.0696^\phi \left(\int_0^\infty \frac{\sin(t)}{t}\,dt\right)^\phi$$

(((1/[1/(4Pi)*(((6/(2-((2^(7/3)/0.482933))+2^(2/3)*0.482933))))^2 * ((3-5)/(3-5))])))^golden ratio -7

where 7 is a Lucas number

Input interpretation:

$$\left(\frac{1}{\frac{1}{4\pi}\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2\times\frac{3-5}{3-5}}\right)^{\phi}-7$$

ϕ is the golden ratio

Result:

125.885...

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

Alternative representations:

$$\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2(3-5)}{(3-5)(4\pi)}}\right)^{\phi}-7=-7+\left(\frac{1}{\frac{\left(\frac{6}{2+0.482933\times 2^{2/3}-\frac{2^{7/3}}{0.482933}}\right)^2}{4\pi}}\right)^{-2\cos(216^\circ)}$$

$$\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2(3-5)}{(3-5)(4\pi)}}\right)^{\phi}-7=-7+\left(\frac{1}{\frac{\left(\frac{6}{2+0.482933\times 2^{2/3}-\frac{2^{7/3}}{0.482933}}\right)^2}{720^\circ}}\right)^{-2\cos(216^\circ)}$$

$$\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2(3-5)}{(3-5)(4\pi)}}\right)^{\phi}-7=-7+\left(\frac{1}{\frac{\left(\frac{6}{2+0.482933\times 2^{2/3}-\frac{2^{7/3}}{0.482933}}\right)^2}{4\pi}}\right)^{2\cos(\pi/5)}$$

Series representations:

$$\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^{2}}{(3-5)(4\pi)}(3-5)}\right)^{\phi}-7=-7+26.1391^{\phi}\left(\sum_{k=0}^{\infty}\frac{(-1)^{k}}{1+2k}\right)^{\phi}$$

$$\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^{2}}{(3-5)(4\pi)}(3-5)}\right)^{\phi}-7=-7+\left(-13.0696+13.0696\sum_{k=1}^{\infty}\frac{2^{k}}{\binom{2k}{k}}\right)^{\phi}$$

$$\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^{2}}{(3-5)(4\pi)}(3-5)}\right)^{\phi}-7=-7+6.53479^{\phi}\left(\sum_{k=0}^{\infty}\frac{2^{-k}(-6+50k)}{\binom{3k}{k}}\right)^{\phi}$$

Integral representations:

$$\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^{2}}{(3-5)(4\pi)}(3-5)}\right)^{\phi}-7=-7+13.0696^{\phi}\left(\int_{0}^{\infty}\frac{1}{1+t^{2}}\,dt\right)^{\phi}$$

$$\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^{2}}{(3-5)(4\pi)}(3-5)}\right)^{\phi}-7=-7+26.1391^{\phi}\left(\int_{0}^{1}\sqrt{1-t^{2}}\,dt\right)^{\phi}$$

$$\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2 (3-5)}{(3-5)(4\pi)}}\right)^{\phi} - 7 = -7 + 13.0696^{\phi}\left(\int_0^{\infty}\frac{\sin(t)}{t}\,dt\right)^{\phi}$$

13*(((1/[1/(4Pi)*(((6/(2-((2^(7/3)/0.482933))+2^(2/3)*0.482933))))^2 * ((3-5)/(3-5))])))^golden ratio+1/2

where 13 is a Fibonacci number

Input interpretation:

$$13\left(\frac{1}{\frac{1}{4\pi}\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2\times\frac{3-5}{3-5}}\right)^{\phi}+\frac{1}{2}$$

ϕ is the golden ratio

Result:

1728.01...

1728.01

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

Alternative representations:

$$13\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^{2}(3-5)}{(3-5)(4\pi)}}\right)^{\phi}+\frac{1}{2}=$$

$$\frac{1}{2}+13\left(\frac{1}{\frac{\left(\frac{6}{2+0.482933\times 2^{2/3}-\frac{2^{7/3}}{0.482933}}\right)^{2}}{4\pi}}\right)^{-2\cos(216^{\circ})}$$

$$13\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^{2}(3-5)}{(3-5)(4\pi)}}\right)^{\phi}+\frac{1}{2}=$$

$$\frac{1}{2}+13\left(\frac{1}{\frac{\left(\frac{6}{2+0.482933\times 2^{2/3}-\frac{2^{7/3}}{0.482933}}\right)^{2}}{720^{\circ}}}\right)^{-2\cos(216^{\circ})}$$

$$13\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2(3-5)}{(3-5)(4\pi)}}\right)^{\phi}+\frac{1}{2}=$$

$$\frac{1}{2}+13\left(\frac{1}{\frac{\left(\frac{6}{2+0.482933\times 2^{2/3}-\frac{2^{7/3}}{0.482933}}\right)^2}{4\pi}}\right)^{2\cos(\pi/5)}$$

Series representations:

$$13\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2(3-5)}{(3-5)(4\pi)}}\right)^{\phi}+\frac{1}{2}=\frac{1}{2}+13\times 26.1391^{\phi}\left(\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}\right)^{\phi}$$

$$13\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2(3-5)}{(3-5)(4\pi)}}\right)^{\phi}+\frac{1}{2}=\frac{1}{2}+13\left(-13.0696+13.0696\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}\right)^{\phi}$$

$$13\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2(3-5)}{(3-5)(4\pi)}}\right)^{\phi}+\frac{1}{2}=\frac{1}{2}+13\times 6.53479^{\phi}\left(\sum_{k=0}^{\infty}\frac{2^{-k}(-6+50k)}{\binom{3k}{k}}\right)^{\phi}$$

