On some Ramanujan expressions and Partition formulas: mathematical connections with ϕ, $\zeta(2)$, various Fractal Hausdorff Dimensions values and several equations of Teleparallel Cosmology. III

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Abstract

In this paper we have described some Ramanujan expressions and Partition formulas. We have obtained mathematical connections with ϕ, $\zeta(2)$, various Fractal Hausdorff Dimensions values and several equations of Teleparallel Cosmology

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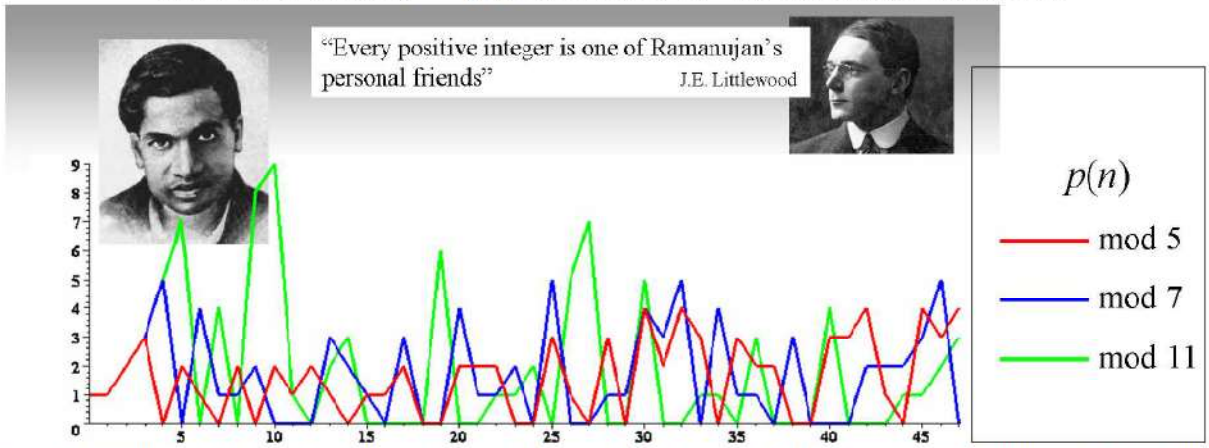
The Ramanujan Partition Congruences *Let n be a non-negative integer and let p(n) denote the number of partitions of n (that is, the number of ways to write n as a sum of positive integers). Then p(n) satisfies the congruence relations:*

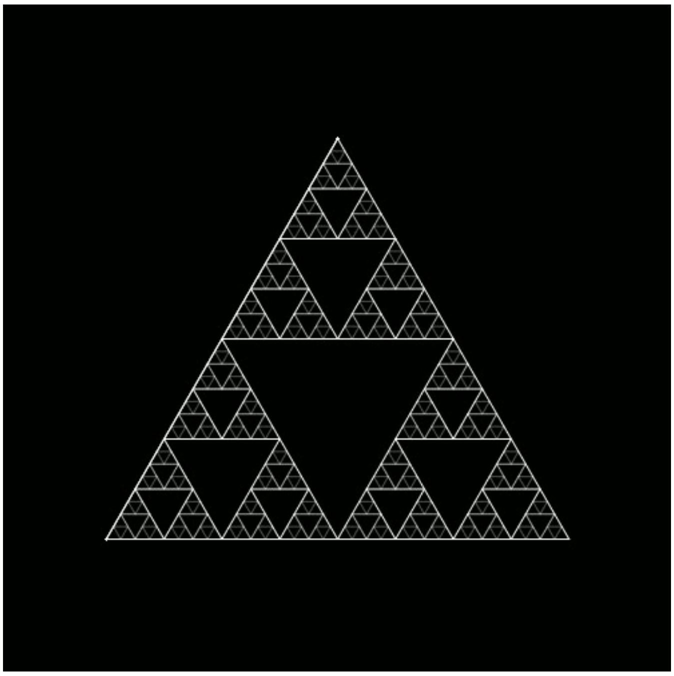
$$p(5t+4) \equiv 0 \pmod{5}, \qquad p(7t+5) \equiv 0 \pmod{7}, \quad \textit{and} \quad p(11t+6) \equiv 0 \pmod{11}.$$



Ramanujan's congruences tell us that, in the set of values of n for which $p(n) \bmod q = 0$, when q is 5, 7 or 11, there is an infinite arithmetic progression of common difference q. Thus we see that, in the above plot, the three graphs touch the horizontal axis at intervals which appear quite irregular but are certainly constrained by this arithmetic progression property. The property extends to all primes $q \geq 5$, a deep result published in 2000 by Ken Ono, but the common differences will not generally be q: the set of values of n for which $p(n) \bmod 31 = 0$, for instance, contains an infinite arithmetic progression whose common difference is not 31 but 31×107^4, and which starts at $n = 30064597$. For $q = 3$, the situation is very different—it is not even known if the values of n for which $p(n) \bmod 3 = 0$ form an infinite set!

Ramanujan published proofs of the congruences for 5 and 7 in 1919. His proof for mod 11 remained unpublished at the time of his death in 1920 and was written up by G.H. Hardy.

https://www.theoremoftheday.org/NumberTheory/Ramanujan/TotDRamanujan.pdf



https://giphy.com/gifs/loop-oc-sierpinsky-EtFMAF8nmOmly

From:

Partitions: At the Interface of *q*-Series and Modular Forms
GEORGE E. ANDREWS
The Pennsylvania State University, University Park, Pennsylvania 16802
In memory of Robert A. Rankin - *Received February 10, 2003; Accepted February 20, 2003*

We have that:

In this new notation we find [19, p. xxvii, Eq. (6.7)]

$$p(n,4) = \frac{1}{24}\binom{n+6}{3} + \left(\frac{1}{9} - \frac{1}{16}(2,3)cr2_n\right)(n+5) + \frac{1}{9}(1,0,-1)cr3_n + \frac{1}{8}(1,0,-1,0)cr4_n. \quad (3.7)$$

In this section, we shall make the simple observation that periodic sequences may also be represented by the greatest integer function. From that knowledge it is easy to derive

formulas such as

$$p(n,4) - \left\{(n+5)\left(n^2+n+22+18\left\lfloor\frac{n}{2}\right\rfloor\right)\Big/144\right\}, \quad (3.8)$$

and

$$p(n,5) = \left\{(n+8)\left(n^3+n+22n^2+44n+248+180\left\lfloor\frac{n}{2}\right\rfloor\right)\Big/2880\right\}, \quad (3.9)$$

Setting n = 2, we obtain:

[((((2+5)(((4+2+22+18)/144)))))]

Input:

$$(2+5)\left(\frac{1}{144}(4+2+22+18)\right)$$

Exact result:

$$\frac{161}{72}$$

Decimal approximation:

2.236111111111111111111111111111111111111111111111111111111...

2.23611111…

[((((2+8)(((8+2+22*4+44*2+248+180)/2880)))))]

Input:

$$(2+8)\times\frac{8+2+22\times4+44\times2+248+180}{2880}$$

Exact result:

$$\frac{307}{144}$$

Decimal approximation:

2.131944444444444444444444444444444444444444444444444444444...

2.13194444….

$$p(n,6)=\left\{(n+11)\left((6n^4+249n^3+2071n^2-4931n+40621)/518400\right.\right.$$
$$\left.\left.+\left\lfloor\frac{n}{2}\right\rfloor(n+10)/192+\left(\left\lfloor\frac{n+1}{3}\right\rfloor+2\left\lfloor\frac{n}{3}\right\rfloor\right)\Big/54\right)\right\},$$

[(2+11)((6*16+249*8+2071*4-4931*2+40621)/518400+(2+10)/192+(1+4/3)/54]

Input:

$$(2+11)\left(\frac{6\times16+249\times8+2071\times4-4931\times2+40621}{518400}+\frac{2+10}{192}+\frac{1}{54}\left(1+\frac{4}{3}\right)\right)$$

Exact result:

$$\frac{46189}{19200}$$

Decimal approximation:

2.405677083333333333333333333333333333333333333333333333333...

2.405677083333….

$$p(n,7) = \left\{(n+14)\left((n^5+70n^4+1785n^3-15365n^2+9702n+277032\Big/3628800 + \left\lfloor\frac{n}{2}\right\rfloor(n+14)/384 + \left\lfloor\frac{n}{3}\right\rfloor\Big/54\right)\right\}, \tag{3.11}$$

[(2+14)((32+70*16+1785*8-15365*4+9702*2+277032/3628800+(2+14)/384+(2/3)/54))]

Input:

$$(2+14)\left(\frac{32+70\times16+1785\times8-15365\times4+9702\times2+277032}{3628800}+\frac{2+14}{384}+\frac{\frac{2}{3}}{54}\right)$$

Exact result:

$$\frac{55801}{28350}$$

Decimal approximation:

1.968289241622574955908289241622574955908289241622574955908...

1.968289241622…

$$p(n,8) = \left\{(n+18)\left((n^6+108n^5-4503n^4+79911n^3+522148n^2-202687n + 9441216)/203212800 + \left\lfloor\frac{n}{2}\right\rfloor(n^2+36+231)\Big/9216 + \left(\left\lfloor\frac{n+1}{3}\right\rfloor+2\left\lfloor\frac{n}{3}\right\rfloor\right)\Big/162 + \left\lfloor\frac{n}{4}\right\rfloor\Big/64\right)\right\}, \tag{3.12}$$

((2+18)((64+108*32+4503*16+79911*8+522148*4-202687*2+9441216)/203212800+(4+36+231)/9216+(1+4/3)/162+(1/2)/64)))

Input:

$$(2+18)\left(\frac{64+108\times 32+4503\times 16+79\,911\times 8+522\,148\times 4-202\,687\times 2+9\,441\,216}{203\,212\,800}+\frac{4+36+231}{9216}+\frac{1}{162}\left(1+\frac{4}{3}\right)+\frac{\frac{1}{2}}{64}\right)$$

Exact result:

$$\frac{1\,674\,703}{762\,048}$$

Decimal approximation:

2.197634532207944906357604770303183001595700008398421096833...

2.1976345322…

$$p(n,9)=\Big\{(n+22)\Big((n^7+158n^6+10034n^5+327352n^4+5419144n^3-32063602n^2+5172096n+564401888)/14631321600+\left\lfloor\frac{n}{2}\right\rfloor(2n^2+91n+728)\Big/36864+\left((n+20)\left\lfloor\frac{n+1}{3}\right\rfloor+2(n+23)\left\lfloor\frac{n}{3}\right\rfloor\right)\Big/2916+\left(\left\lfloor\frac{n}{4}\right\rfloor+\left\lfloor\frac{n+2}{4}\right\rfloor\right)\Big/256\Big)\Big\}. \quad (3.13)$$

((2+22)((128+158*64+10034*32+327352*16+5419144*8-32063602*4+5172096*2+564401888)/14631321600+(8+182+728)/36864+(22+2*25*2/3)/2916+(1/2+1)/256)))

Input:

$$(2+22)\left(\frac{1}{14\,631\,321\,600}(128+158\times 64+10\,034\times 32+327\,352\times 16+5\,419\,144\times 8-32\,063\,602\times 4+5\,172\,096\times 2+564\,401\,888)+\frac{8+182+728}{36\,864}+\frac{22+2\times 25\times\frac{2}{3}}{2916}+\frac{1}{256}\left(\frac{1}{2}+1\right)\right)$$

Exact result:

$$\frac{229\,338\,547}{114\,307\,200}$$

Decimal approximation:

2.006335095252092606589961087315584670082024579379076733574...

2.00633509525…

(2.13194444444+2.236111111+2.40567708333+1.96828924162257495590 8+2.0063350952520926+2.1976345322079449063 5)/6

Input interpretation:

$$\frac{1}{6}(2.13194444444+2.236111111+2.40567708333+1.96828924162257495590 8+2.0063350952520926+2.1976345322079449063 5)$$

Result:

2.15766525130876874370966666666666666666666666666666666...

2.1576652513….

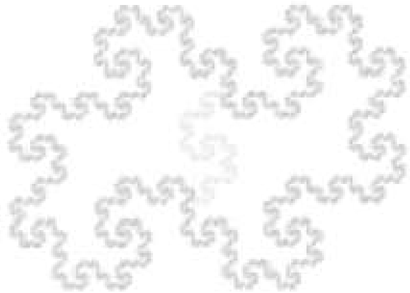
We note that:

0.6309 + 1.5236 = 2.1545 where:

$$\log_2\left(\frac{1+\sqrt[3]{73-6\sqrt{87}}+\sqrt[3]{73+6\sqrt{87}}}{3}\right)$$

= 1.5236

Boundary of the twindragon curve



$$\log_3(2)$$

= 0.6309

Cantor set

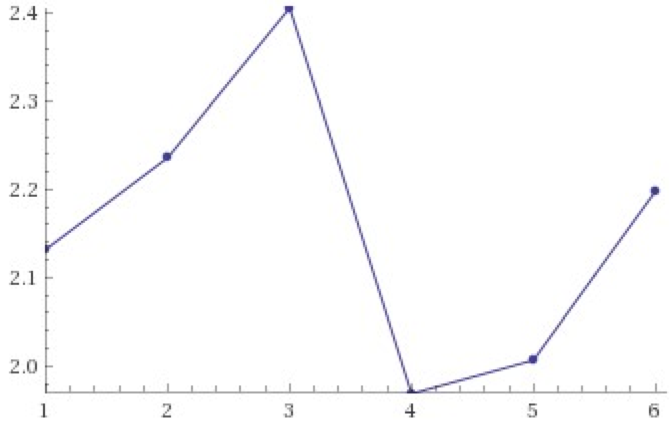
With regard the plot, we have:

plot(2.13194444444, 2.236111111, 2.40567708333, 1.9682892416225749559O8, 2.0063350952520926, 2.19763453220794490635)

Input interpretation:

plot	{2.13194444444, 2.236111111, 2.40567708333, 1.968289241622574955908, 2.0063350952520926, 2.19763453220794490635}

Plot:



Now, we have that:

survey article [5]. Ramanujan focuses upon one mock theta function in particular:

$$f(q) = 1 + \sum_{n=1}^{\infty} \frac{q^{n^2}}{(1+q)^2(1+q^2)^2 \ldots (1+q^n)^2}. \tag{5.1}$$

He asserts that: "The coefficient of q^n in $f(q)$ is

$$\frac{(-1)^{n-1} e^{\pi\left(\frac{n}{6}-\frac{1}{144}\right)^{\frac{1}{2}}}}{2\left(n-\frac{1}{24}\right)^{\frac{1}{2}}} + O\left(\frac{e^{\frac{\pi}{2}\left(\frac{n}{6}-\frac{1}{144}\right)^{\frac{1}{2}}}}{\left(n-\frac{1}{24}\right)^{\frac{1}{2}}}\right). \tag{5.2}$$

From

$$\frac{(-1)^{n-1} e^{\pi\left(\frac{n}{6}-\frac{1}{144}\right)^{\frac{1}{2}}}}{2\left(n-\frac{1}{24}\right)^{\frac{1}{2}}} + O\left(\frac{e^{\frac{\pi}{2}\left(\frac{n}{6}-\frac{1}{144}\right)^{\frac{1}{2}}}}{\left(n-\frac{1}{24}\right)^{\frac{1}{2}}}\right).$$

We obtain, for n = 1

(-1)^0 exp(Pi(1/6-1/144)^0.5) / ((2(1-1/24)^0.5)) + O(exp(Pi/2(1/6-1/144)^0.5)) / ((1-1/24)^0.5)

exp(Pi(1/6-1/144)^0.5) / ((2(1-1/24)^0.5))

Input:

$$\frac{\exp\left(\pi\sqrt{\frac{1}{6}-\frac{1}{144}}\right)}{2\sqrt{1-\frac{1}{24}}}$$

Exact result:

$$\sqrt{\frac{6}{23}}\, e^{\left(\sqrt{23}\,\pi\right)/12}$$

Decimal approximation:

1.792620262767653013982879880946763273881653208659354197800...