Integral representations:

$$13\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2 (3-5)}{(3-5)(4\pi)}}\right)^{\phi}+\frac{1}{2}=\frac{1}{2}+13\times 13.0696^{\phi}\left(\int_0^{\infty}\frac{1}{1+t^2}\,dt\right)^{\phi}$$

$$13\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2 (3-5)}{(3-5)(4\pi)}}\right)^{\phi}+\frac{1}{2}=\frac{1}{2}+13\times 26.1391^{\phi}\left(\int_0^{1}\sqrt{1-t^2}\,dt\right)^{\phi}$$

$$13\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2 (3-5)}{(3-5)(4\pi)}}\right)^{\phi}+\frac{1}{2}=\frac{1}{2}+13\times 13.0696^{\phi}\left(\int_0^{\infty}\frac{\sin(t)}{t}\,dt\right)^{\phi}$$

(((1/[1/(4Pi)*(((6/(2-((2^(7/3)/0.482933))+2^(2/3)*0.482933))))^2 * ((3-5)/(3-5))]))))^golden ratio +29+11-1/golden ratio

where 29 and 11 are Lucas numbers

Input interpretation:

$$\left(\frac{1}{\frac{1}{4\pi}\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2\times\frac{3-5}{3-5}}\right)^{\phi}+29+11-\frac{1}{\phi}$$

ϕ is the golden ratio

Result:

172.267...

172.2674104158390…

Alternative representations:

$$\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2 (3-5)}{(3-5)(4\pi)}}\right)^{\phi} + 29 + 11 - \frac{1}{\phi} = 40 - -\frac{1}{2\cos(216°)} + \left(\frac{1}{\frac{\left(\frac{6}{2+0.482933\times 2^{2/3}-\frac{2^{7/3}}{0.482933}}\right)^2}{4\pi}}\right)^{-2\cos(216°)}$$

$$\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2 (3-5)}{(3-5)(4\pi)}}\right)^{\phi} + 29 + 11 - \frac{1}{\phi} = 40 - -\frac{1}{2\cos(216°)} + \left(\frac{1}{\frac{\left(\frac{6}{2+0.482933\times 2^{2/3}-\frac{2^{7/3}}{0.482933}}\right)^2}{720°}}\right)^{-2\cos(216°)}$$

$$\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^{2}(3-5)}{(3-5)(4\pi)}}\right)^{\phi}+29+11-\frac{1}{\phi}=$$

$$40-\frac{1}{2\cos\left(\frac{\pi}{5}\right)}+\left(\frac{1}{\frac{\left(\frac{6}{2+0.482933\times 2^{2/3}-\frac{2^{7/3}}{0.482933}}\right)^{2}}{4\pi}}\right)^{2\cos(\pi/5)}$$

Series representations:

$$\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^{2}(3-5)}{(3-5)(4\pi)}}\right)^{\phi}+29+11-\frac{1}{\phi}=40-\frac{1}{\phi}+26.1391^{\phi}\left(\sum_{k=0}^{\infty}\frac{(-1)^{k}}{1+2k}\right)^{\phi}$$

$$\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^{2}(3-5)}{(3-5)(4\pi)}}\right)^{\phi}+29+11-\frac{1}{\phi}=$$

$$40-\frac{1}{\phi}+\left(-13.0696+13.0696\sum_{k=1}^{\infty}\frac{2^{k}}{\binom{2k}{k}}\right)^{\phi}$$

$$\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^{2}(3-5)}{(3-5)(4\pi)}}\right)^{\phi}+29+11-\frac{1}{\phi}=$$

$$40-\frac{1}{\phi}+6.53479^{\phi}\left(\sum_{k=0}^{\infty}\frac{2^{-k}(-6+50k)}{\binom{3k}{k}}\right)^{\phi}$$

Integral representations:

$$\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^{2}(3-5)}{(3-5)(4\pi)}}\right)^{\phi}+29+11-\frac{1}{\phi}=40-\frac{1}{\phi}+13.0696^{\phi}\left(\int_{0}^{\infty}\frac{1}{1+t^{2}}\,dt\right)^{\phi}$$

$$\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^{2}(3-5)}{(3-5)(4\pi)}}\right)^{\phi}+29+11-\frac{1}{\phi}=$$

$$40-\frac{1}{\phi}+26.1391^{\phi}\left(\int_{0}^{1}\sqrt{1-t^{2}}\,dt\right)^{\phi}$$

$$\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^{2}(3-5)}{(3-5)(4\pi)}}\right)^{\phi}+29+11-\frac{1}{\phi}=40-\frac{1}{\phi}+13.0696^{\phi}\left(\int_{0}^{\infty}\frac{\sin(t)}{t}\,dt\right)^{\phi}$$

golden ratio(((1/[1/(4Pi)*(((6/(2-((2^(7/3)/0.482933))+2^(2/3)*0.482933))))^2 * ((3-5)/(3-5))]))^3+64*4+2

where 2 is a Lucas/Fibonacci number

Input interpretation:

$$\phi\left(\frac{1}{\frac{1}{4\pi}\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2\times\frac{3-5}{3-5}}\right)^3+64\times 4+2$$

ϕ is the golden ratio

Result:

14258.10481835700741757020096391895167673197048173236296539...

14258.1048….

Alternative representations:

$$\phi\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2(3-5)}{(3-5)(4\pi)}}\right)^3+64\times 4+2=$$

$$258-2\cos(216\,°)\left(\frac{1}{\frac{\left(\frac{6}{2+0.482933\times 2^{2/3}-\frac{2^{7/3}}{0.482933}}\right)^2}{4\pi}}\right)^3$$

$$\phi\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^{2}(3-5)}{(3-5)(4\pi)}}\right)^{3}+64\times 4+2=$$

$$258-2\cos(216^\circ)\left(\frac{1}{\frac{\left(\frac{6}{2+0.482933\times 2^{2/3}-\frac{2^{7/3}}{0.482933}}\right)^{2}}{720^\circ}}\right)^{3}$$

$$\phi\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^{2}(3-5)}{(3-5)(4\pi)}}\right)^{3}+64\times 4+2=$$

$$258+2\cos\left(\frac{\pi}{5}\right)\left(\frac{1}{\frac{\left(\frac{6}{2+0.482933\times 2^{2/3}-\frac{2^{7/3}}{0.482933}}\right)^{2}}{4\pi}}\right)^{3}$$

Series representations:

$$\phi\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^{2}(3-5)}{(3-5)(4\pi)}}\right)^{3}+64\times 4+2=258+17859.7\,\phi\left(\sum_{k=0}^{\infty}\frac{(-1)^{k}}{1+2k}\right)^{3}$$

$$\phi\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^{2}(3-5)}{(3-5)(4\pi)}}\right)^{3}+64\times 4+2=258+2232.46\,\phi\left(-1+\sum_{k=1}^{\infty}\frac{2^{k}}{\binom{2k}{k}}\right)^{3}$$

$$\phi\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^{2}(3-5)}{(3-5)(4\pi)}}\right)^{3}+64\times 4+2=$$
$$258+279.058\,\phi\left(\sum_{k=0}^{\infty}\frac{2^{-k}(-6+50k)}{\binom{3k}{k}}\right)^{3}$$

Integral representations:

$$\phi\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^{2}(3-5)}{(3-5)(4\pi)}}\right)^{3}+64\times 4+2=258+2232.46\,\phi\left(\int_{0}^{\infty}\frac{1}{1+t^{2}}\,dt\right)^{3}$$

$$\phi\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^{2}(3-5)}{(3-5)(4\pi)}}\right)^{3}+64\times 4+2=258+17859.7\,\phi\left(\int_{0}^{1}\sqrt{1-t^{2}}\,dt\right)^{3}$$

$$\phi\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^{2}(3-5)}{(3-5)(4\pi)}}\right)^{3}+64\times 4+2=258+2232.46\,\phi\left(\int_{0}^{\infty}\frac{\sin(t)}{t}\,dt\right)^{3}$$

golden ratio(((1/[1/(4Pi)*(((6/(2-((2^(7/3)/0.482933))+2^(2/3)*0.482933))))^2 * ((3-5)/(3-5))])))^3+64*4-21-2-64*2^5-64*2^4

where 21 is a Fibonacci number

Input interpretation:

$$\phi\left(\frac{1}{\frac{1}{4\pi}\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2\times\frac{3-5}{3-5}}\right)^3+64\times 4-21-2-64\times 2^5-64\times 2^4$$

ϕ is the golden ratio

Result:

11161.1...

11161.1...

Alternative representations:

$$\phi\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2(3-5)}{(3-5)(4\pi)}}\right)^3+64\times 4-21-2-64\times 2^5-64\times 2^4=$$

$$233-64\times 2^4-64\times 2^5-2\cos(216\,°)\left(\frac{1}{\frac{\left(\frac{6}{2+0.482933\times 2^{2/3}-\frac{2^{7/3}}{0.482933}}\right)^2}{4\pi}}\right)^3$$

$$\phi\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2 (3-5)}{(3-5)(4\pi)}}\right)^3 + 64\times 4 - 21 - 2 - 64\times 2^5 - 64\times 2^4 =$$

$$233 - 64\times 2^4 - 64\times 2^5 - 2\cos(216\,°)\left(\frac{1}{\frac{\left(\frac{6}{2+0.482933\times 2^{2/3}-\frac{2^{7/3}}{0.482933}}\right)^2}{720\,°}}\right)^3$$

$$\phi\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2 (3-5)}{(3-5)(4\pi)}}\right)^3 + 64\times 4 - 21 - 2 - 64\times 2^5 - 64\times 2^4 =$$

$$233 - 64\times 2^4 - 64\times 2^5 + 2\cos\left(\frac{\pi}{5}\right)\left(\frac{1}{\frac{\left(\frac{6}{2+0.482933\times 2^{2/3}-\frac{2^{7/3}}{0.482933}}\right)^2}{4\pi}}\right)^3$$

Series representations:

$$\phi\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2 (3-5)}{(3-5)(4\pi)}}\right)^3 + 64\times 4 - 21 - 2 - 64\times 2^5 - 64\times 2^4 =$$

$$-2839 + 17859.7\,\phi\left(\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}\right)^3$$

$$\phi\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^{2}(3-5)}{(3-5)(4\pi)}}\right)^{3}+64\times 4-21-2-64\times 2^{5}-64\times 2^{4}=$$

$$-2839+2232.46\,\phi\left(-1+\sum_{k=1}^{\infty}\frac{2^{k}}{\binom{2k}{k}}\right)^{3}$$

$$\phi\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^{2}(3-5)}{(3-5)(4\pi)}}\right)^{3}+64\times 4-21-2-64\times 2^{5}-64\times 2^{4}=$$

$$-2839+279.058\,\phi\left(\sum_{k=0}^{\infty}\frac{2^{-k}(-6+50k)}{\binom{3k}{k}}\right)^{3}$$