1.7926202….

Property:

$\sqrt{\frac{6}{23}}\, e^{\left(\sqrt{23}\,\pi\right)/12}$ is a transcendental number

O(((exp(Pi/2(1/6-1/144)^0.5)) / ((1-1/24)^0.5)))

Input:

$$O\left(\frac{\exp\left(\frac{\pi}{2}\sqrt{\frac{1}{6}-\frac{1}{144}}\right)}{\sqrt{1-\frac{1}{24}}}\right)$$

Exact result:

$$O\left(2\sqrt{\frac{6}{23}}\, e^{\left(\sqrt{23}\,\pi\right)/24}\right)$$

Input:

$$\frac{\exp\left(\frac{\pi}{2}\sqrt{\frac{1}{6}-\frac{1}{144}}\right)}{\sqrt{1-\frac{1}{24}}}$$

Exact result:

$$2\sqrt{\frac{6}{23}}\, e^{\left(\sqrt{23}\,\pi\right)/24}$$

Decimal approximation:

1.913727068848488814863080569622122473903875251594680711367...

1.9137270688….

Property:

$2\sqrt{\frac{6}{23}}\, e^{\left(\sqrt{23}\,\pi\right)/24}$ is a transcendental number

The sum is equal to

3.706347331616141828845960450568885747785528460254034909167 =

Coefficient of q^n in $f(q)$ of Ramanujan mock theta function

Indeed:

exp(Pi(1/6-1/144)^0.5) / ((2(1-1/24)^0.5)) + (exp(Pi/2(1/6-1/144)^0.5)) / ((1-1/24)^0.5)

Input:

$$\frac{\exp\left(\pi\sqrt{\frac{1}{6}-\frac{1}{144}}\right)}{2\sqrt{1-\frac{1}{24}}}+\frac{\exp\left(\frac{\pi}{2}\sqrt{\frac{1}{6}-\frac{1}{144}}\right)}{\sqrt{1-\frac{1}{24}}}$$

Exact result:

$$2\sqrt{\frac{6}{23}}\, e^{\left(\sqrt{23}\,\pi\right)/24} + \sqrt{\frac{6}{23}}\, e^{\left(\sqrt{23}\,\pi\right)/12}$$

Decimal approximation:

3.706347331616141828845960450568885747785528460254034909167...

3.706347331616141….. = Coefficient of q^n in $f(q)$ of Ramanujan mock theta function

Property:

$2\sqrt{\frac{6}{23}}\, e^{\left(\sqrt{23}\,\pi\right)/24} + \sqrt{\frac{6}{23}}\, e^{\left(\sqrt{23}\,\pi\right)/12}$ is a transcendental number

Alternate forms:

$$\sqrt{\frac{6}{23}}\, e^{\left(\sqrt{23}\,\pi\right)/24}\left(2 + e^{\left(\sqrt{23}\,\pi\right)/24}\right)$$

$$\frac{1}{23}\, e^{\left(\sqrt{23}\,\pi\right)/24}\left(2 + e^{\left(\sqrt{23}\,\pi\right)/24}\right)\sqrt{138}$$

From which:

1+1/(((exp(Pi(1/6-1/144)^0.5) / ((2(1-1/24)^0.5)) + (exp(Pi/2(1/6-1/144)^0.5)) / ((1-1/24)^0.5))))^1/3

Input:

$$1 + \frac{1}{\sqrt[3]{\frac{\exp\left(\pi\sqrt{\frac{1}{6}-\frac{1}{144}}\right)}{2\sqrt{1-\frac{1}{24}}} + \frac{\exp\left(\frac{\pi}{2}\sqrt{\frac{1}{6}-\frac{1}{144}}\right)}{\sqrt{1-\frac{1}{24}}}}}$$

Exact result:

$$1 + \frac{1}{\sqrt[3]{2\sqrt{\frac{6}{23}}\, e^{\left(\sqrt{23}\,\pi\right)/24} + \sqrt{\frac{6}{23}}\, e^{\left(\sqrt{23}\,\pi\right)/12}}}$$

Decimal approximation:

1.646176701005816630293113777794318899341575113022037986495...

1.646176701….

Alternate forms:

$$1+\frac{\sqrt[6]{\frac{23}{6}}\, e^{-(\sqrt{23}\,\pi)/72}}{\sqrt[3]{2+e^{(\sqrt{23}\,\pi)/24}}}$$

$$1+\frac{\sqrt[6]{\frac{23}{6}}}{\sqrt[3]{2\,e^{(\sqrt{23}\,\pi)/24}+e^{(\sqrt{23}\,\pi)/12}}}$$

$$\frac{e^{-(\sqrt{23}\,\pi)/72}\left(\sqrt[6]{23}+\sqrt[6]{6}\, e^{(\sqrt{23}\,\pi)/72}\sqrt[3]{2+e^{(\sqrt{23}\,\pi)/24}}\right)}{\sqrt[6]{6}\,\sqrt[3]{2+e^{(\sqrt{23}\,\pi)/24}}}$$

((1+1/(((exp(Pi(1/6-1/144)^0.5) / ((2(1-1/24)^0.5)) + (exp(Pi/2(1/6-1/144)^0.5)) / ((1-1/24)^0.5))))^1/3))-(29-1)1/10^3

Input:

$$\left(1+\frac{1}{\sqrt[3]{\frac{\exp\left(\pi\sqrt{\frac{1}{6}-\frac{1}{144}}\right)}{2\sqrt{1-\frac{1}{24}}}+\frac{\exp\left(\frac{\pi}{2}\sqrt{\frac{1}{6}-\frac{1}{144}}\right)}{\sqrt{1-\frac{1}{24}}}}}\right)-(29-1)\times\frac{1}{10^3}$$

Exact result:

$$\frac{243}{250}+\frac{1}{\sqrt[3]{2\sqrt{\frac{6}{23}}\, e^{(\sqrt{23}\,\pi)/24}+\sqrt{\frac{6}{23}}\, e^{(\sqrt{23}\,\pi)/12}}}$$

Decimal approximation:

1.618176701005816630293113777794318899341575113022037986495...

1.618176701….

Alternate forms:

$$\frac{243}{250}+\frac{\sqrt[6]{\frac{23}{6}}\, e^{-\left(\sqrt{23}\,\pi\right)/72}}{\sqrt[3]{2+e^{\left(\sqrt{23}\,\pi\right)/24}}}$$

$$\frac{243}{250}+\frac{\sqrt[6]{\frac{23}{6}}}{\sqrt[3]{2\,e^{\left(\sqrt{23}\,\pi\right)/24}+e^{\left(\sqrt{23}\,\pi\right)/12}}}$$

$$\frac{e^{-\left(\sqrt{23}\,\pi\right)/72}\left(250\sqrt[6]{23}+243\sqrt[6]{6}\,e^{\left(\sqrt{23}\,\pi\right)/72}\sqrt[3]{2+e^{\left(\sqrt{23}\,\pi\right)/24}}\right)}{250\sqrt[6]{6}\sqrt[3]{2+e^{\left(\sqrt{23}\,\pi\right)/24}}}$$

(((exp(Pi(1/6-1/144)^0.5) / ((2(1-1/24)^0.5)) + (exp(Pi/2(1/6-1/144)^0.5)) / ((1-1/24)^0.5))))*(47-1)1/10^2+(29-2)1/10^3

Input:

$$\left(\frac{\exp\left(\pi\sqrt{\frac{1}{6}-\frac{1}{144}}\right)}{2\sqrt{1-\frac{1}{24}}}+\frac{\exp\left(\frac{\pi}{2}\sqrt{\frac{1}{6}-\frac{1}{144}}\right)}{\sqrt{1-\frac{1}{24}}}\right)(47-1)\times\frac{1}{10^2}+(29-2)\times\frac{1}{10^3}$$

Exact result:

$$\frac{27}{1000}+\frac{23}{50}\left(2\sqrt{\frac{6}{23}}\,e^{\left(\sqrt{23}\,\pi\right)/24}+\sqrt{\frac{6}{23}}\,e^{\left(\sqrt{23}\,\pi\right)/12}\right)$$

Decimal approximation:

1.731919772543425241269141807261687443981343091716856058216...

1.73191977….

Alternate forms:

$$\frac{27+20\sqrt{138}\,e^{(\sqrt{23}\,\pi)/24}\left(2+e^{(\sqrt{23}\,\pi)/24}\right)}{1000}$$

$$\frac{1}{50}\,e^{(\sqrt{23}\,\pi)/24}\left(2+e^{(\sqrt{23}\,\pi)/24}\right)\sqrt{138}+\frac{27}{1000}$$

$$\frac{27+40\sqrt{138}\,e^{(\sqrt{23}\,\pi)/24}+20\sqrt{138}\,e^{(\sqrt{23}\,\pi)/12}}{1000}$$

(((exp(Pi(1/6-1/144)^0.5) / ((2(1-1/24)^0.5)) + (exp(Pi/2(1/6-1/144)^0.5)) / ((1-1/24)^0.5))))*(47)1/10^2-(18+1)/10^3

Input:

$$\left(\frac{\exp\left(\pi\sqrt{\frac{1}{6}-\frac{1}{144}}\right)}{2\sqrt{1-\frac{1}{24}}}+\frac{\exp\left(\frac{\pi}{2}\sqrt{\frac{1}{6}-\frac{1}{144}}\right)}{\sqrt{1-\frac{1}{24}}}\right)\times 47\times\frac{1}{10^2}-\frac{18+1}{10^3}$$

Exact result:

$$\frac{47}{100}\left(2\sqrt{\frac{6}{23}}\,e^{(\sqrt{23}\,\pi)/24}+\sqrt{\frac{6}{23}}\,e^{(\sqrt{23}\,\pi)/12}\right)-\frac{19}{1000}$$

Decimal approximation:

1.722983245859586659557601411767376301459198376319396407308...

1.72298…. result practically equal to the Hausdorff dimension of Pinwheel fractal 1.7227

Alternate forms:

$$\frac{47\,e^{(\sqrt{23}\,\pi)/24}\left(2+e^{(\sqrt{23}\,\pi)/24}\right)\sqrt{138}}{2300}-\frac{19}{1000}$$

$$\frac{-437+940\sqrt{138}\,e^{(\sqrt{23}\,\pi)/24}+470\sqrt{138}\,e^{(\sqrt{23}\,\pi)/12}}{23000}$$

$$\frac{-19+940\sqrt{\frac{6}{23}}\,e^{(\sqrt{23}\,\pi)/24}+470\sqrt{\frac{6}{23}}\,e^{(\sqrt{23}\,\pi)/12}}{1000}$$

For n = 8, we obtain:

(-1)^7 exp(Pi(8/6-1/144)^0.5) / ((2(8-1/24)^0.5)) + (exp(Pi/2(8/6-1/144)^0.5)) / ((8-1/24)^0.5)

Input:

$$(-1)^7 \times \frac{\exp\left(\pi \sqrt{\frac{8}{6} - \frac{1}{144}}\right)}{2\sqrt{8 - \frac{1}{24}}} + \frac{\exp\left(\frac{\pi}{2} \sqrt{\frac{8}{6} - \frac{1}{144}}\right)}{\sqrt{8 - \frac{1}{24}}}$$

Exact result:

$$2\sqrt{\frac{6}{191}}\, e^{\left(\sqrt{191}\,\pi\right)/24} - \sqrt{\frac{6}{191}}\, e^{\left(\sqrt{191}\,\pi\right)/12}$$

Decimal approximation:

−4.4413638249772364733104604114579377121275488012288210 5699...

-4.44136382497…..

Property:

$$2\sqrt{\frac{6}{191}}\, e^{\left(\sqrt{191}\,\pi\right)/24} - \sqrt{\frac{6}{191}}\, e^{\left(\sqrt{191}\,\pi\right)/12}$$ is a transcendental number

Alternate forms:

$$-\sqrt{\frac{6}{191}}\, e^{\left(\sqrt{191}\,\pi\right)/24}\left(e^{\left(\sqrt{191}\,\pi\right)/24} - 2\right)$$

$$-\frac{1}{191}\, e^{\left(\sqrt{191}\,\pi\right)/24}\left(e^{\left(\sqrt{191}\,\pi\right)/24} - 2\right)\sqrt{1146}$$

(-(-exp(Pi(8/6-1/144)^0.5) / ((2(8-1/24)^0.5)) + (exp(Pi/2(8/6-1/144)^0.5)) / ((8-1/24)^0.5)))^1/3

Input:

$$\sqrt[3]{-\left(-\frac{\exp\left(\pi\sqrt{\frac{8}{6}-\frac{1}{144}}\right)}{2\sqrt{8-\frac{1}{24}}}+\frac{\exp\left(\frac{\pi}{2}\sqrt{\frac{8}{6}-\frac{1}{144}}\right)}{\sqrt{8-\frac{1}{24}}}\right)}$$

Exact result:

$$\sqrt[3]{\sqrt{\frac{6}{191}}\, e^{\left(\sqrt{191}\,\pi\right)/12}-2\sqrt{\frac{6}{191}}\, e^{\left(\sqrt{191}\,\pi\right)/24}}$$

Decimal approximation:

1.643761422038521934170446004657724700387442842848618864950...

1.643761422….

Alternate forms:

$$\sqrt[6]{\frac{6}{191}}\, e^{\left(\sqrt{191}\,\pi\right)/72}\sqrt[3]{e^{\left(\sqrt{191}\,\pi\right)/24}-2}$$

$$\sqrt[6]{\frac{6}{191}}\sqrt[3]{e^{\left(\sqrt{191}\,\pi\right)/12}-2\, e^{\left(\sqrt{191}\,\pi\right)/24}}$$

All 3rd roots of sqrt(6/191) e^((sqrt(191) π)/12) - 2 sqrt(6/191) e^((sqrt(191) π)/24):

$$\sqrt[3]{\sqrt{\frac{6}{191}}\, e^{\left(\sqrt{191}\,\pi\right)/12}-2\sqrt{\frac{6}{191}}\, e^{\left(\sqrt{191}\,\pi\right)/24}}\; e^0 \approx 1.6438 \text{ (real, principal root)}$$

$$\sqrt[3]{\sqrt{\frac{6}{191}}\, e^{\left(\sqrt{191}\,\pi\right)/12}-2\sqrt{\frac{6}{191}}\, e^{\left(\sqrt{191}\,\pi\right)/24}}\; e^{(2 i \pi)/3} \approx -0.8219+1.424\, i$$

$$\sqrt[3]{\sqrt{\frac{6}{191}}\, e^{\left(\sqrt{191}\,\pi\right)/12}-2\sqrt{\frac{6}{191}}\, e^{\left(\sqrt{191}\,\pi\right)/24}}\; e^{-(2 i \pi)/3} \approx -0.8219-1.424\, i$$

Integral representation:

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

(-(-exp(Pi(8/6-1/144)^0.5) / ((2(8-1/24)^0.5)) + (exp(Pi/2(8/6-1/144)^0.5)) / ((8-1/24)^0.5)))^1/3 - (21+5)1/10^3

Input:

$$\sqrt[3]{-\left(-\frac{\exp\left(\pi\sqrt{\frac{8}{6}-\frac{1}{144}}\right)}{2\sqrt{8-\frac{1}{24}}}+\frac{\exp\left(\frac{\pi}{2}\sqrt{\frac{8}{6}-\frac{1}{144}}\right)}{\sqrt{8-\frac{1}{24}}}\right)} - (21+5)\times\frac{1}{10^3}$$

Exact result:

$$\sqrt[3]{\sqrt{\frac{6}{191}}\,e^{\left(\sqrt{191}\,\pi\right)/12} - 2\sqrt{\frac{6}{191}}\,e^{\left(\sqrt{191}\,\pi\right)/24}} - \frac{13}{500}$$

Decimal approximation:

1.617761422038521934170446004657724700387442842848618864950...

1.617761422….