Integral representations:

$$\phi\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^{2}(3-5)}{(3-5)(4\pi)}}\right)^{3}+64\times 4-21-2-64\times 2^{5}-64\times 2^{4}=$$

$$-2839+2232.46\,\phi\left(\int_{0}^{\infty}\frac{1}{1+t^{2}}\,dt\right)^{3}$$

$$\phi\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^{2}(3-5)}{(3-5)(4\pi)}}\right)^{3}+64\times 4-21-2-64\times 2^{5}-64\times 2^{4}=$$

$$-2839+17\,859.7\,\phi\left(\int_{0}^{1}\sqrt{1-t^{2}}\,dt\right)^{3}$$

$$\phi\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2 (3-5)}{(3-5)(4\pi)}}\right)^3 + 64\times 4 - 21 - 2 - 64\times 2^5 - 64\times 2^4 =$$

$$-2839 + 2232.46\,\phi\left(\int_0^\infty \frac{\sin(t)}{t}\,dt\right)^3$$

golden ratio(((1/[1/(4Pi)*(((6/(2-((2^(7/3)/0.482933))+2^(2/3)*0.482933))))^2 * ((3-5)/(3-5))]))))^3+64*(8-2^5-2^4)+29-1/golden ratio

where 29 is a Lucas number

Input interpretation:

$$\phi\left(\frac{1}{\frac{1}{4\pi}\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2\times\frac{3-5}{3-5}}\right)^3 + 64\left(8-2^5-2^4\right)+29-\frac{1}{\phi}$$

ϕ is the golden ratio

Result:

11468.48678436825752272199637708458603861425017255255720253...

11468.4867…

Alternative representations:

$$\phi\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2 (3-5)}{(3-5)(4\pi)}}\right)^3+64\left(8-2^5-2^4\right)+29-\frac{1}{\phi}=$$

$$29+64\left(8-2^4-2^5\right)--\frac{1}{2\cos(216^\circ)}-2\cos(216^\circ)\left(\frac{1}{\frac{\left(\frac{6}{2+0.482933\times 2^{2/3}-\frac{2^{7/3}}{0.482933}}\right)^2}{4\pi}}\right)^3$$

$$\phi\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2 (3-5)}{(3-5)(4\pi)}}\right)^3+64\left(8-2^5-2^4\right)+29-\frac{1}{\phi}=$$

$$29+64\left(8-2^4-2^5\right)--\frac{1}{2\cos(216^\circ)}-2\cos(216^\circ)\left(\frac{1}{\frac{\left(\frac{6}{2+0.482933\times 2^{2/3}-\frac{2^{7/3}}{0.482933}}\right)^2}{720^\circ}}\right)^3$$

$$\phi\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^2 (3-5)}{(3-5)(4\pi)}}\right)^3+64\left(8-2^5-2^4\right)+29-\frac{1}{\phi}=$$

$$29+64\left(8-2^4-2^5\right)-\frac{1}{2\cos\left(\frac{\pi}{5}\right)}+2\cos\left(\frac{\pi}{5}\right)\left(\frac{1}{\frac{\left(\frac{6}{2+0.482933\times 2^{2/3}-\frac{2^{7/3}}{0.482933}}\right)^2}{4\pi}}\right)^3$$

Series representations:

$$\phi\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^{2}(3-5)}{(3-5)(4\pi)}}\right)^{3}+64\left(8-2^{5}-2^{4}\right)+29-\frac{1}{\phi}=$$

$$-2531-\frac{1}{\phi}+17\,859.7\,\phi\left(\sum_{k=0}^{\infty}\frac{(-1)^{k}}{1+2k}\right)^{3}$$

$$\phi\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^{2}(3-5)}{(3-5)(4\pi)}}\right)^{3}+64\left(8-2^{5}-2^{4}\right)+29-\frac{1}{\phi}=$$

$$-2531-\frac{1}{\phi}+2232.46\,\phi\left(-1+\sum_{k=1}^{\infty}\frac{2^{k}}{\binom{2k}{k}}\right)^{3}$$

$$\phi\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^{2}(3-5)}{(3-5)(4\pi)}}\right)^{3}+64\left(8-2^{5}-2^{4}\right)+29-\frac{1}{\phi}=$$

$$-2531-\frac{1}{\phi}+279.058\,\phi\left(\sum_{k=0}^{\infty}\frac{2^{-k}(-6+50k)}{\binom{3k}{k}}\right)^{3}$$

Integral representations:

$$\phi\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^{2}}{(3-5)(4\pi)}}\right)^{3}+64\left(8-2^{5}-2^{4}\right)+29-\frac{1}{\phi}=$$
$$-2531-\frac{1}{\phi}+2232.46\,\phi\left(\int_{0}^{\infty}\frac{1}{1+t^{2}}\,dt\right)^{3}$$

$$\phi\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^{2}}{(3-5)(4\pi)}}\right)^{3}+64\left(8-2^{5}-2^{4}\right)+29-\frac{1}{\phi}=$$
$$-2531-\frac{1}{\phi}+17\,859.7\,\phi\left(\int_{0}^{1}\sqrt{1-t^{2}}\,dt\right)^{3}$$

$$\phi\left(\frac{1}{\frac{\left(\frac{6}{2-\frac{2^{7/3}}{0.482933}+2^{2/3}\times 0.482933}\right)^{2}}{(3-5)(4\pi)}}\right)^{3}+64\left(8-2^{5}-2^{4}\right)+29-\frac{1}{\phi}=$$
$$-2531-\frac{1}{\phi}+2232.46\,\phi\left(\int_{0}^{\infty}\frac{\sin(t)}{t}\,dt\right)^{3}$$

We have obtained the following results very near to the Ramanujan taxicab numbers:

11468.4867…,   11161.1…,   14258.1048….,   172.2674104158390…

Now, we have that:

leads to a result which is constant. By denoting $\mathfrak{z} = -7 - 27Q^2 + 3\alpha$, for $\alpha = \sqrt{9 + 42Q^2 + 81Q^4}$, the temperature reads

For L = 1, Q = √5 and

for $\zeta = -2^{7/3} + 2\mathfrak{z}^{1/3} + 2\mathfrak{z}^{2/3}$ and $\zeta_1 = \zeta + 6\mathfrak{z}^{1/3}$.

$$T = \frac{8748\,\mathfrak{z}^{7/3}\left\{\zeta + Q^2\left[-2^{7/3} + 10\mathfrak{z}^{1/3} + 2\mathfrak{z}^{2/3}\right]\right\}^2}{L^2\pi\zeta^4\zeta_1^2\left[28 - 12\alpha + 2^{10/3}\mathfrak{z} - 7\times(2\mathfrak{z}^2)^{1/3} + 3\times 2^{1/3}\alpha\mathfrak{z}^{2/3} + 27Q^2\left(1 - (2\mathfrak{z}^2)^{1/3}\right)\right]} \qquad (14)$$

$$\alpha = \sqrt{9 + 42Q^2 + 81Q^4}$$

$$\mathfrak{z} = -7 - 27Q^2 + 3\alpha$$

((9+42*(sqrt5)^2+81*(sqrt5)^4))^1/2

Input:

$\sqrt{9 + 42\sqrt{5}^2 + 81\sqrt{5}^4}$

Result:

$2\sqrt{561}$

Decimal approximation:

47.370877129308044933170959823701808015724814152768505517 25...

47.3708771293.... = α

-7-27*(sqrt5)^2+3*(47.3708771293)

Input interpretation:

$-7 - 27\sqrt{5}^2 + 3\times 47.3708771293$

Result:

0.1126313879

0.1126313879 = ʒ

for $\zeta = -2^{7/3} + 2\mathfrak{z}^{1/3} + 2\mathfrak{z}^{2/3}$ and $\zeta_1 = \zeta + 6\mathfrak{z}^{1/3}$.

-2^(7/3)+2*(0.1126313879)^(1/3)+2*(0.1126313879)^(2/3)

Input interpretation:

$-2^{7/3} + 2\sqrt[3]{0.1126313879} + 2 \times 0.1126313879^{2/3}$

Result:

$-3.6073714020\ldots$

-3.6073714020.... = ζ

-3.6073714020+6*(0.1126313879)^(1/3)

Input interpretation:

$-3.6073714020 + 6\sqrt[3]{0.1126313879}$

Result:

$-0.7097760991\ldots$

-0.7097760991.... = ζ_1

We have:

47.3708771293.... = α 0.1126313879 = $\mathfrak{z}$ -3.6073714020.... = ζ

-0.7097760991.... = ζ_1 L = 1   Q = √5

$$T = \frac{8748\,\mathfrak{z}^{7/3}\left\{\zeta + Q^2\left[-2^{7/3} + 10\mathfrak{z}^{1/3} + 2\mathfrak{z}^{2/3}\right]\right\}^2}{L^2\pi\zeta^4\zeta_1^2\left[28 - 12\alpha + 2^{10/3}\mathfrak{z} - 7\times(2\mathfrak{z}^2)^{1/3} + 3\times 2^{1/3}\alpha\mathfrak{z}^{2/3} + 27Q^2\left(4 - (2\mathfrak{z}^2)^{1/3}\right)\right]} \quad (14)$$

$(-3.6073714020)^4$

$= 169.341511586879509551652685644698924816$

$(-0.7097760991)^2$

$= 0.50378211085361302081$

$0.1126313879^{7/3}$

$= 0.006126400015\ldots$

$0.1126313879^{2/3}$

$= 0.2332238483\ldots$

$\sqrt[3]{0.1126313879}$

$= 0.4829325505\ldots$

8748*(0.006126400015) * [(((-3.6073714020+5(((-2^(7/3)+10*0.4829325505+2*0.2332238483))))))]^2

Input interpretation:

$$8748 \times 0.006126400015 \left(-3.6073714020 + 5\left(-2^{7/3} + 10 \times 0.4829325505 + 2 \times 0.2332238483\right)\right)^2$$

Result:

290.187977...

290.187977...

Pi*169.34151158*0.50378211[(28-12*47.3708771293+2^(10/3)*0.1126313879-7*(2*0.1126313879^2)^(1/3)+3*2^(1/3)*47.3708771293*0.2332238483+27*5((4-(2*0.1126313879^2)^(1/3)))]

Input interpretation:

$$\pi \times 169.34151158 \times 0.50378211 \left(28 + 12 \times (-47.3708771293) + 2^{10/3} \times 0.1126313879 - 7\sqrt[3]{2 \times 0.1126313879^2} + 3\sqrt[3]{2} \times 47.3708771293 \times 0.2332238483 + 27 \times 5\left(4 - \sqrt[3]{2 \times 0.1126313879^2}\right)\right)$$

Result:

192.38617...

192.38617…

Alternative representations:

$$\pi\, 169.341511580000 \times 0.503782 \left(28 - 12 \times 47.37087712930000 + 2^{10/3} \times 0.112631 - 7 \sqrt[3]{2 \times 0.112631^2} + 3 \sqrt[3]{2}\; 47.37087712930000 \times 0.233224 + 27 \times 5 \left(4 - \sqrt[3]{2 \times 0.112631^2}\right)\right) = 15356.{}^\circ \left(-540.4505255516000 + 33.1441 \sqrt[3]{2} + 0.112631 \times 2^{10/3} + 135 \left(4 - \sqrt[3]{2 \times 0.112631^2}\right) - 7 \sqrt[3]{2 \times 0.112631^2}\right)$$

$$\pi\, 169.341511580000 \times 0.503782 \left(28 - 12 \times 47.37087712930000 + 2^{10/3} \times 0.112631 - 7 \sqrt[3]{2 \times 0.112631^2} + 3 \sqrt[3]{2}\; 47.37087712930000 \times 0.233224 + 27 \times 5 \left(4 - \sqrt[3]{2 \times 0.112631^2}\right)\right) = -85.3112\, i \log(-1) \left(-540.4505255516000 + 33.1441 \sqrt[3]{2} + 0.112631 \times 2^{10/3} + 135 \left(4 - \sqrt[3]{2 \times 0.112631^2}\right) - 7 \sqrt[3]{2 \times 0.112631^2}\right)$$