Alternate forms:

$$\sqrt[6]{\frac{6}{191}}\,e^{\left(\sqrt{191}\,\pi\right)/72}\sqrt[3]{e^{\left(\sqrt{191}\,\pi\right)/24}-2} - \frac{13}{500}$$

$$\frac{1}{500}\left(500\sqrt[6]{\frac{6}{191}}\sqrt[3]{e^{\left(\sqrt{191}\,\pi\right)/12}-2\,e^{\left(\sqrt{191}\,\pi\right)/24}} - 13\right)$$

$$\frac{500\sqrt[6]{6}\;191^{5/6}\,e^{\left(\sqrt{191}\,\pi\right)/72}\sqrt[3]{e^{\left(\sqrt{191}\,\pi\right)/24}-2} - 2483}{95500}$$

(-(-exp(Pi(8/6-1/144)^0.5) / ((2(8-1/24)^0.5)) + (exp(Pi/2(8/6-1/144)^0.5)) / ((8-1/24)^0.5)))^1/3+8/10^2+89/10^4

Input:

$$\sqrt[3]{-\left(-\frac{\exp\left(\pi\sqrt{\frac{8}{6}-\frac{1}{144}}\right)}{2\sqrt{8-\frac{1}{24}}}+\frac{\exp\left(\frac{\pi}{2}\sqrt{\frac{8}{6}-\frac{1}{144}}\right)}{\sqrt{8-\frac{1}{24}}}\right)}+\frac{8}{10^2}+\frac{89}{10^4}$$

Exact result:

$$\frac{889}{10000}+\sqrt[3]{\sqrt{\frac{6}{191}}\,e^{\left(\sqrt{191}\,\pi\right)/12}-2\sqrt{\frac{6}{191}}\,e^{\left(\sqrt{191}\,\pi\right)/24}}$$

Decimal approximation:

1.732661422038521934170446004657724700387442842848618864950...

1.732661422….

Alternate forms:

$$\frac{889}{10000}+\sqrt[6]{\frac{6}{191}}\,e^{\left(\sqrt{191}\,\pi\right)/72}\sqrt[3]{e^{\left(\sqrt{191}\,\pi\right)/24}-2}$$

$$\frac{889+10000\sqrt[6]{\frac{6}{191}}\sqrt[3]{e^{\left(\sqrt{191}\,\pi\right)/12}-2\,e^{\left(\sqrt{191}\,\pi\right)/24}}}{10000}$$

$$\frac{169799+10000\sqrt[6]{6}\;191^{5/6}\,e^{\left(\sqrt{191}\,\pi\right)/72}\sqrt[3]{e^{\left(\sqrt{191}\,\pi\right)/24}-2}}{1910000}$$

(-(-exp(Pi(8/6-1/144)^0.5) / ((2(8-1/24)^0.5)) + (exp(Pi/2(8/6-1/144)^0.5)) / ((8-1/24)^0.5)))^1/3+8/10^2-10^-3

Input:

$$\sqrt[3]{-\left(-\frac{\exp\left(\pi\sqrt{\frac{8}{6}-\frac{1}{144}}\right)}{2\sqrt{8-\frac{1}{24}}}+\frac{\exp\left(\frac{\pi}{2}\sqrt{\frac{8}{6}-\frac{1}{144}}\right)}{\sqrt{8-\frac{1}{24}}}\right)}+\frac{8}{10^2}-\frac{1}{10^3}$$

Exact result:

$$\frac{79}{1000}+\sqrt[3]{\sqrt{\frac{6}{191}}\, e^{\left(\sqrt{191}\,\pi\right)/12}-2\sqrt{\frac{6}{191}}\, e^{\left(\sqrt{191}\,\pi\right)/24}}$$

Decimal approximation:

1.722761422038521934170446004657724700387442842848618864950...

1.72276…. result practically equal to the Hausdorff dimension of Pinwheel fractal 1.7227

Alternate forms:

$$\frac{79}{1000}+\sqrt[6]{\frac{6}{191}}\, e^{\left(\sqrt{191}\,\pi\right)/72}\sqrt[3]{e^{\left(\sqrt{191}\,\pi\right)/24}-2}$$

$$\frac{79+1000\sqrt[6]{\frac{6}{191}}\sqrt[3]{e^{\left(\sqrt{191}\,\pi\right)/12}-2\, e^{\left(\sqrt{191}\,\pi\right)/24}}}{1000}$$

$$\frac{15\,089+1000\sqrt[6]{6}\;191^{5/6}\, e^{\left(\sqrt{191}\,\pi\right)/72}\sqrt[3]{e^{\left(\sqrt{191}\,\pi\right)/24}-2}}{191\,000}$$

For n = 24, we obtain:

(-1)^23 exp(Pi(24/6-1/144)^0.5) / ((2(24-1/24)^0.5)) + (exp(Pi/2(24/6-1/144)^0.5)) / ((24-1/24)^0.5)

Input:

$$(-1)^{23}\times\frac{\exp\left(\pi\sqrt{\frac{24}{6}-\frac{1}{144}}\right)}{2\sqrt{24-\frac{1}{24}}}+\frac{\exp\left(\frac{\pi}{2}\sqrt{\frac{24}{6}-\frac{1}{144}}\right)}{\sqrt{24-\frac{1}{24}}}$$

Exact result:

$$\frac{2}{5}\sqrt{\frac{6}{23}}\, e^{\left(5\sqrt{23}\,\pi\right)/24}-\frac{1}{5}\sqrt{\frac{6}{23}}\, e^{\left(5\sqrt{23}\,\pi\right)/12}$$

Decimal approximation:

-49.688429419226985108406283578252397513800639923422321 5016...

-49.688429419226985….

Property:

$\frac{2}{5}\sqrt{\frac{6}{23}}\, e^{\left(5\sqrt{23}\,\pi\right)/24} - \frac{1}{5}\sqrt{\frac{6}{23}}\, e^{\left(5\sqrt{23}\,\pi\right)/12}$ is a transcendental number

Alternate forms:

$$-\frac{1}{5}\sqrt{\frac{6}{23}}\, e^{\left(5\sqrt{23}\,\pi\right)/24}\left(e^{\left(5\sqrt{23}\,\pi\right)/24} - 2\right)$$

$$-\frac{1}{115}\, e^{\left(5\sqrt{23}\,\pi\right)/24}\left(e^{\left(5\sqrt{23}\,\pi\right)/24} - 2\right)\sqrt{138}$$

(-((-1) exp(Pi(24/6-1/144)^0.5) / ((2(24-1/24)^0.5)) + (exp(Pi/2(24/6-1/144)^0.5)) / ((24-1/24)^0.5)))^1/8+13/10^3

Input:

$$\sqrt[8]{-\left(-\frac{\exp\left(\pi\sqrt{\frac{24}{6}-\frac{1}{144}}\right)}{2\sqrt{24-\frac{1}{24}}} + \frac{\exp\left(\frac{\pi}{2}\sqrt{\frac{24}{6}-\frac{1}{144}}\right)}{\sqrt{24-\frac{1}{24}}}\right)} + \frac{13}{10^3}$$

Exact result:

$$\frac{13}{1000} + \sqrt[8]{\frac{1}{5}\sqrt{\frac{6}{23}}\, e^{\left(5\sqrt{23}\,\pi\right)/12} - \frac{2}{5}\sqrt{\frac{6}{23}}\, e^{\left(5\sqrt{23}\,\pi\right)/24}}$$

Decimal approximation:

1.642415745452410346359573922372380420352256851339186702279...

1.64241574545….

Alternate forms:

$$\frac{13}{1000} + \frac{\sqrt[16]{\frac{6}{23}}\, e^{\left(5\sqrt{23}\,\pi\right)/192}\sqrt[8]{e^{\left(5\sqrt{23}\,\pi\right)/24} - 2}}{\sqrt[8]{5}}$$

$$\frac{13}{1000} + \frac{\sqrt[16]{\frac{6}{23}}\sqrt[8]{e^{\left(5\sqrt{23}\,\pi\right)/12} - 2\, e^{\left(5\sqrt{23}\,\pi\right)/24}}}{\sqrt[8]{5}}$$

$$\frac{13+200\sqrt[16]{\frac{6}{23}}\,5^{7/8}\sqrt[8]{e^{(5\sqrt{23}\,\pi)/12}-2\,e^{(5\sqrt{23}\,\pi)/24}}}{1000}$$

(-((-1) exp(Pi(24/6-1/144)^0.5) / ((2(24-1/24)^0.5)) + (exp(Pi/2(24/6-1/144)^0.5)) / ((24-1/24)^0.5)))^1/8-11/10^3

Input:

$$\sqrt[8]{-\left(-\frac{\exp\left(\pi\sqrt{\frac{24}{6}-\frac{1}{144}}\right)}{2\sqrt{24-\frac{1}{24}}}+\frac{\exp\left(\frac{\pi}{2}\sqrt{\frac{24}{6}-\frac{1}{144}}\right)}{\sqrt{24-\frac{1}{24}}}\right)}-\frac{11}{10^3}$$

Exact result:

$$\sqrt[8]{\frac{1}{5}\sqrt{\frac{6}{23}}\,e^{(5\sqrt{23}\,\pi)/12}-\frac{2}{5}\sqrt{\frac{6}{23}}\,e^{(5\sqrt{23}\,\pi)/24}}-\frac{11}{1000}$$

Decimal approximation:

1.618415745452410346359573922372380420352256851339186702279...

1.61841574545….

Alternate forms:

$$\frac{\sqrt[16]{\frac{6}{23}}\,e^{(5\sqrt{23}\,\pi)/192}\sqrt[8]{e^{(5\sqrt{23}\,\pi)/24}-2}}{\sqrt[8]{5}}-\frac{11}{1000}$$

$$\frac{\sqrt[16]{\frac{6}{23}}\sqrt[8]{e^{(5\sqrt{23}\,\pi)/12}-2\,e^{(5\sqrt{23}\,\pi)/24}}}{\sqrt[8]{5}}-\frac{11}{1000}$$

$$\frac{200\sqrt[16]{\frac{6}{23}}\,5^{7/8}\sqrt[8]{e^{(5\sqrt{23}\,\pi)/12}-2\,e^{(5\sqrt{23}\,\pi)/24}}-11}{1000}$$

(-((-1) exp(Pi(24/6-1/144)^0.5) / ((2(24-1/24)^0.5)) + (exp(Pi/2(24/6-1/144)^0.5)) / ((24-1/24)^0.5)))^1/7-(13+2)1/10^3

Input:

$$\sqrt[7]{-\left(-\frac{\exp\left(\pi\sqrt{\frac{24}{6}-\frac{1}{144}}\right)}{2\sqrt{24-\frac{1}{24}}}+\frac{\exp\left(\frac{\pi}{2}\sqrt{\frac{24}{6}-\frac{1}{144}}\right)}{\sqrt{24-\frac{1}{24}}}\right)}-(13+2)\times\frac{1}{10^3}$$

Exact result:

$$\sqrt[7]{\frac{1}{5}\sqrt{\frac{6}{23}}\,e^{(5\sqrt{23}\,\pi)/12}-\frac{2}{5}\sqrt{\frac{6}{23}}\,e^{(5\sqrt{23}\,\pi)/24}}-\frac{3}{200}$$

Decimal approximation:

1.732117771602666578815404148300146243976675777427400403703...

1.7321177716….

Alternate forms:

$$\frac{\sqrt[14]{\frac{6}{23}}\,e^{(5\sqrt{23}\,\pi)/168}\sqrt[7]{e^{(5\sqrt{23}\,\pi)/24}-2}}{\sqrt[7]{5}}-\frac{3}{200}$$

$$\frac{\sqrt[14]{\frac{6}{23}}\sqrt[7]{e^{(5\sqrt{23}\,\pi)/12}-2\,e^{(5\sqrt{23}\,\pi)/24}}}{\sqrt[7]{5}}-\frac{3}{200}$$

$$\frac{1}{200}\left(40\sqrt[14]{\frac{6}{23}}\,5^{6/7}\sqrt[7]{e^{(5\sqrt{23}\,\pi)/12}-2\,e^{(5\sqrt{23}\,\pi)/24}}-3\right)$$

(-((-1) exp(Pi(24/6-1/144)^0.5) / ((2(24-1/24)^0.5)) + (exp(Pi/2(24/6-1/144)^0.5)) / ((24-1/24)^0.5)))^1/7-(18+7)1/10^3

Input:

$$\sqrt[7]{-\left(-\frac{\exp\left(\pi\sqrt{\frac{24}{6}-\frac{1}{144}}\right)}{2\sqrt{24-\frac{1}{24}}}+\frac{\exp\left(\frac{\pi}{2}\sqrt{\frac{24}{6}-\frac{1}{144}}\right)}{\sqrt{24-\frac{1}{24}}}\right)}-(18+7)\times\frac{1}{10^3}$$

Exact result:

$$\sqrt[7]{\frac{1}{5}\sqrt{\frac{6}{23}}\,e^{\left(5\sqrt{23}\,\pi\right)/12}-\frac{2}{5}\sqrt{\frac{6}{23}}\,e^{\left(5\sqrt{23}\,\pi\right)/24}}-\frac{1}{40}$$

Decimal approximation:

1.722117771602666578815404148300146243976675777427400403703...

1.722117…. result practically equal to the Hausdorff dimension of Pinwheel fractal 1.7227

Alternate forms:

$$\frac{\sqrt[14]{\frac{6}{23}}\,e^{\left(5\sqrt{23}\,\pi\right)/168}\sqrt[7]{e^{\left(5\sqrt{23}\,\pi\right)/24}-2}}{\sqrt[7]{5}}-\frac{1}{40}$$

$$\frac{\sqrt[14]{\frac{6}{23}}\sqrt[7]{e^{\left(5\sqrt{23}\,\pi\right)/12}-2\,e^{\left(5\sqrt{23}\,\pi\right)/24}}}{\sqrt[7]{5}}-\frac{1}{40}$$

$$\frac{1}{40}\left(8\sqrt[14]{\frac{6}{23}}\,5^{6/7}\sqrt[7]{e^{\left(5\sqrt{23}\,\pi\right)/12}-2\,e^{\left(5\sqrt{23}\,\pi\right)/24}}-1\right)$$

For n = 64, we obtain:

- exp(Pi(64/6-1/144)^0.5) / ((2(64-1/24)^0.5)) + (exp(Pi/2(64/6-1/144)^0.5)) / ((64-1/24)^0.5)

Input:

$$-\frac{\exp\left(\pi\sqrt{\frac{64}{6}-\frac{1}{144}}\right)}{2\sqrt{64-\frac{1}{24}}}+\frac{\exp\left(\frac{\pi}{2}\sqrt{\frac{64}{6}-\frac{1}{144}}\right)}{\sqrt{64-\frac{1}{24}}}$$

Exact result:

$$2\sqrt{\frac{6}{1535}}\,e^{\left(\sqrt{1535}\,\pi\right)/24}-\sqrt{\frac{6}{1535}}\,e^{\left(\sqrt{1535}\,\pi\right)/12}$$

Decimal approximation:

-1759.656171211416387093076004439195198609023489447057470 18...

-1759.656171211416…..

Property:

$$2\sqrt{\frac{6}{1535}}\,e^{\left(\sqrt{1535}\,\pi\right)/24}-\sqrt{\frac{6}{1535}}\,e^{\left(\sqrt{1535}\,\pi\right)/12}$$ is a transcendental number

Alternate forms:

$$-\sqrt{\frac{6}{1535}}\,e^{\left(\sqrt{1535}\,\pi\right)/24}\left(e^{\left(\sqrt{1535}\,\pi\right)/24}-2\right)$$

$$-\frac{e^{\left(\sqrt{1535}\,\pi\right)/24}\left(e^{\left(\sqrt{1535}\,\pi\right)/24}-2\right)\sqrt{9210}}{1535}$$

[-(- exp(Pi(64/6-1/144)^0.5) / ((2(64-1/24)^0.5)) + (exp(Pi/2(64/6-1/144)^0.5)) / ((64-1/24)^0.5))]-29-3/2

Input:

$$-\left(-\frac{\exp\left(\pi\sqrt{\frac{64}{6}-\frac{1}{144}}\right)}{2\sqrt{64-\frac{1}{24}}}+\frac{\exp\left(\frac{\pi}{2}\sqrt{\frac{64}{6}-\frac{1}{144}}\right)}{\sqrt{64-\frac{1}{24}}}\right)-29-\frac{3}{2}$$

Exact result:

$$-\frac{61}{2}-2\sqrt{\frac{6}{1535}}\,e^{\left(\sqrt{1535}\,\pi\right)/24}+\sqrt{\frac{6}{1535}}\,e^{\left(\sqrt{1535}\,\pi\right)/12}$$

Decimal approximation:

1729.1561712114163870930760044391951986090234894470574701 89...

1729.156171211…

Alternate forms:

$$\frac{e^{\left(\sqrt{1535}\,\pi\right)/24}\left(e^{\left(\sqrt{1535}\,\pi\right)/24}-2\right)\sqrt{9210}}{1535}-\frac{61}{2}$$

$$\frac{-93635-4\sqrt{9210}\,e^{\left(\sqrt{1535}\,\pi\right)/24}+2\sqrt{9210}\,e^{\left(\sqrt{1535}\,\pi\right)/12}}{3070}$$

$$\frac{1}{2}\left(-61-4\sqrt{\frac{6}{1535}}\,e^{\left(\sqrt{1535}\,\pi\right)/24}+2\sqrt{\frac{6}{1535}}\,e^{\left(\sqrt{1535}\,\pi\right)/12}\right)$$

((([-(- exp(Pi(64/6-1/144)^0.5) / ((2(64-1/24)^0.5)) + (exp(Pi/2(64/6-1/144)^0.5)) / ((64-1/24)^0.5))]-29-3/2)))^1/15

Input:

$$\sqrt[15]{-\left(-\frac{\exp\left(\pi\sqrt{\frac{64}{6}-\frac{1}{144}}\right)}{2\sqrt{64-\frac{1}{24}}}+\frac{\exp\left(\frac{\pi}{2}\sqrt{\frac{64}{6}-\frac{1}{144}}\right)}{\sqrt{64-\frac{1}{24}}}\right)-29-\frac{3}{2}}$$

Exact result:

$$\sqrt[15]{-\frac{61}{2}-2\sqrt{\frac{6}{1535}}\,e^{\left(\sqrt{1535}\,\pi\right)/24}+\sqrt{\frac{6}{1535}}\,e^{\left(\sqrt{1535}\,\pi\right)/12}}$$

Decimal approximation:

1.6438251267936583201890713530131676311085823307478851 60189...

1.64382512679….

Alternate forms:

$$\frac{1}{\sqrt[15]{\frac{3070}{2\sqrt{9210}\,e^{\left(\sqrt{1535}\,\pi\right)/24}\left(e^{\left(\sqrt{1535}\,\pi\right)/24}-2\right)-93635}}}$$

$$\frac{1}{\sqrt[15]{\frac{3070}{-93635-4\sqrt{9210}\,e^{\left(\sqrt{1535}\,\pi\right)/24}+2\sqrt{9210}\,e^{\left(\sqrt{1535}\,\pi\right)/12}}}}$$

$$\frac{1}{\sqrt[15]{\frac{2}{-61-4\sqrt{\frac{6}{1535}}\,e^{\left(\sqrt{1535}\,\pi\right)/24}+2\sqrt{\frac{6}{1535}}\,e^{\left(\sqrt{1535}\,\pi\right)/12}}}}$$

All 15th roots of -61/2 - 2 sqrt(6/1535) e^((sqrt(1535) π)/24) + sqrt(6/1535) e^((sqrt(1535) π)/12):

$$\sqrt[15]{-\frac{61}{2}-2\sqrt{\frac{6}{1535}}\,e^{\left(\sqrt{1535}\,\pi\right)/24}+\sqrt{\frac{6}{1535}}\,e^{\left(\sqrt{1535}\,\pi\right)/12}}\;e^{0}\approx 1.6438$$

(real, principal root)

$$\sqrt[15]{-\frac{61}{2}-2\sqrt{\frac{6}{1535}}\,e^{\left(\sqrt{1535}\,\pi\right)/24}+\sqrt{\frac{6}{1535}}\,e^{\left(\sqrt{1535}\,\pi\right)/12}}\;e^{(2 i \pi)/15}\approx 1.5017+0.6686\,i$$

$$\sqrt[15]{-\frac{61}{2}-2\sqrt{\frac{6}{1535}}\,e^{\left(\sqrt{1535}\,\pi\right)/24}+\sqrt{\frac{6}{1535}}\,e^{\left(\sqrt{1535}\,\pi\right)/12}}\;e^{(4 i \pi)/15}\approx 1.0999+1.2216\,i$$

$$\sqrt[15]{-\frac{61}{2}-2\sqrt{\frac{6}{1535}}\,e^{\left(\sqrt{1535}\,\pi\right)/24}+\sqrt{\frac{6}{1535}}\,e^{\left(\sqrt{1535}\,\pi\right)/12}}\;e^{(2 i \pi)/5}\approx 0.5080+1.5634\,i$$

$$\sqrt[15]{-\frac{61}{2}-2\sqrt{\frac{6}{1535}}\,e^{\left(\sqrt{1535}\,\pi\right)/24}+\sqrt{\frac{6}{1535}}\,e^{\left(\sqrt{1535}\,\pi\right)/12}}\;e^{(8 i \pi)/15}$$
$$\approx -0.17183+1.6348\,i$$

Integral representation:

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

((([-(- exp(Pi(64/6-1/144)^0.5) / ((2(64-1/24)^0.5)) + (exp(Pi/2(64/6-1/144)^0.5)) / ((64-1/24)^0.5))]-29-3/2)))^1/15-(21+5)1/10^3

Input:

$$\sqrt[15]{-\left(-\frac{\exp\left(\pi\sqrt{\frac{64}{6}-\frac{1}{144}}\right)}{2\sqrt{64-\frac{1}{24}}}+\frac{\exp\left(\frac{\pi}{2}\sqrt{\frac{64}{6}-\frac{1}{144}}\right)}{\sqrt{64-\frac{1}{24}}}\right)-29-\frac{3}{2}}-(21+5)\times\frac{1}{10^3}$$

Exact result:

$$\sqrt[15]{-\frac{61}{2}-2\sqrt{\frac{6}{1535}}\,e^{\left(\sqrt{1535}\,\pi\right)/24}+\sqrt{\frac{6}{1535}}\,e^{\left(\sqrt{1535}\,\pi\right)/12}}-\frac{13}{500}$$

Decimal approximation:

1.617825126793658320189071353013167631108582330747885160189...

1.617825126....

Alternate forms:

$$\frac{50\times 3070^{14/15}\sqrt[15]{-93635-4\sqrt{9210}\,e^{\left(\sqrt{1535}\,\pi\right)/24}+2\sqrt{9210}\,e^{\left(\sqrt{1535}\,\pi\right)/12}}-3991}{153500}$$

$$\frac{500\sqrt[15]{-61-4\sqrt{\frac{6}{1535}}\,e^{\left(\sqrt{1535}\,\pi\right)/24}+2\sqrt{\frac{6}{1535}}\,e^{\left(\sqrt{1535}\,\pi\right)/12}}-13\sqrt[15]{2}}{500\sqrt[15]{2}}$$

((([-(- exp(Pi(64/6-1/144)^0.5) / ((2(64-1/24)^0.5)) + (exp(Pi/2(64/6-1/144)^0.5)) / ((64-1/24)^0.5))]-29-3/2)))^1/14 + 29/10^3

Input:

$$\sqrt[14]{-\left(-\frac{\exp\left(\pi\sqrt{\frac{64}{6}-\frac{1}{144}}\right)}{2\sqrt{64-\frac{1}{24}}}+\frac{\exp\left(\frac{\pi}{2}\sqrt{\frac{64}{6}-\frac{1}{144}}\right)}{\sqrt{64-\frac{1}{24}}}\right)-29-\frac{3}{2}}+\frac{29}{10^3}$$

Exact result:

$$\frac{29}{1000}+\sqrt[14]{-\frac{61}{2}-2\sqrt{\frac{6}{1535}}\,e^{\left(\sqrt{1535}\,\pi\right)/24}+\sqrt{\frac{6}{1535}}\,e^{\left(\sqrt{1535}\,\pi\right)/12}}$$

Decimal approximation:

1.732232254269956517337945290352126214788350639059637323522...

1.732232254….

Alternate forms:

$$\frac{8903+100\times 3070^{13/14}\sqrt[14]{-93635-4\sqrt{9210}\,e^{\left(\sqrt{1535}\,\pi\right)/24}+2\sqrt{9210}\,e^{\left(\sqrt{1535}\,\pi\right)/12}}}{307000}$$

$$\frac{29\sqrt[14]{2}+1000\sqrt[14]{-61-4\sqrt{\frac{6}{1535}}\,e^{\left(\sqrt{1535}\,\pi\right)/24}+2\sqrt{\frac{6}{1535}}\,e^{\left(\sqrt{1535}\,\pi\right)/12}}}{1000\sqrt[14]{2}}$$

((([-(- exp(Pi(64/6-1/144)^0.5) / ((2(64-1/24)^0.5)) + (exp(Pi/2(64/6-1/144)^0.5)) / ((64-1/24)^0.5))]-29-3/2)))^1/14 + (18+1)1/10^3

Input:

$$\sqrt[14]{-\left(-\frac{\exp\left(\pi\sqrt{\frac{64}{6}-\frac{1}{144}}\right)}{2\sqrt{64-\frac{1}{24}}}+\frac{\exp\left(\frac{\pi}{2}\sqrt{\frac{64}{6}-\frac{1}{144}}\right)}{\sqrt{64-\frac{1}{24}}}\right)-29-\frac{3}{2}}+(18+1)\times\frac{1}{10^3}$$

Exact result:

$$\frac{19}{1000}+\sqrt[14]{-\frac{61}{2}-2\sqrt{\frac{6}{1535}}\,e^{\left(\sqrt{1535}\,\pi\right)/24}+\sqrt{\frac{6}{1535}}\,e^{\left(\sqrt{1535}\,\pi\right)/12}}$$

Decimal approximation:

1.722232254269956517337945290352126214788350639059637323522...

1.7222… result practically equal to the Hausdorff dimension of Pinwheel fractal 1.7227

Alternate forms:

$$\frac{5833+100\times 3070^{13/14}\sqrt[14]{-93635-4\sqrt{9210}\,e^{\left(\sqrt{1535}\,\pi\right)/24}+2\sqrt{9210}\,e^{\left(\sqrt{1535}\,\pi\right)/12}}}{307000}$$

$$\frac{19\sqrt[14]{2}+1000\sqrt[14]{-61-4\sqrt{\frac{6}{1535}}\,e^{\left(\sqrt{1535}\,\pi\right)/24}+2\sqrt{\frac{6}{1535}}\,e^{\left(\sqrt{1535}\,\pi\right)/12}}}{1000\sqrt[14]{2}}$$

Now, we have that

11-(-3.706347331616141-4.44136382497+49.688429419226985-1759.656171211416)

Input interpretation:

$11-(-3.706347331616141-4.44136382497+49.688429419226985-1759.656171211416)$

Result:

1729.115452948775156

1729.115452948775156

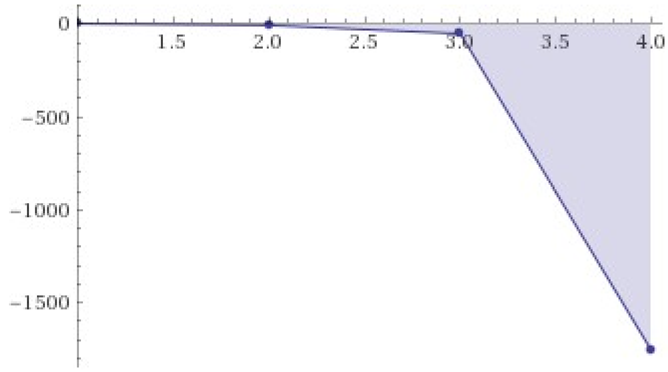
With regard the plot, we have:

plot(3.706347331616141, -4.44136382497, -49.688429419226985, -1759.656171211416)

Input interpretation:

plot	{3.706347331616141, −4.44136382497, −49.688429419226985, −1759.656171211416}

Plot:



We have also that:

(-(3.706347331616141-4.44136382497-49.688429419226985-1759.656171211416))^1/3

Input interpretation:

(-(3.706347331616141 - 4.44136382497 - 49.688429419226985 - 1759.656171211416)) ^ (1 / 3)

Result:

12.1870677644976...

12.187067.... result very near to the entropy black hole 12.1904 that is equal to ln (196883)

and:

(-(3.706347331616141-4.44136382497-49.688429419226985-1759.656171211416))^1/3 +2Pi

Input interpretation:

(-(3.706347331616141 - 4.44136382497 - 49.688429419226985 - 1759.656171211416)) ^ (1 / 3) + 2 π

Result:

18.4702530716771...

18.470253…result very near to the entropy black hole 18.2773 that is equal to ln (86645620)

Alternative representations:

$$(-(3.70634733161614100000 - 4.441363824970000 - 49.68842941922698500000 - 1759.6561712114160000))^\wedge(1/3) + 2\pi = 360° + \sqrt[3]{1810.079617123996844}$$

$$(-(3.70634733161614100000 - 4.441363824970000 - 49.68842941922698500000 - 1759.6561712114160000))^\wedge(1/3) + 2\pi = -2\,i\log(-1) + \sqrt[3]{1810.079617123996844}$$

$$(-(3.70634733161614100000 - 4.441363824970000 - 49.68842941922698500000 - 1759.6561712114160000))^\wedge(1/3) + 2\pi = 2\cos^{-1}(-1) + \sqrt[3]{1810.079617123996844}$$

Series representations:

$$(-(3.70634733161614100000 - 4.441363824970000 - 49.68842941922698500000 - 1759.6561712114160000))^\wedge(1/3) + 2\pi = 12.18706776449755151 + 8\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}$$

$$(-(3.70634733161614100000 - 4.441363824970000 - 49.68842941922698500000 - 1759.6561712114160000))^\wedge(1/3) + 2\pi = 8.18706776449755151 + 4.000000000000000000\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}$$

$$(-(3.70634733161614100000 - 4.441363824970000 - 49.68842941922698500000 - 1759.6561712114160000))^\wedge(1/3) + 2\pi = 12.18706776449755151 + 2\sum_{k=0}^{\infty}\frac{2^{-k}(-6+50k)}{\binom{3k}{k}}$$

Integral representations:

$$(-(3.70634733161614100000 - 4.441363824970000 - 49.68842941922698500000 - 1759.6561712114160000))^\wedge(1/3) + 2\pi = 12.18706776449755151 + 4\int_0^{\infty}\frac{1}{1+t^2}\,dt$$

$$(-(3.7063473316161410000 - 4.441363824970000 - 49.6884294192269850000 - 1759.6561712114160000))^{(1/3)} + 2\pi = 12.18706776449755151 + 8\int_0^1 \sqrt{1-t^2}\, dt$$

$$(-(3.7063473316161410000 - 4.441363824970000 - 49.6884294192269850000 - 1759.6561712114160000))^{(1/3)} + 2\pi = 12.18706776449755151 + 4\int_0^\infty \frac{\sin(t)}{t}\, dt$$

From

A 6% measurement of the Hubble parameter at z ≈ 0.45: direct evidence of the epoch of cosmic re-acceleration

Michele Moresco, Lucia Pozzetti, Andrea Cimatti, Raul Jimenez, Claudia Maraston, Licia Verde, Daniel Thomas, Annalisa Citro, Rita Tojeiro, and David Wilkinson

arXiv:1601.01701v2 [astro-ph.CO] 2 May 2016

	M11 models					BC03 models				
z	$H(z)$	σ_{stat}	σ_{syst}	σ_{tot}	% error	$H(z)$	σ_{stat}	σ_{syst}	σ_{tot}	% error
0.3802	89.3	3.2	13.7	14.1	15.8%	83.0	4.3	12.9	13.5	16.3%
0.4004	82.8	2.4	10.3	10.6	12.8%	77.0	2.1	10	10.2	13.2%
0.4247	93.7	2.7	11.4	11.7	12.4%	87.1	2.4	11	11.2	12.9%
0.4497	99.7	3.1	13	13.4	13.4%	92.8	4.5	12.1	12.9	13.9%
0.4783	86.6	2	8.5	8.7	10.1%	80.9	2.1	8.8	9	11.2%
⟨0.4293⟩	91.8	1	5.1	5.3	5.8%	85.7	1	5.1	5.2	6.1%

Table 3. $H(z)$ measurements (in units of [km/Mpc/s]) and their errors. The relative contribution of statistical and systematic errors are reported, as well as the total error (estimated by summing in quadrature σ_{stat} and σ_{syst}). These values have been estimated with M11 and BC03 EPS models respectively. For each model the averaged measurement is also reported. This dataset can be downloaded from http://www.physics-astronomy.unibo.it/en/research/areas/astrophysics/cosmology-with-cosmic-chronometers.