$$\pi\, 169.341511580000 \times 0.503782 \left(28 - 12 \times 47.37087712930000 + 2^{10/3} \times 0.112631 - 7 \sqrt[3]{2 \times 0.112631^2} + 3 \sqrt[3]{2}\; 47.37087712930000 \times 0.233224 + 27 \times 5 \left(4 - \sqrt[3]{2 \times 0.112631^2}\right)\right) = 85.3112 \cos^{-1}(-1) \left(-540.4505255516000 + 33.1441 \sqrt[3]{2} + 0.112631 \times 2^{10/3} + 135 \left(4 - \sqrt[3]{2 \times 0.112631^2}\right) - 7 \sqrt[3]{2 \times 0.112631^2}\right)$$

Series representations:

$$\pi\, 169.341511580000 \times 0.503782 \left(28 - 12 \times 47.37087712930000 + 2^{10/3} \times 0.112631 - 7 \sqrt[3]{2 \times 0.112631^2} + 3 \sqrt[3]{2}\; 47.37087712930000 \times 0.233224 + 27 \times 5 \left(4 - \sqrt[3]{2 \times 0.112631^2}\right)\right) = 244.954 \sum_{k=0}^{\infty} \frac{(-1)^k}{1 + 2k}$$

$$\pi\, 169.341511580000 \times 0.503782 \left(28 - 12 \times 47.37087712930000 + 2^{10/3} \times 0.112631 - 7 \sqrt[3]{2 \times 0.112631^2} + 3 \sqrt[3]{2}\, 47.37087712930000 \times 0.233224 + 27 \times 5 \left(4 - \sqrt[3]{2 \times 0.112631^2}\right)\right) = -122.477 + 122.477 \sum_{k=1}^{\infty} \frac{2^k}{\binom{2k}{k}}$$

$$\pi\, 169.341511580000 \times 0.503782 \left(28 - 12 \times 47.37087712930000 + 2^{10/3} \times 0.112631 - 7 \sqrt[3]{2 \times 0.112631^2} + 3 \sqrt[3]{2}\, 47.37087712930000 \times 0.233224 + 27 \times 5 \left(4 - \sqrt[3]{2 \times 0.112631^2}\right)\right) = 61.2384 \sum_{k=0}^{\infty} \frac{2^{-k}(-6 + 50k)}{\binom{3k}{k}}$$

Integral representations:

$$\pi\, 169.341511580000 \times 0.503782 \left(28 - 12 \times 47.37087712930000 + 2^{10/3} \times 0.112631 - 7 \sqrt[3]{2 \times 0.112631^2} + 3 \sqrt[3]{2}\, 47.37087712930000 \times 0.233224 + 27 \times 5 \left(4 - \sqrt[3]{2 \times 0.112631^2}\right)\right) = 122.477 \int_0^{\infty} \frac{1}{1 + t^2}\, dt$$

$$\pi\, 169.341511580000 \times 0.503782 \left(28 - 12 \times 47.37087712930000 + 2^{10/3} \times 0.112631 - 7 \sqrt[3]{2 \times 0.112631^2} + 3 \sqrt[3]{2}\, 47.37087712930000 \times 0.233224 + 27 \times 5 \left(4 - \sqrt[3]{2 \times 0.112631^2}\right)\right) = 244.954 \int_0^{1} \sqrt{1 - t^2}\, dt$$

$$\pi\, 169.341511580000 \times 0.503782 \left(28 - 12 \times 47.37087712930000 + 2^{10/3} \times 0.112631 - 7 \sqrt[3]{2 \times 0.112631^2} + 3 \sqrt[3]{2}\, 47.37087712930000 \times 0.233224 + 27 \times 5 \left(4 - \sqrt[3]{2 \times 0.112631^2}\right)\right) = 122.477 \int_0^{\infty} \frac{\sin(t)}{t}\, dt$$

(290.187977) * 1/((((Pi*169.34151158*0.50378211[(28-12*47.3708771293+2^(10/3)*0.1126313879-7*(2*0.1126313879^2)^(1/3)+3*2^(1/3)*47.3708771293*0.2332238483+27*5((4-(2*0.1126313879^2)^(1/3)))])))))

Input interpretation:

$$290.187977 \times 1 \Big/ \left(\pi \times 169.34151158 \times 0.50378211 \left(28 + 12 \times (-47.3708771293) + 2^{10/3} \times 0.1126313879 - 7 \sqrt[3]{2 \times 0.1126313879^2} + 3 \sqrt[3]{2} \times 47.3708771293 \times 0.2332238483 + 27 \times 5 \left(4 - \sqrt[3]{2 \times 0.1126313879^2}\right)\right)\right)$$

Result:

1.5083619...