From:

Model-independent reconstruction of f(T) teleparallel cosmology

Salvatore Capozziello, Rocco D'Agostino and Orlando Luongo - arXiv:1706.02962v1 [gr-qc] 9 Jun 2017

For:

$T_0 = -6H_0^2.$

$T = -6H^2$, with $H = H(z)$, H(z) = 89

$$\Omega_{m0} = 0.364\ , \qquad H_0 = 71.47\ \mathrm{km/s/Mpc}$$

and, from the following expressions:

$$c_0 = 2 - \Omega_{m0} \qquad (66a)$$
$$c_1 = \Omega_{m0} - 1 \qquad (66b)$$
$$c_2 = -3 \times 10^{-6} \qquad (66c)$$
$$c_3 = \frac{1}{15} \times 10^{-9} \qquad (66d)$$
$$c_4 = \frac{3}{4} \times 10^{-14} \qquad (66e)$$

We have that:

c_0 = 2-0.364 = 1.636; c_1 = 0.364-1 = -0.636; c_2 = -3*10^-6; c_3 = 1/15*10^-9 = 0.06666 * 10^-9; c_4 = 3/4 * 10^-14 = 0.75 * 10^-14

T_0 = -6*(71.47)^2 = -30647.7654; T = -6*(89)^2 = -47526

Now, we have the following equation:

$$f(T)_{\mathrm{ABCL}} = c_0 T + (T - T_0)\Big[c_1 + c_3 \cosh(T - T_0) + (T - T_0)\Big(c_2 + c_4 (T - T_0)\sinh(T - T_0)\Big)\Big] \qquad (65)$$

We obtain:

(1.636)(-47526)+(-47526+30647.7654)[(-0.636+0.06666e-9) cosh(-47526+30647.7654)+(-47526+30647.7654)*(-3*10^-6 + 0.75*10^-14(-47526+30647.7654) sinh(-47526+30647.7654))]

Input interpretation:

$$1.636 \times (-47526) + (-47526 + 30\,647.7654)\Big((-0.636 + 0.06666 \times 10^{-9}) \cosh(-47526 + 30\,647.7654) + (-47526 + 30\,647.7654)\big(-3 \times 10^{-6} + 0.75 \times 10^{-14} (-47526 + 30\,647.7654) \sinh(-47526 + 30\,647.7654)\big)\Big)$$

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

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

Result:

$7.14343... \times 10^{7333}$

$7.1434275850835080063925351462336251992466747 86 \times 10^{7333}$

Now, from the Ramanujan fundamental formula for obtain a highly precise golden ratio:

$$\sqrt[5]{\left(\frac{1}{\frac{1}{32}\left(-1+\sqrt{5}\right)^5+5e^{\left(-\sqrt{5}\pi\right)^5}}-\frac{11\times 5e^{\left(-\sqrt{5}\pi\right)^5}}{2\left(\frac{1}{32}\left(-1+\sqrt{5}\right)^5+5e^{\left(-\sqrt{5}\pi\right)^5}\right)}-\frac{5\sqrt{5}\times 5e^{\left(-\sqrt{5}\pi\right)^5}}{2\left(\frac{1}{32}\left(-1+\sqrt{5}\right)^5+5e^{\left(-\sqrt{5}\pi\right)^5}\right)}\right)}$$

considering the inverse of the result of $f(T)_{ABCL}$, we obtain:

(((1/((1/32(-1+sqrt(5))^5+5*(e^((-sqrt(5)*Pi))^5)))+(1/(7.143427585083508006392535146233625199246674786 × 10^7333)))))^1/5

Input interpretation:

$$\left(\frac{1}{\frac{1}{32}\left(-1+\sqrt{5}\right)^5+5\,e^{\left(-\sqrt{5}\,\pi\right)^5}}+\frac{1}{7.143427585083508006392535146233625199246674786\times 10^{7333}}\right)\hat{}\,(1/5)$$

Result:

1.6180339887498948482045868343656381177203091798057628621 35...

1.61803398…..

Or:

$$\sqrt[5]{\frac{1}{\frac{1}{32}\left(-1+\sqrt{5}\right)^5+5\,e^{\left(-\sqrt{5}\,\pi\right)^5}}+\frac{1}{7.14342758508350800639253514\times 10^{7333}}}$$

1.6180339887498948482045868343656381177203091798057628621354...

1.61803398……

We get the following 5th roots of 11.0901699437494742........., that are similar to this spectacular and intriguing root:

1.61803398874989484820458683436563811772030917980576286213544862270526046281890244970720720418939113748475408807538689175212663386222353693179318006076672635443338908659593958290563832266131992829026788067520876689250171169620703222104321626954862629631361443814975870122034080588795445474924618569536486444924104432077134494704956584678850987433944221254487706647809158846074998871240076521705751797883416625624940758906970400028121042762177111777805315317141011704666599146697987317613560067087480710131795236894275219484353056783002287856997829778347845878228911097625003026961561700250464338243776486102838312683303724292675263116533924731671112115881863851331620384005222165791286675294654906811317159934323597349498509040947621322298101726107059611645629909816290555208524790352406020172799747175342777592778625619432082750513121815628551222480939471234145170223735805772786160086883829523045926478780178899219902707769038953219681986151437803149974110692608867429622675756052317277752035361393621076738937645560606059216589466759551900400555908950229530942312482355212212415444006470340565734797663972394949946584578873039623090375033993856210242369025138680414577995698122445747178034173126453220416397232134044449487302315417676893752103068737880344170093954409627955898678723209512426893557309704509595684401755519881921802064052905518934947592600734852282101088194644544222318891319294689622002301443770269923007803085261180754519288770502109684249362713592518760777884665836150238913493333122310533923213624319263728910670503399282265263556209029798642472759772565508615487543574826471814145127000602389016207773224499435308899909501680328112194320481964387675863314798571911397815397807476150772211750826945863932045652098969855567814106968372884058746103378105444390943683583581381131168993855576975484149144534150912954070050194775486163075422641729394680367319805861833918328599130396072

4455950449779212076124785645916160837059498786006970189409886400764436170933417270919143365013715766011480381430626238051432117348151005
5901345610118007905063814215270930858809287570345050780814545881990633612982798141174533927312080928972792221329806429468782427487401745
0554067787570832373109759151177629784432847479081765180977872684161176325038612112914368343767023503711163307258698832587103363222381098
0901211019899176841491751233134015273384383723450093478604979294599158220125810459823092552872124137043614910205471855496118087642657651
1060545881475604431784798584539731286301625448761148520217064404111660766950597757832570395110878230827106478939021115691039276838453863
3332156582965977310343603232254574363720412440640888267375843395367959312322134373209957498894699565647360072959998391288103197426312517
9714143201231127955189477817269141589117799195648125580018455065632952859859100090862180297756378925999164994642819302229355234667475932
6951654214021091363018194722707890122087287361707348649998156255472811373479871656952748900814438405327483781378246691744422963491470815
7007352545707089772675469343822619546861533120953357923801460927351021011919021836067509730895752895774681422954339438549315533963038072
9169175846101460995055064803679304147236572039860073550760902317312501613204843583648177048481810991602442523271672190189334596378608787
5287017393593030133590112371023917126590470263494028307668767436386513271062803231740693173344823435645318505813531085497333507599667787
1244905836367541328908624063245639535721252426117027802865604323494283730172557440583727826799603173936401328762770124367983114464369476
7053127249241047167001382478312865650649343418039004101780533950587724586655755229391582397084177298337282311525692609299594224000056062
6678674357923972454084817651973436265268944888552720274778747335983536727761407591712051326934483752991649980936024617844267572776790019
1919070380522046123248239132610432719168451230602362789354543246176997575368904176365025478513824631465833638337602357789926729886321618
5839590363998183845827644912459809370430555961379734326134830494949686810895356963482817812886253646084203394653819441945714266682371839491832370908574850266568039897440662105360306400260817112665995419936873160945722888109207788227720363668448153256172841176909792666655
2238468831137185299192163190520156863122282071559987646842355205928537175780765605036773130975191223973887224682580571597445740484298780
7352215984266766257807706201943040054255015831250301753409411719101929890384472503329880245014367968441694795954530459103138116218704567
9978663661746059570003445970113525181346006565535203478881174149941274826415213556776394039071038708818233806803350038046800174808220591
0968442026446402187705340100318028816644153091393948156403192822785482414510503188825189970074862287942155895742820216657062188090578088
0503246769912972872103870736974064356674589202586565739785608595665341070359978320446336346485489497663885351045527298242290699848853696

82804645974576265143435905093832124374333387051665714900590710567024
88798580437181512610044038148804072524406164290224782271527241120850
65788838712493635106806365166743222327767755797399270376231914704732
39551206070550399208844260370879084333426183841359707816482955371432
19611895037977146300075559753795703552271449319132172556440128309180
50450089921870512118606933573153895935079030073672702331416532042340
15537414426871540551164796114332302485440409406911456139873026039518
28168034482525432673857590056043202453727192912486458133344169852993
91357478698957986439498023047116967157362283912018127312916589952759
91922031837235682727938563733126547998591246327503006059256745497943
50881192950568549325935531872914180113641218747075262810686983013576
05247194455932195535961045283031488391176930119658583431442489489856
55842508341094295027719758335224429125736493807541711373924376014350
68298784932712997512286881960498357751587717804106971319667534771947
92263651901633977128473907933611119140899830560336106098717178305543
54035608952929081846414371392943781356048203894791257450770755751030
02420726629001809042293424942590606661413322872269806901459945119954
78016399151412612525728280664331261657469388195106442167387180001100
42184830258091654338374923641183888564685143150063731904295148146942
43146089525470720374055669130692209908048194529751106504642810541775
52590951871318883591476599604131796020941530858553323877253802327276
32977372143127968216716234421183201802881412747443168847218459392781
43547409999907223320305926297661123832798331698825393126200650370288
44782866694044730794710476125586583752986236250999823233597155072338
38332440815257781933642626304330265895817080045127887311593558774721
72564947000516366725771539209840950327451121536873009121996295227659
13163709396860727134269262315475330437993316581107369643142171979434
05639155121081081362626888569748068060116918941750272298741586991791
45349946244419401219785860137366082869072236514771391268742096651378
75620591854328888341742920901563133283193575622089713765630978501563
15498245644586542479293572282875060848145335135218172958793299117100
32476222052194645105362450512988430871344439507244267351462861799183
23364598369637632722575691597239543830520866474742381511079273494836
95239647926899369832491799950278950006045966131346336302494995148080
53290179029751825158750490074351879835118360327227726017174045355716
58855578297291061958193517105548257930709100576358699019297258843355
96694212549169408937583925988956841361 e^0 ≈ 1.6180 (real, principal root)

e^((2 i π)/5) ≈ 0.50000 + 1.5388 i

$e^{(4 i \pi)/5} \approx -1.3090 + 0.95106 i$

$e^{-(4 i \pi)/5} \approx -1.3090 - 0.95106 i$

$e^{-(2 i \pi)/5} \approx 0.50000 - 1.5388 i$

We note that:

1.6180339887498948482045868343656381177203091798057628

Rational approximation:

$$\frac{347880681146567910619198829}{215002084978043708894524818} = 1 + \frac{132878596168524201724674011}{215002084978043708894524818}$$

Possible closed forms:

$\phi \approx 1.618033988749894848204586834365638117720309179805762862135$

$\Phi + 1 \approx 1.618033988749894848204586834365638117720309179805762862135$

$\frac{1}{\Phi} \approx 1.618033988749894848204586834365638117720309179805762862135$

$\frac{151837964 \pi}{294810267} \approx 1.61803398874989484850313$

$\frac{11(-70 + 23 \pi + 40 \pi^2)}{-185 - 659 \pi + 502 \pi^2} \approx 1.61803398874989484854941$

π root of $11208 x^3 + 103781 x^2 - 49442 x - 3596$ near $x = 0.515036$ $\approx$ 1.6180339887498948482068128

π root of $4704 x^4 + 358 x^3 - 4422 x^2 - 3386 x + 2537$ near $x = 0.515036$ $\approx$ 1.61803398874989484818899

$$\frac{1}{42}\left(-1 + 34 e - 56 e^2 + 7\sqrt{1+e} - 5\sqrt{1+e^2} + 50 \pi + 22 \pi^2 - 24\sqrt{1+\pi} + 20\sqrt{1+\pi^2}\right) \approx 1.6180339887498948482008510$$

$$\frac{-487 - 906 e + 711 e^2}{283 - 56 e + 175 e^2} \approx 1.61803398874989484835044$$

$$\frac{-13 + \sqrt{2} - 3 e + 2 \pi - \pi^2 - \log(6)}{7 \sqrt{2} + 7 \sqrt{3} - e - \pi - 3 \pi^2 - \log(8)} \approx 1.61803398874989484867509$$

$$\frac{7778742049}{4807526976} \approx 1.61803398874989484822 3936$$

ϕ is the golden ratio

Φ is the golden ratio conjugate

$\log(x)$ is the natural logarithm

We observe that we obtain also:

(((1/((1/32(-1+sqrt(5))^5+5*(e^((-sqrt(5)*Pi))^5)))^1/5))) - x = 1/(1.6951911277e-1467)^5

Input interpretation:

$$\frac{1}{\sqrt[5]{\frac{1}{32} \left(-1 + \sqrt{5}\right)^5 + 5 e^{\left(-\sqrt{5} \pi\right)^5}}} - x = \frac{1}{\left(\frac{1.6951911277}{10^{1467}}\right)^5}$$

Result:

$$\frac{1}{\sqrt[5]{\frac{1}{32} \left(\sqrt{5} - 1\right)^5 + 5 e^{-25 \sqrt{5} \pi^5}}} - x = 7.143427585 \times 10^{7333}$$

where

$$\frac{1}{\sqrt[5]{\frac{1}{32} \left(\sqrt{5} - 1\right)^5 + 5 e^{-25 \sqrt{5} \pi^5}}}$$

is equal to:

1.6180339887498948482045868343656381177203091798057628621354...

1.61803398….

Alternate forms:

$$\frac{1}{\sqrt[5]{-\frac{11}{2}+\frac{5\sqrt{5}}{2}+5\,e^{-25\sqrt{5}\,\pi^5}}}-x=7.143427585\times10^{7333}$$

$$\frac{1}{\sqrt[5]{\frac{1}{2}\left(5\sqrt{5}-11\right)+5\,e^{-25\sqrt{5}\,\pi^5}}}-x=7.143427585\times10^{7333}$$

$$\frac{\sqrt[5]{2}\;e^{5\sqrt{5}\,\pi^5}-\sqrt[5]{10-11\,e^{25\sqrt{5}\,\pi^5}+5\sqrt{5}\;e^{25\sqrt{5}\,\pi^5}}\;x}{\sqrt[5]{10-11\,e^{25\sqrt{5}\,\pi^5}+5\sqrt{5}\;e^{25\sqrt{5}\,\pi^5}}}=7.143427585\times10^{7333}$$

Solution:

The result is:

-7.143427585×10^7333

From (in Italian)

https://sites.google.com/site/marelv83/fisica-moderna/serie-infinite-per-p

Qui di seguito riporto alcune sensazionali formule scoperte da Ramanujan:

$$\pi \cong \frac{-2}{\sqrt{210}}\log\left[\frac{(\sqrt{2}-1)^2(2-\sqrt{3})(\sqrt{7}-\sqrt{6})^2(8-3\sqrt{7})(\sqrt{10}-3)^2(\sqrt{15}-\sqrt{14})(4-\sqrt{15})^2(6-\sqrt{35})}{4}\right]$$

$$\cfrac{1}{1+\cfrac{e^{-2\pi\sqrt{5}}}{1+\cfrac{e^{-4\pi\sqrt{5}}}{1+\cfrac{e^{-6\pi\sqrt{5}}}{1+\cdots}}}}=\left(\frac{\sqrt{5}}{1+\sqrt[3]{5^{3/4}\left(\frac{\sqrt{5}-1}{2}\right)^{5/2}-1}}-\frac{\sqrt{5}+1}{2}\right)e^{2\pi/\sqrt{5}}$$

$$\frac{2}{\pi}=1-\left(\frac{1}{2}\right)^3+9\left(\frac{1}{2}\times\frac{3}{4}\right)^3-13\left(\frac{1}{2}\times\frac{3}{4}\times\frac{5}{6}\right)^3+17\left(\frac{1}{2}\times\frac{3}{4}\times\frac{5}{6}\times\frac{7}{8}\right)^3\ldots$$

We have the following Ramanujan equation for the computation of π:

-2/(sqrt210) ln(((((((sqr2 – 1)^2(2-sqrt3)(sqrt7-sqrt6)^2(8-3sqrt7)(sqrt10 – 3)^2(sqrt15-sqrt14)(4-sqrt15)^2(6-sqrt35)))/4))))

Input:

$$-\frac{2}{\sqrt{210}} \log\left(\frac{1}{4}\left(\left(\sqrt{2}-1\right)^2\left(2-\sqrt{3}\right)\left(\sqrt{7}-\sqrt{6}\right)^2\left(8-3\sqrt{7}\right)\left(\sqrt{10}-3\right)^2\left(\sqrt{15}-\sqrt{14}\right)\left(4-\sqrt{15}\right)^2\left(6-\sqrt{35}\right)\right)\right)$$

$\log(x)$ is the natural logarithm

Exact result:

$$-\sqrt{\frac{2}{105}} \log\left(\frac{1}{4}\left(\sqrt{2}-1\right)^2\left(2-\sqrt{3}\right)\left(8-3\sqrt{7}\right)\left(\sqrt{7}-\sqrt{6}\right)^2\left(\sqrt{10}-3\right)^2\left(4-\sqrt{15}\right)^2\left(\sqrt{15}-\sqrt{14}\right)\left(6-\sqrt{35}\right)\right)$$

Decimal approximation:

3.141592653589793238471982129475433747178624413292481760466...

3.14159265…. = π

Property:

$$-\sqrt{\frac{2}{105}} \log\left(\frac{1}{4}\left(-1+\sqrt{2}\right)^2\left(2-\sqrt{3}\right)\left(8-3\sqrt{7}\right)\left(-\sqrt{6}+\sqrt{7}\right)^2\left(-3+\sqrt{10}\right)^2\left(4-\sqrt{15}\right)^2\left(-\sqrt{14}+\sqrt{15}\right)\left(6-\sqrt{35}\right)\right)$$ is a transcendental number

Alternate forms:

$$-\sqrt{\frac{2}{105}} \log\left(\frac{1}{4}\left(2\sqrt{2}-3\right)\left(\sqrt{3}-2\right)\left(3\sqrt{7}-8\right)\left(\sqrt{10}-3\right)^2\left(\sqrt{14}-\sqrt{15}\right)\left(\sqrt{15}-4\right)^2\left(\sqrt{35}-6\right)\left(2\sqrt{42}-13\right)\right)$$

$$-\sqrt{\frac{2}{105}}\log\left(\text{root of } 4\,294\,967\,296\,x^{16} + 2\,063\,886\,834\,047\,385\,600\,x^{15} + 270\,505\,513\,578\,917\,789\,696\,x^{14} + 1\,984\,534\,806\,845\,089\,382\,400\,x^{13} + 2\,681\,619\,117\,516\,374\,671\,360\,x^{12} - 123\,920\,556\,616\,581\,120\,000\,x^{11} - 663\,008\,144\,242\,052\,694\,016\,x^{10} - 15\,496\,619\,999\,153\,356\,800\,x^{9} + 61\,793\,785\,904\,374\,349\,824\,x^{8} + 968\,538\,749\,947\,084\,800\,x^{7} - 2\,589\,875\,563\,445\,518\,336\,x^{6} + 30\,254\,042\,142\,720\,000\,x^{5} + 40\,918\,260\,460\,149\,760\,x^{4} - 1\,892\,599\,875\,302\,400\,x^{3} + 16\,123\,385\,046\,656\,x^{2} - 7\,688\,577\,600\,x + 1 \text{ near } x = 1.30063\times10^{-10}\right)$$

$$\frac{1}{105}\left(-\sqrt{210}\log\left(\left(\sqrt{6}-\sqrt{7}\right)^2\right) - \sqrt{210}\log\left(\left(\sqrt{3}-2\right)\left(3\sqrt{7}-8\right)\right) - 2\left(\sqrt{210}\left(\log\left(\sqrt{2}-1\right)-\log(2)\right) + \sqrt{210}\log\left(\sqrt{10}-3\right)\right) - \sqrt{210}\log\left(\left(\sqrt{15}-4\right)^2\right) - \sqrt{210}\log\left(\left(\sqrt{14}-\sqrt{15}\right)\left(\sqrt{35}-6\right)\right)\right)$$

Alternative representations:

$$\frac{1}{\sqrt{210}}\log\left(\frac{1}{4}\left(\sqrt{2}-1\right)^2\left(2-\sqrt{3}\right)\left(\sqrt{7}-\sqrt{6}\right)^2\left(8-3\sqrt{7}\right)\left(\sqrt{10}-3\right)^2\left(\sqrt{15}-\sqrt{14}\right)\left(4-\sqrt{15}\right)^2\left(6-\sqrt{35}\right)\right)(-2) = -\frac{1}{\sqrt{210}}\,2\log_e\left(\frac{1}{4}\left(-1+\sqrt{2}\right)^2\left(-\sqrt{6}+\sqrt{7}\right)^2\left(-3+\sqrt{10}\right)^2\left(4-\sqrt{15}\right)^2\left(2-\sqrt{3}\right)\left(8-3\sqrt{7}\right)\left(-\sqrt{14}+\sqrt{15}\right)\left(6-\sqrt{35}\right)\right)$$

$$\frac{1}{\sqrt{210}}\log\left(\frac{1}{4}\left(\sqrt{2}-1\right)^2\left(2-\sqrt{3}\right)\left(\sqrt{7}-\sqrt{6}\right)^2\left(8-3\sqrt{7}\right)\left(\sqrt{10}-3\right)^2\left(\sqrt{15}-\sqrt{14}\right)\left(4-\sqrt{15}\right)^2\left(6-\sqrt{35}\right)\right)(-2) = -\frac{1}{\sqrt{210}}\,2\log(a)\log_a\left(\frac{1}{4}\left(-1+\sqrt{2}\right)^2\left(-\sqrt{6}+\sqrt{7}\right)^2\left(-3+\sqrt{10}\right)^2\left(4-\sqrt{15}\right)^2\left(2-\sqrt{3}\right)\left(8-3\sqrt{7}\right)\left(-\sqrt{14}+\sqrt{15}\right)\left(6-\sqrt{35}\right)\right)$$

$$\frac{1}{\sqrt{210}}\log\left(\frac{1}{4}\left(\sqrt{2}-1\right)^2\left(2-\sqrt{3}\right)\left(\sqrt{7}-\sqrt{6}\right)^2\left(8-3\sqrt{7}\right)\left(\sqrt{10}-3\right)^2\left(\sqrt{15}-\sqrt{14}\right)\left(4-\sqrt{15}\right)^2\left(6-\sqrt{35}\right)\right)(-2) = \frac{1}{\sqrt{210}}\,2\,\mathrm{Li}_1\left(1-\frac{1}{4}\left(-1+\sqrt{2}\right)^2\left(-\sqrt{6}+\sqrt{7}\right)^2\left(-3+\sqrt{10}\right)^2\left(4-\sqrt{15}\right)^2\left(2-\sqrt{3}\right)\left(8-3\sqrt{7}\right)\left(-\sqrt{14}+\sqrt{15}\right)\left(6-\sqrt{35}\right)\right)$$

From which:

Input:

$$\frac{1}{6}\left(-\sqrt{\frac{2}{105}}\log\left(\frac{1}{4}\left(\sqrt{2}-1\right)^2\left(2-\sqrt{3}\right)\left(8-3\sqrt{7}\right)\left(\sqrt{7}-\sqrt{6}\right)^2\left(\sqrt{10}-3\right)^2\left(4-\sqrt{15}\right)^2\left(\sqrt{15}-\sqrt{14}\right)\left(6-\sqrt{35}\right)\right)\right)^2$$

log(x) is the natural logarithm

Exact result:

$$\frac{1}{315}\log^2\left(\frac{1}{4}\left(\sqrt{2}-1\right)^2\left(2-\sqrt{3}\right)\left(8-3\sqrt{7}\right)\left(\sqrt{7}-\sqrt{6}\right)^2\left(\sqrt{10}-3\right)^2\left(4-\sqrt{15}\right)^2\left(\sqrt{15}-\sqrt{14}\right)\left(6-\sqrt{35}\right)\right)$$

Decimal approximation:

1.644934066848226436482194678793650531552486937307044349575...

1.6449340668…

Property:

$\frac{1}{315}\log^2\left(\frac{1}{4}\left(-1+\sqrt{2}\right)^2\left(2-\sqrt{3}\right)\left(8-3\sqrt{7}\right)\left(-\sqrt{6}+\sqrt{7}\right)^2\left(-3+\sqrt{10}\right)^2\left(4-\sqrt{15}\right)^2\left(-\sqrt{14}+\sqrt{15}\right)\left(6-\sqrt{35}\right)\right)$ is a transcendental number

Alternate forms:

$$\frac{1}{315}\left(2\log\left(\frac{1}{2}\left(\sqrt{2}-1\right)\left(\sqrt{10}-3\right)\right)+\log\left(\left(\sqrt{3}-2\right)\left(\sqrt{6}-\sqrt{7}\right)^2\left(3\sqrt{7}-8\right)\left(\sqrt{14}-\sqrt{15}\right)\left(\sqrt{15}-4\right)^2\left(\sqrt{35}-6\right)\right)\right)^2$$

$$\frac{1}{315}\log^2\left(\text{root of } 4294967296x^{16}+2063886834047385600x^{15}+270505513578917789696x^{14}+1984534806845089382400x^{13}+2681619117516374671360x^{12}-123920556616581120000x^{11}-663008144242052694016x^{10}-15496619999153356800x^9+61793785904374349824x^8+968538749947084800x^7-2589875563445518336x^6+30254042142720000x^5+40918260460149760x^4-1892599875302400x^3+16123385046656x^2-7688577600x+1 \text{ near } x=1.30063\times10^{-10}\right)$$

Alternative representations:

$$\frac{1}{6}\left(-\sqrt{\frac{2}{105}}\log\left(\frac{1}{4}\left(\sqrt{2}-1\right)^2\left(2-\sqrt{3}\right)\left(\left(8-3\sqrt{7}\right)\left(\sqrt{7}-\sqrt{6}\right)^2\left(\sqrt{10}-3\right)^2\left(4-\sqrt{15}\right)^2\left(\sqrt{15}-\sqrt{14}\right)\left(6-\sqrt{35}\right)\right)\right)\right)^2=$$
$$\frac{1}{6}\left(-\log_e\left(\frac{1}{4}\left(-1+\sqrt{2}\right)^2\left(-\sqrt{6}+\sqrt{7}\right)^2\left(-3+\sqrt{10}\right)^2\left(4-\sqrt{15}\right)^2\left(2-\sqrt{3}\right)\left(8-3\sqrt{7}\right)\left(-\sqrt{14}+\sqrt{15}\right)\left(6-\sqrt{35}\right)\right)\sqrt{\frac{2}{105}}\right)^2$$

$$\frac{1}{6}\left(-\sqrt{\frac{2}{105}}\log\left(\frac{1}{4}\left(\sqrt{2}-1\right)^2\left(2-\sqrt{3}\right)\left(\left(8-3\sqrt{7}\right)\left(\sqrt{7}-\sqrt{6}\right)^2\left(\sqrt{10}-3\right)^2\left(4-\sqrt{15}\right)^2\left(\sqrt{15}-\sqrt{14}\right)\left(6-\sqrt{35}\right)\right)\right)\right)^2=$$
$$\frac{1}{6}\left(-\log(a)\log_a\left(\frac{1}{4}\left(-1+\sqrt{2}\right)^2\left(-\sqrt{6}+\sqrt{7}\right)^2\left(-3+\sqrt{10}\right)^2\left(4-\sqrt{15}\right)^2\left(2-\sqrt{3}\right)\left(8-3\sqrt{7}\right)\left(-\sqrt{14}+\sqrt{15}\right)\left(6-\sqrt{35}\right)\right)\sqrt{\frac{2}{105}}\right)^2$$

$$\frac{1}{6}\left(-\sqrt{\frac{2}{105}}\log\left(\frac{1}{4}\left(\sqrt{2}-1\right)^2\left(2-\sqrt{3}\right)\left(\left(8-3\sqrt{7}\right)\left(\sqrt{7}-\sqrt{6}\right)^2\left(\sqrt{10}-3\right)^2\left(4-\sqrt{15}\right)^2\left(\sqrt{15}-\sqrt{14}\right)\left(6-\sqrt{35}\right)\right)\right)\right)^2 =$$

$$\frac{1}{6}\left(\text{Li}_1\left(1-\frac{1}{4}\left(-1+\sqrt{2}\right)^2\left(-\sqrt{6}+\sqrt{7}\right)^2\left(-3+\sqrt{10}\right)^2\left(4-\sqrt{15}\right)^2\left(2-\sqrt{3}\right)\left(8-3\sqrt{7}\right)\left(-\sqrt{14}+\sqrt{15}\right)\left(6-\sqrt{35}\right)\right)\sqrt{\frac{2}{105}}\right)^2$$

and:

(((1/6(((-sqrt(2/105) log(1/4(sqrt(2)-1)^2 (2-sqrt(3))(8-3 sqrt(7))(sqrt(7)-sqrt(6))^2 (sqrt(10)-3)^2 (4-sqrt(15))^2 (sqrt(15)-sqrt(14))(6-sqrt(35))))))^2)))+(1/(7.143427585e+7333))^1/5 - (29-2)/10^3

Input interpretation:

$$\frac{1}{6}\left(-\sqrt{\frac{2}{105}}\log\left(\left(\frac{1}{4}\left(\sqrt{2}-1\right)^2\right)\left(\left(2-\sqrt{3}\right)\left(8-3\sqrt{7}\right)\left(\sqrt{7}-\sqrt{6}\right)^2\right)\left(\sqrt{10}-3\right)^2\left(4-\sqrt{15}\right)^2\left(\left(\sqrt{15}-\sqrt{14}\right)\left(6-\sqrt{35}\right)\right)\right)\right)^2 + \sqrt[5]{\frac{1}{7.143427585\times 10^{7333}}}-\frac{29-2}{10^3}$$

log(x) is the natural logarithm

Result:

1.617934066848226436482194678793650531552486937307044349575...