1.5083619…

Alternative representations:

$$290.188 \Big/ \left(\pi\, 169.341511580000 \times 0.503782 \left(28 - 12 \times 47.37087712930000 + 2^{10/3} \times 0.112631 - 7 \sqrt[3]{2 \times 0.112631^2} + 3 \sqrt[3]{2}\; 47.37087712930000 \times 0.233224 + 27 \times 5 \left(4 - \sqrt[3]{2 \times 0.112631^2}\right)\right)\right) = 290.188 \Big/ \left(15\,356.{}^\circ \left(-540.4505255516000 + 33.1441 \sqrt[3]{2} + 0.112631 \times 2^{10/3} + 135 \left(4 - \sqrt[3]{2 \times 0.112631^2}\right) - 7 \sqrt[3]{2 \times 0.112631^2}\right)\right)$$

$$290.188 \Big/ \left(\pi\, 169.341511580000 \times 0.503782 \left(28 - 12 \times 47.37087712930000 + 2^{10/3} \times 0.112631 - 7 \sqrt[3]{2 \times 0.112631^2} + 3 \sqrt[3]{2}\; 47.37087712930000 \times 0.233224 + 27 \times 5 \left(4 - \sqrt[3]{2 \times 0.112631^2}\right)\right)\right) = -\left(290.188 \Big/ \left(85.3112\, i \log(-1) \left(-540.4505255516000 + 33.1441 \sqrt[3]{2} + 0.112631 \times 2^{10/3} + 135 \left(4 - \sqrt[3]{2 \times 0.112631^2}\right) - 7 \sqrt[3]{2 \times 0.112631^2}\right)\right)\right)$$

$$290.188 \Big/ \left(\pi\, 169.341511580000 \times 0.503782 \left(28 - 12 \times 47.37087712930000 + 2^{10/3} \times 0.112631 - 7 \sqrt[3]{2 \times 0.112631^2} + 3 \sqrt[3]{2}\; 47.37087712930000 \times 0.233224 + 27 \times 5 \left(4 - \sqrt[3]{2 \times 0.112631^2}\right)\right)\right) = 290.188 \Big/ \left(85.3112 \cos^{-1}(-1) \left(-540.4505255516000 + 33.1441 \sqrt[3]{2} + 0.112631 \times 2^{10/3} + 135 \left(4 - \sqrt[3]{2 \times 0.112631^2}\right) - 7 \sqrt[3]{2 \times 0.112631^2}\right)\right)$$

Series representations:

$$290.188 \Big/ \left(\pi\, 169.341511580000 \times 0.503782 \left(28 - 12 \times 47.37087712930000 + 2^{10/3} \times 0.112631 - 7 \sqrt[3]{2 \times 0.112631^2} + 3 \sqrt[3]{2}\; 47.37087712930000 \times 0.233224 + 27 \times 5 \left(4 - \sqrt[3]{2 \times 0.112631^2}\right)\right)\right) = \frac{1.18466}{\sum_{k=0}^{\infty} \frac{(-1)^k}{1+2k}}$$

$$290.188 \Big/ \left(\pi\, 169.341511580000 \times 0.503782 \left(28 - 12 \times 47.37087712930000 + 2^{10/3} \times 0.112631 - 7 \sqrt[3]{2 \times 0.112631^2} + 3 \sqrt[3]{2}\; 47.37087712930000 \times 0.233224 + 27 \times 5 \left(4 - \sqrt[3]{2 \times 0.112631^2}\right)\right)\right) = \frac{2.36933}{-1 + \sum_{k=1}^{\infty} \frac{2^k}{\binom{2k}{k}}}$$

$$290.188 \Big/ \left(\pi\, 169.341511580000 \times 0.503782 \left(28 - 12 \times 47.37087712930000 + 2^{10/3} \times 0.112631 - 7 \sqrt[3]{2 \times 0.112631^2} + 3 \sqrt[3]{2}\; 47.37087712930000 \times 0.233224 + 27 \times 5 \left(4 - \sqrt[3]{2 \times 0.112631^2}\right)\right)\right) = \frac{4.73866}{\sum_{k=0}^{\infty} \frac{2^{-k}(-6+50k)}{\binom{3k}{k}}}$$

Integral representations:

$$290.188 \Big/ \left(\pi\, 169.341511580000 \times 0.503782 \left(28 - 12 \times 47.37087712930000 + 2^{10/3} \times 0.112631 - 7 \sqrt[3]{2 \times 0.112631^2} + 3 \sqrt[3]{2}\; 47.37087712930000 \times 0.233224 + 27 \times 5 \left(4 - \sqrt[3]{2 \times 0.112631^2}\right)\right)\right) = \frac{2.36933}{\int_0^{\infty} \frac{1}{1+t^2}\, dt}$$

$$290.188 \Big/ \left(\pi\, 169.341511580000 \times 0.503782 \left(28 - 12 \times 47.37087712930000 + 2^{10/3} \times 0.112631 - 7 \sqrt[3]{2 \times 0.112631^2} + 3 \sqrt[3]{2}\; 47.37087712930000 \times 0.233224 + 27 \times 5 \left(4 - \sqrt[3]{2 \times 0.112631^2}\right)\right)\right) = \frac{1.18466}{\int_0^{1} \sqrt{1-t^2}\, dt}$$

$$290.188 \Big/ \Big(\pi\, 169.341511580000 \times 0.503782 \Big(28 - 12 \times 47.37087712930000 + 2^{10/3} \times 0.112631 - 7\sqrt[3]{2 \times 0.112631^2} + 3\sqrt[3]{2}\; 47.37087712930000 \times 0.233224 + 27 \times 5\left(4 - \sqrt[3]{2 \times 0.112631^2}\right)\Big)\Big) = \frac{2.36933}{\int_0^\infty \frac{\sin(t)}{t}\, dt}$$

Note that, from the following Ramanujan mock theta function:

0.449329+0.449329^4(1+0.449329)+0.449329^9(1+0.449329)(1+0.449329^2)

$$0.449329 + 0.449329^4\,(1 + 0.449329) + 0.449329^9\,(1 + 0.449329)\,(1 + 0.449329^2)$$

0.5097073744509261754651063500274011413838019839860008516 64...

$\boldsymbol{\phi(q) = 0.50970737445...}$

we obtain: 1+0.50970737445 = 1.50970737445 ≈ 1.5083619…

We have that:

(1.508361946751986)^12-1/golden ratio

Input interpretation:

$$1.508361946751986^{12} - \frac{1}{\phi}$$

ϕ is the golden ratio

Result:

138.078883437051...