1.6179340668….

Alternative representations:

$$\frac{1}{6}\left(-\sqrt{\frac{2}{105}}\log\left(\frac{1}{4}\left(\left(2-\sqrt{3}\right)\left(8-3\sqrt{7}\right)\left(\sqrt{7}-\sqrt{6}\right)^2\right)\left(\sqrt{2}-1\right)^2\right.\right.$$
$$\left.\left.\left(\sqrt{10}-3\right)^2\left(\left(4-\sqrt{15}\right)^2\left(\left(\sqrt{15}-\sqrt{14}\right)\left(6-\sqrt{35}\right)\right)\right)\right)\right)^2+$$
$$\sqrt[5]{\frac{1}{7.14343\times 10^{7333}}}-\frac{29-2}{10^3}=-\frac{27}{10^3}+\sqrt[5]{\frac{1}{7.14343\times 10^{7333}}}+$$
$$\frac{1}{6}\left(-\log_e\left(\frac{1}{4}\left(-1+\sqrt{2}\right)^2\left(-\sqrt{6}+\sqrt{7}\right)^2\left(-3+\sqrt{10}\right)^2\left(4-\sqrt{15}\right)^2\left(2-\sqrt{3}\right)\right.\right.$$
$$\left.\left.\left(8-3\sqrt{7}\right)\left(-\sqrt{14}+\sqrt{15}\right)\left(6-\sqrt{35}\right)\right)\sqrt{\frac{2}{105}}\right)^2$$

$$\frac{1}{6}\left(-\sqrt{\frac{2}{105}}\log\left(\frac{1}{4}\left(\left(2-\sqrt{3}\right)\left(8-3\sqrt{7}\right)\left(\sqrt{7}-\sqrt{6}\right)^2\right)\left(\sqrt{2}-1\right)^2\right.\right.$$
$$\left.\left.\left(\sqrt{10}-3\right)^2\left(\left(4-\sqrt{15}\right)^2\left(\left(\sqrt{15}-\sqrt{14}\right)\left(6-\sqrt{35}\right)\right)\right)\right)\right)^2+$$
$$\sqrt[5]{\frac{1}{7.14343\times 10^{7333}}}-\frac{29-2}{10^3}=-\frac{27}{10^3}+\sqrt[5]{\frac{1}{7.14343\times 10^{7333}}}+$$
$$\frac{1}{6}\left(-\log(a)\log_a\left(\frac{1}{4}\left(-1+\sqrt{2}\right)^2\left(-\sqrt{6}+\sqrt{7}\right)^2\left(-3+\sqrt{10}\right)^2\left(4-\sqrt{15}\right)^2\right.\right.$$
$$\left.\left.\left(2-\sqrt{3}\right)\left(8-3\sqrt{7}\right)\left(-\sqrt{14}+\sqrt{15}\right)\left(6-\sqrt{35}\right)\right)\sqrt{\frac{2}{105}}\right)^2$$

$$\frac{1}{6}\left(-\sqrt{\frac{2}{105}}\log\left(\frac{1}{4}\left(\left(2-\sqrt{3}\right)\left(8-3\sqrt{7}\right)\left(\sqrt{7}-\sqrt{6}\right)^2\right)\left(\sqrt{2}-1\right)^2\right.\right.$$
$$\left.\left.\left(\sqrt{10}-3\right)^2\left(\left(4-\sqrt{15}\right)^2\left(\left(\sqrt{15}-\sqrt{14}\right)\left(6-\sqrt{35}\right)\right)\right)\right)\right)^2+$$
$$\sqrt[5]{\frac{1}{7.14343\times 10^{7333}}}-\frac{29-2}{10^3}=-\frac{27}{10^3}+\sqrt[5]{\frac{1}{7.14343\times 10^{7333}}}+$$
$$\frac{1}{6}\left(\mathrm{Li}_1\left(1-\frac{1}{4}\left(-1+\sqrt{2}\right)^2\left(-\sqrt{6}+\sqrt{7}\right)^2\left(-3+\sqrt{10}\right)^2\left(4-\sqrt{15}\right)^2\left(2-\sqrt{3}\right)\right.\right.$$
$$\left.\left.\left(8-3\sqrt{7}\right)\left(-\sqrt{14}+\sqrt{15}\right)\left(6-\sqrt{35}\right)\right)\sqrt{\frac{2}{105}}\right)^2$$

$\log_b(x)$ is the base− b logarithm

$\mathrm{Li}_n(x)$ is the polylogarithm function

Integral representation:

$$\frac{1}{6}\left(-\sqrt{\frac{2}{105}}\log\left(\frac{1}{4}\left(\left(2-\sqrt{3}\right)\left(8-3\sqrt{7}\right)\left(\sqrt{7}-\sqrt{6}\right)^2\right)\left(\sqrt{2}-1\right)^2\left(\sqrt{10}-3\right)^2\left(\left(4-\sqrt{15}\right)^2\left(\left(\sqrt{15}-\sqrt{14}\right)\left(6-\sqrt{35}\right)\right)\right)\right)\right)^2+\sqrt[5]{\frac{1}{7.14343\times 10^{7333}}}-\frac{29-2}{10^3}=$$

$$\begin{aligned}
-0.026&999999999999999999999999999999999999999999999999999999999999\\
&999999999999999999999999999999999999999999999999999999999999\\
&999999999999999999999999999999999999999999999999999999999999\\
&999999999999999999999999999999999999999999999999999999999999\\
&999999999999999999999999999999999999999999999999999999999999\\
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&999999999999999999999999999999999999999999999999999999999999\\
&999999999999999999999999999999999999999999999999999999999999\\
&999999999999999999999999999999999999999999999999999999999999\\
&999999999999999999999999999999999999999999999999999999999999\\
&9999999999999999999999983048088722995264\ +
\end{aligned}$$

$$\frac{1}{6}\left(\int_1^{\frac{1}{4}\left(-1+\sqrt{2}\right)^2\left(2-\sqrt{3}\right)\left(8-3\sqrt{7}\right)\left(-\sqrt{6}+\sqrt{7}\right)^2\left(-3+\sqrt{10}\right)^2\left(4-\sqrt{15}\right)^2\left(-\sqrt{14}+\sqrt{15}\right)\left(6-\sqrt{35}\right)}\frac{1}{t}\,dt\right)^2\sqrt{\frac{2}{105}}^{\,2}$$

But, we have also:

(((1/6(((-sqrt(2/105) log(1/4(sqrt(2)-1)^2 (2-sqrt(3))(8-3 sqrt(7))(sqrt(7)-sqrt(6))^2 (sqrt(10)-3)^2 (4-sqrt(15))^2 (sqrt(15)-sqrt(14))(6-sqrt(35))))))^2)))-x = 1/(1.6951911277e-1467)^5

Input interpretation:

$$\frac{1}{6}\left(-\sqrt{\frac{2}{105}}\log\left(\left(\frac{1}{4}\left(\sqrt{2}-1\right)^2\right)\left(\left(2-\sqrt{3}\right)\left(8-3\sqrt{7}\right)\left(\sqrt{7}-\sqrt{6}\right)^2\right)\left(\sqrt{10}-3\right)^2\left(4-\sqrt{15}\right)^2\left(\left(\sqrt{15}-\sqrt{14}\right)\left(6-\sqrt{35}\right)\right)\right)\right)^2-x=\frac{1}{\left(\frac{1.6951911277}{10^{1467}}\right)^5}$$

$\log(x)$ is the natural logarithm

Result:

$$\frac{1}{315}\log^2\left(\frac{1}{4}\left(\sqrt{2}-1\right)^2\left(2-\sqrt{3}\right)\left(8-3\sqrt{7}\right)\left(\sqrt{7}-\sqrt{6}\right)^2\left(\sqrt{10}-3\right)^2\left(4-\sqrt{15}\right)^2\left(\sqrt{15}-\sqrt{14}\right)\left(6-\sqrt{35}\right)\right)-x=7.143427585\times10^{7333}$$

Where

$$\frac{1}{315}\log^2\left(\frac{1}{4}\left(\sqrt{2}-1\right)^2\left(2-\sqrt{3}\right)\left(8-3\sqrt{7}\right)\left(\sqrt{7}-\sqrt{6}\right)^2\left(\sqrt{10}-3\right)^2\left(4-\sqrt{15}\right)^2\left(\sqrt{15}-\sqrt{14}\right)\left(6-\sqrt{35}\right)\right)$$

is equal to

1.6449340668482264364821946787936505315524869373070443495 75...

Alternate forms:

$$0.\times10^{14514}-x=0$$

$$\frac{1}{315}\log^2\left(\frac{1}{4}\left(2\sqrt{2}-3\right)\left(\sqrt{3}-2\right)\left(3\sqrt{7}-8\right)\left(\sqrt{10}-3\right)^2\left(\sqrt{14}-\sqrt{15}\right)\left(\sqrt{15}-4\right)^2\left(\sqrt{35}-6\right)\left(2\sqrt{42}-13\right)\right)-x=7.143427585\times10^{7333}$$

$$\frac{1}{315}\log^2\left(\text{root of } 4294967296x^{16}+2063886834047385600x^{15}+270505513578917789696x^{14}+1984534806845089382400x^{13}+2681619117516374671360x^{12}-123920556616581120000x^{11}-663008144242052694016x^{10}-15496619999153356800x^9+61793785904374349824x^8+968538749947084800x^7-2589875563445518336x^6+30254042142720000x^5+40918260460149760x^4-1892599875302400x^3+16123385046656x^2-7688577600x+1 \text{ near } x=1.30063\times10^{-10}\right)-x=7.143427585\times10^{7333}$$

Alternate form assuming x>0:

True

Solution:
Integer solution:

$x = 0$

The result is:

x = $-7.14342758500 * 10^{7333}$

Now, we have the following equations of the *f(T)* cosmological models:

$$\mathcal{P}'(T) \equiv \frac{\partial \mathcal{P}(T)}{\partial T} = -3\left(-3q_0^2(1+q_0) + j_0(3+4q_0) + s_0\right)^2 + \frac{\sqrt{6}H_0}{\sqrt{-T}}\Big[j_0^3 + 3j_0^2(1+q_0)(6+11q_0) - 3j_0q_0^2(12 + q_0(29+16q_0)) + q_0^4\left(18 + q_0(36+17q_0) - 15q_0^2(1+q_0)s_0\right) + 3j_0(5+7q_0)s_0 + 3s_0^2\Big], \quad (62)$$

$$\mathcal{P}''(T) \equiv \frac{\partial^2 \mathcal{P}(T)}{\partial T^2} = \sqrt{\frac{3}{2}}\frac{H_0}{(-T)^{3/2}}\Big[j_0^3 + 3j_0^2(1+q_0)(6+11q_0) - 3j_0q_0^2(12+q_0(29+16q_0)) + q_0^4(18+q_0(36+17q_0)) - 15q_0^2(1+q_0)s_0 + 3j_0(5+7q_0)s_0 + 3s_0^2\Big]. \quad (63)$$

For:

Eqs. (39a)–(39f) using the parameters $(\Omega_{m0}, h, q_0, j_0) = (0.289,\ 0.692,\ -0.545,\ 0.776)$.

and:

$T_0 = -6H_0^2$.

$T = -6H^2$, with $H = H(z)$, H(z) = 89

$\Omega_{m0} = 0.364$, $H_0 = 71.47$ km/s/Mpc

T = -47526; H_0 = 71.47; q_0 = -0.545; j_0 = 0.776 and s_0 = -0.192

From

$$\mathcal{P}'(T) \equiv \frac{\partial \mathcal{P}(T)}{\partial T} = -3\left(-3q_0^2(1+q_0) + j_0(3+4q_0) + s_0\right)^2 + \frac{\sqrt{6}H_0}{\sqrt{-T}}\Big[j_0^3 + 3j_0^2(1+q_0)(6+11q_0) - 3j_0q_0^2(12 + q_0(29+16q_0)) + q_0^4\left(18 + q_0(36+17q_0) - 15q_0^2(1+q_0)s_0\right) + 3j_0(5+7q_0)s_0 + 3s_0^2\Big],$$

we obtain:

-3(((-3*0.545^2(1-0.545)+0.776(3-4*0.545)-0.192)))^2+ ((sqrt6(71.47))/(sqrt(47526))

Input:

$$-3\left(-3\times 0.545^2\,(1-0.545)+0.776\,(3-4\times 0.545)-0.192\right)^2+\frac{\sqrt{6}\times 71.47}{\sqrt{47526}}$$

Result:

0.79849854054287166432584269662921348314606741573033707865 1...

0.798498540542871664325842696629213483146067415730337078651

T = -47526; H_0 = 71.47; q_0 = -0.545; j_0 = 0.776 and s_0 = -0.192

[((((0.776^3+3*0.776^2(1-0.545)(6-11*0.545)-3*0.776*0.545^2((((12-0.545(29-16*0.545)+0.545^4(18-0.545(36-17*0.545)-15*0.545^2(1-0.545)(-0.192))))+3*0.776(5-7*0.545)(-0.192)+3*0.192^2))))))]

Input:

$$0.776^3+3\times 0.776^2\,(1-0.545)\,(6-11\times 0.545)-3\times 0.776\times 0.545^2\left((12-0.545\,(29-16\times 0.545)+0.545^4\left(18-0.545\,(36-17\times 0.545)-15\times 0.545^2\,(1-0.545)\times(-0.192)\right)\right)+3\times 0.776\,(5-7\times 0.545)\times(-0.192)+3\times 0.192^2\right)$$

Result:

−0.1268796709624271971094 2

-0.12687967096242719710942

Thence, in conclusion:

-3(((-3*0.545^2(1-0.545)+0.776(3-4*0.545)-0.192)))^2+((sqrt6(71.47)))/((sqrt(47526)))(-0.12687967096242719710942)

Input interpretation:

$$-3\left(-3\times 0.545^2\,(1-0.545)+0.776\,(3-4\times 0.545)-0.192\right)^2+\frac{\sqrt{6}\times 71.47}{\sqrt{47526}}\times(-0.12687967096242719710942)$$

Result:

-0.10642381994796734440910390337078651685393258426966292134...

-0.106423819.... = $\mathcal{P}'(T)$

From which:

sqrt[-1/((((-3(((-3*0.545^2(1-0.545)+0.776(3-4*0.545)-0.192)))^2+((sqrt6(71.47))/((sqrt(47526)))(-0.1268796709)))))]+(8/10)^2

Input interpretation:

$$\sqrt{-\left(1\middle/\left(-3\left(-3\times 0.545^2(1-0.545)+0.776(3-4\times 0.545)-0.192\right)^2+\frac{\sqrt{6}\times 71.47}{\sqrt{47526}}\times(-0.1268796709)\right)\right)}+\left(\frac{8}{10}\right)^2$$

Result:

3.70535...

3.70535... result very near to the value of coefficient of q^n in $f(q)$ of Ramanujan mock theta function

1-6[((((-3(((-3*0.545^2(1-0.545)+0.776(3-4*0.545)-0.192)))^2+((sqrt6(71.47))/((sqrt(47526)))(-0.1268796709)))))]+(4+2)1/10^3

Input interpretation:

$$1-6\left(-3\left(-3\times 0.545^2(1-0.545)+0.776(3-4\times 0.545)-0.192\right)^2+\frac{\sqrt{6}\times 71.47}{\sqrt{47526}}\times(-0.1268796709)\right)+(4+2)\times\frac{1}{10^3}$$

Result:

1.64454291938701720505617977528089887640449438202247191 0112...

1.64454291938...

1-6[(((((-3(((-3*0.545^2(1-0.545)+0.776(3-4*0.545)-0.192)))^2+((sqrt6(71.47)))/((sqrt(47526)))(-0.1268796709)))))]-(18+2)1/10^3

Input interpretation:

$$1-6\left(-3\left(-3\times 0.545^2\,(1-0.545)+0.776\,(3-4\times 0.545)-0.192\right)^2+\frac{\sqrt{6}\times 71.47}{\sqrt{47526}}\times(-0.1268796709)\right)-(18+2)\times\frac{1}{10^3}$$

Result:

1.618542919387017205056179775280898876404494382022471910112...