138.078883437051…

Alternative representations:

$$1.50836194675198600000^{12} - \frac{1}{\phi} = 1.50836194675198600000^{12} - \frac{1}{2\sin(54°)}$$

$$1.50836194675198600000^{12} - \frac{1}{\phi} = 1.50836194675198600000^{12} - -\frac{1}{2\cos(216°)}$$

$$1.50836194675198600000^{12} - \frac{1}{\phi} = 1.50836194675198600000^{12} - -\frac{1}{2\sin(666°)}$$

And:

(1.508361946751986)^12-3-1/golden ratio

where 3 is a Lucas/Fibonacci number

Input interpretation:

$$1.508361946751986^{12} - 3 - \frac{1}{\phi}$$

ϕ is the golden ratio

Result:

135.078883437051...

135.078883437051…

Alternative representations:

$$1.50836194675198600000^{12} - 3 - \frac{1}{\phi} = -3 + 1.50836194675198600000^{12} - \frac{1}{2\sin(54°)}$$

$$1.50836194675198600000^{12} - 3 - \frac{1}{\phi} = -3 + 1.50836194675198600000^{12} - -\frac{1}{2\cos(216°)}$$

$$1.50836194675198600000^{12} - 3 - \frac{1}{\phi} = -3 + 1.50836194675198600000^{12} - -\frac{1}{2\sin(666°)}$$

(1.508361946751986)^12+34-1/golden ratio

where 34 is a Fibonacci number

Input interpretation:

$$1.508361946751986^{12} + 34 - \frac{1}{\phi}$$

ϕ is the golden ratio

Result:

172.078883437051...

172.078883437051….

Alternative representations:

$$1.50836194675198600000^{12} + 34 - \frac{1}{\phi} = 34 + 1.50836194675198600000^{12} - \frac{1}{2 \sin(54°)}$$

$$1.50836194675198600000^{12} + 34 - \frac{1}{\phi} = 34 + 1.50836194675198600000^{12} - -\frac{1}{2 \cos(216°)}$$

$$1.50836194675198600000^{12} + 34 - \frac{1}{\phi} = 34 + 1.50836194675198600000^{12} - -\frac{1}{2 \sin(666°)}$$

Now, we take the following Ramanujan expression:

$$135^3 + 138^3 = 172^3 - 1$$

We can to obtain the following new mathematical expressions:

135.078883437051^3 + 138.078883437051^3 > 172.078883437051^3 – 1

Input interpretation:

$135.078883437051^3 + 138.078883437051^3 > 172.078883437051^3 - 1$

Result:

True

Difference:

1820.5435789

1820.5435789

Indeed:

135.078883437051^3 + 138.078883437051^3

Input interpretation:

$135.078883437051^3 + 138.078883437051^3$

Result:

$5.097271817734729739711047777796449432087302 \times 10^6$

Decimal form:

5097271.817734729739711047777796449432087302

5097271.81773472…

172.078883437051^3 – 1

Input interpretation:

$172.078883437051^3 - 1$

Result:

$5.095451274155876907627498796904724716043651 \times 10^6$

Decimal form:

5095451.274155876907627498796904724716043651

5095451.274155876…

135.078883437051^3 + 138.078883437051^3 - (172.078883437051^3 – 1)

Input interpretation:

$135.078883437051^3 + 138.078883437051^3 - (172.078883437051^3 - 1)$

Result:

1820.5435788528320835489808917247160436 51

1820.54357885...

And:

((135.078883437051^3 + 138.078883437051^3 - (172.078883437051^3 – 1)))+47-3

where 47 and 3 are Lucas numbers

Input interpretation:

$(135.078883437051^3 + 138.078883437051^3 - (172.078883437051^3 - 1)) + 47 - 3$

Result:

1864.543578852832083548980891724716043651

1864.543578.... result practically equal to the rest mass of D meson 1864.84

Appendix

From:

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

Spyros D. Avramis, Alex Kehagiasb and Constantina Mattheopoulou

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m	L_0	d	S	S_{BH}
3	1	196883	12.1904	12.5664
	2	21296876	16.8741	17.7715
	3	842609326	20.5520	21.7656
4	2/3	139503	11.8458	11.8477
	5/3	69193488	18.0524	18.7328
	8/3	6928824200	22.6589	23.6954
5	1/3	20619	9.9340	9.3664
	4/3	86645620	18.2773	18.7328
	7/3	24157197490	23.9078	24.7812
6	1	42987519	17.5764	17.7715
	2	40448921875	24.4233	25.1327
	3	8463511703277	29.7668	30.7812
7	2/3	7402775	15.8174	15.6730
	5/3	33934039437	24.2477	24.7812
	8/3	16953652012291	30.4615	31.3460
8	1/3	278511	12.5372	11.8477
	4/3	13996384631	23.3621	23.6954
	7/3	19400406113385	30.5963	31.3460

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

Examples

$$135^3 + 138^3 = 172^3 - 1$$

$$11161^3 + 11468^3 = 14258^3 + 1$$

$$791^3 + 812^3 = 1010^3 - 1$$

$$9^3 + 10^3 = 12^3 + 1$$

$$6^3 + 8^3 = 9^3 - 1$$

References

Black Hole Microstate Counting and its Macroscopic Counterpart
Ipsita Mandal and Ashoke Sen - arXiv:1008.3801v2 [hep-th] 3 Apr 2012

Deformed AdS_4-Reissner-Nordstrom black branes and shear viscosity-to entropy density ratio
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R. da Rocha - CMCC, Federal University of ABC, 09210-580, Santo André, Brazil. - arXiv:1904.01093v1 [hep-th] 1 Apr 2019