1.61854291938…

Now:

$$\mathcal{P}''(T)\equiv\frac{\partial^2\mathcal{P}(T)}{\partial T^2}=\sqrt{\frac{3}{2}}\frac{H_0}{(-T)^{3/2}}\Big[j_0^3+3j_0^2(1+q_0)(6+11q_0)-3j_0q_0^2\big(12+q_0(29+16q_0)\big)+q_0^4\big(18+q_0(36+17q_0)\big)-15q_0^2(1+q_0)s_0+3j_0(5+7q_0)s_0+3s_0^2\Big]\;. \tag{63}$$

We obtain:

$T = -47526$; $H_0 = 71.47$; $q_0 = -0.545$; $j_0 = 0.776$ and $s_0 = -0.192$

(((0.776^3+3*0.776^2(1-0.545)(6-11*0.545)-3*0.776*0.545^2((12-0.545(29-16*0.545)))+0.545^4(18-0.545(36-17*0.545))-15*0.545^2(1-0.545)(-0.192)+3*0.776(5-7*0.545)(-0.192)+3*0.192^2)))

Input:

$$0.776^3+3\times 0.776^2\,(1-0.545)\,(6-11\times 0.545)-3\times 0.776\times 0.545^2\,(12-0.545\,(29-16\times 0.545))+0.545^4\,(18-0.545\,(36-17\times 0.545))-15\times 0.545^2\,(1-0.545)\times(-0.192)+3\times 0.776\,(5-7\times 0.545)\times(-0.192)+3\times 0.192^2$$

Result:

0.088999849049640625

0.088999849049640625

sqrt(3/2)(71.47)/((47526)^1.5)*(0.088999849049640625)

Input interpretation:

$$\sqrt{\frac{3}{2}} \times \frac{71.47}{47526^{1.5}} \times 0.088999849049640625$$

Result:

$7.5190294556425122579267078883374067985022509264000733... \times 10^{-7}$

7.5190294556…*10^{-7} = $\mathcal{P}''(T)$

From which:

[1/((((sqrt(3/2)(71.47)/((47526)^1.5)*(0.088999849)))))]^1/12+47/10^2

Input interpretation:

$$\sqrt[12]{\frac{1}{\sqrt{\frac{3}{2}} \times \frac{71.47}{47526^{1.5}} \times 0.088999849}} + \frac{47}{10^2}$$

Result:

3.70832...

3.70832… result very near to value of coefficient of q^n in $f(q)$ of Ramanujan mock theta function

[1/((((sqrt(3/2)(71.47)/((47526)^1.5)*(0.088999849)))))]^1/28 - 11/10^3

Input interpretation:

$$\sqrt[28]{\frac{1}{\sqrt{\frac{3}{2}} \times \frac{71.47}{47526^{1.5}} \times 0.088999849}} - \frac{11}{10^3}$$

Result:

1.6436590068042013064669145636360908471975973514409386021 10...

1.6436590068…

[1/((((sqrt(3/2)(71.47)/((47526)^1.5)*(0.088999849)))))]^1/29-8/10^3

Input interpretation:

$$\sqrt[29]{\frac{1}{\sqrt{\frac{3}{2}} \times \frac{71.47}{47526^{1.5}} \times 0.088999849}} - \frac{8}{10^3}$$

Result:

1.618173333043938004147887496083814134749634584838666765075...

1.618173333...

Now:

$$\mathcal{Q} \equiv -3q_0^2(1+q_0) + j_0(3+4q_0) + s_0 \ , \tag{51}$$

T = -47526; H_0 = 71.47; q_0 = -0.545; j_0 = 0.776 and s_0 = -0.192

-3*0.545^2(1-0.545)+0.776(3-4*0.545)-0.192

Input:

$-3 \times 0.545^2 (1 - 0.545) + 0.776 (3 - 4 \times 0.545) - 0.192$

Result:

0.038880875

0.038880875 = $\mathcal{Q}$

From which:

[1/(((-3*0.545^2(1-0.545)+0.776(3-4*0.545)-0.192)))]^1/3+76/10^2

Input:

$$\sqrt[3]{\frac{1}{-3\times 0.545^2\,(1-0.545)+0.776\,(3-4\times 0.545)-0.192}}+\frac{76}{10^2}$$

Result:

3.71181...

3.71181… result very near to the value of coefficient of q^n in $f(q)$ of Ramanujan mock theta function

1+1/[1/(((-3*0.545^2(1-0.545)+0.776(3-4*0.545)-0.192)))]^1/8-21/10^3

Input:

$$1+\frac{1}{\sqrt[8]{\frac{1}{-3\times 0.545^2\,(1-0.545)+0.776\,(3-4\times 0.545)-0.192}}}-\frac{21}{10^3}$$

Result:

1.645372404159118434483481098713107130385800553290655315703...

1.645372404….

1+1/[1/(((-3*0.545^2(1-0.545)+0.776(3-4*0.545)-0.192)))]^1/7-11/10^3

Input:

$$1+\frac{1}{\sqrt[7]{\frac{1}{-3\times 0.545^2\,(1-0.545)+0.776\,(3-4\times 0.545)-0.192}}}-\frac{11}{10^3}$$

Result:

1.617830674561736605783057885870507605318564690684630912326...

1.61783067456….

Now, from the following equation:

$$\mathcal{M}'(T) \equiv \frac{\partial \mathcal{M}(T)}{\partial T} = \frac{1}{\sqrt{2}} \left[\frac{\sqrt{3} H_0^2 \mathcal{Q}^2 T}{(-T)^{3/2}} + \frac{H_0^2 \mathcal{Q}}{\sqrt{\mathcal{P}(T)}} \mathcal{P}'(T) \right] , \tag{60}$$

T = -47526; H_0 = 71.47; q_0 = -0.545; j_0 = 0.776 and s_0 = -0.192;
$\mathcal{Q}$ = 0.038880875; -0.106423819.... = $\mathcal{P}'(t)$

we obtain:

1/sqrt2 (((((sqrt3*71.47^2*0.038880875^2*-47526)/(47526)^1.5 + ((71.47^2*0.038880875)*(-0.106423819))
/(sqrt(x*-47526))))))

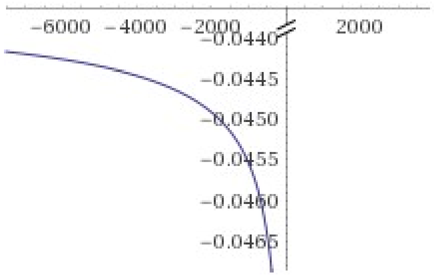
Input interpretation:

$$\frac{1}{\sqrt{2}} \left(\frac{\sqrt{3} \times 71.47^2 \times 0.038880875^2 \times (-47526)}{47526^{1.5}} + \frac{(71.47^2 \times 0.038880875) \times (-0.106423819)}{\sqrt{x \times (-47526)}} \right)$$

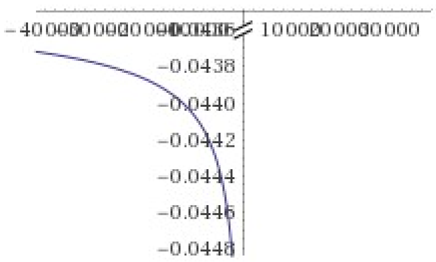
Result:

$$\frac{-\frac{0.096952}{\sqrt{-x}} - 0.06135}{\sqrt{2}}$$

Plots:



(x from −7529 to 3874)



(x from −41738 to 38082)

Alternate forms:

$$-\frac{0.0685554}{\sqrt{-x}}-0.043381$$

$$\frac{0.0685554\,(\sqrt{-x}-0.632787\,x)}{x}$$

$$-\frac{0.06135\sqrt{-x}+0.096952}{\sqrt{2}\,\sqrt{-x}}$$

Alternate form assuming x is positive:

$$-0.043381+\frac{0.0685554\,i}{\sqrt{x}}$$

Expanded form:

$$\frac{0.0685554\sqrt{-x}}{x}-0.043381$$

Roots:

(no roots exist)

Properties as a real function:

Domain

$\{x \in \mathbb{R} : x < 0\}$ (all negative real numbers)

Range

$$\{y \in \mathbb{R} : y < -\frac{6\,135\,000\,744\,044\,707}{100\,000\,000\,000\,000\,000\,\sqrt{2}}\}$$

Injectivity

injective (one-to-one)

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

Series expansion at x = 0:

$$\begin{cases} \left(-\frac{0.0685554}{\sqrt{-x}}-0.043381\right)+O(x^{13}) & \mathrm{Im}(x)\le 0 \\ \left(-0.0685554\left(\frac{1}{\sqrt{-x}}\right)^{*}-0.043381\right)+O(x^{13}) & \text{(otherwise)} \end{cases}$$

Series expansion at x = ∞:

$$\left(-\frac{0.0685554}{\sqrt{-x}}-0.043381\right)+O\left(\left(\frac{1}{x}\right)^{13}\right)$$

(generalized Puiseux series)

Derivative:

$$\frac{d}{dx}\left(\frac{-\frac{0.096952}{\sqrt{-x}} - 0.06135}{\sqrt{2}}\right) = -\frac{0.0342777}{(-x)^{3/2}}$$

Indefinite integral:

$$\int \frac{\frac{\sqrt{3}\ 71.47^2 \times 0.038880875^2 (-47526)}{47526^{1.5}} + \frac{(71.47^2 \times 0.038880875)(-0.106423819)}{\sqrt{x(-47526)}}}{\sqrt{2}} \, dx =$$

$$0.137111\sqrt{-x} - 0.043381\, x + \text{constant}$$

Limit:

$$\lim_{x\to\pm\infty} \frac{-0.06135 - \frac{0.096952}{\sqrt{-x}}}{\sqrt{2}} = -0.043381$$

Series representations:

$$\frac{\frac{\sqrt{3}\ 71.47^2 \times 0.0388809^2 (-47526)}{47526^{1.5}} + \frac{(71.47^2 \times 0.0388809)(-0.106424)}{\sqrt{x(-47526)}}}{\sqrt{2}} =$$

$$-\left(\left(0.0354204\left(596.717 + \sqrt{z_0}^2 \sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty} \frac{(-1)^{k_1+k_2}\left(-\frac{1}{2}\right)_{k_1}\left(-\frac{1}{2}\right)_{k_2}(3-z_0)^{k_1}(-47526\,x - z_0)^{k_2} z_0^{-k_1-k_2}}{k_1!\,k_2!}\right)\right) \Bigg/ \left(\sqrt{z_0}^2 \left(\sum_{k=0}^{\infty} \frac{(-1)^k\left(-\frac{1}{2}\right)_k (2-z_0)^k z_0^{-k}}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(-47526\,x - z_0)^k z_0^{-k}}{k!}\right)\right)$$

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

$$\frac{\frac{\sqrt{3}\ 71.47^2 \times 0.0388809^2 (-47526)}{47526^{1.5}} + \frac{(71.47^2 \times 0.0388809)(-0.106424)}{\sqrt{x(-47526)}}}{\sqrt{2}} =$$

$$-\left(\left(0.0354204\left(596.717 + \exp\left(i\pi\left\lfloor\frac{\arg(3-\xi)}{2\pi}\right\rfloor\right)\exp\left(i\pi\left\lfloor\frac{\arg(-47526x-\xi)}{2\pi}\right\rfloor\right)\sqrt{\xi}^2\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}\frac{(-1)^{k_1+k_2}(3-\xi)^{k_1}(-47526x-\xi)^{k_2}\xi^{-k_1-k_2}\left(-\frac{1}{2}\right)_{k_1}\left(-\frac{1}{2}\right)_{k_2}}{k_1!\,k_2!}\right)\right) \Big/ \left(\exp\left(i\pi\left\lfloor\frac{\arg(2-\xi)}{2\pi}\right\rfloor\right)\exp\left(i\pi\left\lfloor\frac{\arg(-47526x-\xi)}{2\pi}\right\rfloor\right)\sqrt{\xi}^2\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-\xi)^k\xi^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k(-47526x-\xi)^k\xi^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\right) \text{ for } (\xi \in \mathbb{R} \text{ and } \xi < 0)$$

$$\frac{\frac{\sqrt{3}\ 71.47^2 \times 0.0388809^2 (-47526)}{47526^{1.5}} + \frac{(71.47^2 \times 0.0388809)(-0.106424)}{\sqrt{x(-47526)}}}{\sqrt{2}} =$$

$$-\left(\left(0.0354204\left(\frac{1}{z_0}\right)^{-1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor-1/2\lfloor\arg(-47526x-z_0)/(2\pi)\rfloor} z_0^{-1-1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor-1/2\lfloor\arg(-47526x-z_0)/(2\pi)\rfloor}\left(596.717 + \left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(3-z_0)/(2\pi)\rfloor+1/2\lfloor\arg(-47526x-z_0)/(2\pi)\rfloor} z_0^{1+1/2\lfloor\arg(3-z_0)/(2\pi)\rfloor+1/2\lfloor\arg(-47526x-z_0)/(2\pi)\rfloor}\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}\frac{(-1)^{k_1+k_2}\left(-\frac{1}{2}\right)_{k_1}\left(-\frac{1}{2}\right)_{k_2}(3-z_0)^{k_1}(-47526x-z_0)^{k_2}z_0^{-k_1-k_2}}{k_1!\,k_2!}\right)\right)\Big/\left(\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(-47526x-z_0)^k z_0^{-k}}{k!}\right)\right)$$

From

$$\frac{-\frac{0.096952}{\sqrt{-x}} - 0.06135}{\sqrt{2}}$$

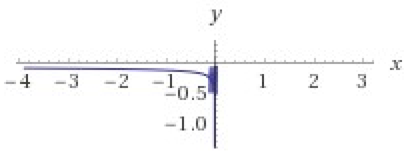
We obtain:

(-0.06135 - 0.096952/sqrt(-x))/sqrt(2) = y

Input:

$$\frac{-0.06135 - \frac{0.096952}{\sqrt{-x}}}{\sqrt{2}} = y$$

Implicit plot:



Alternate forms:

$$-\frac{0.0685554}{\sqrt{-x}} - 0.043381 = y$$

$$y = -\frac{0.0685554}{\sqrt{-x}} - 0.043381$$

$$\frac{0.0685554\,(\sqrt{-x} - 0.632787\,x)}{x} = y$$

Alternate form assuming x and y are positive:

$$-0.043381 + \frac{0.0685554\,i}{\sqrt{x}} = y$$

Expanded form:

$$\frac{0.0685554\sqrt{-x}}{x} - 0.043381 = y$$

Real solution:

$$x \le 0\,, \quad y \approx \frac{1.11649\times10^{-17}\,(6.14025\times10^{15}\sqrt{-x} - 3.88547\times10^{15}\,x)}{x}$$

Partial derivatives:

$$\frac{\partial}{\partial x}\left(\frac{-\frac{0.096952}{\sqrt{-x}} - 0.06135}{\sqrt{2}}\right) = -\frac{0.0342777}{(-x)^{3/2}}$$

$$\frac{\partial}{\partial y}\left(\frac{-\frac{0.096952}{\sqrt{-x}} - 0.06135}{\sqrt{2}}\right) = 0$$

Implicit derivatives:

$$\frac{\partial x(y)}{\partial y} = -((2\,000\,000\,000\,000\,(2\,349\,922\,576\,x^2\,y - 940\,955\,625\,x^3\,y + 500\,000\,000\,000\,x^3\,y^3))/(5\,522\,136\,113\,194\,475\,776 + 8\,844\,691\,464\,806\,760\,000\,x + 2\,656\,192\,464\,657\,421\,875\,x^2 + 4\,699\,845\,152\,000\,000\,000\,000\,x\,y^2 - 2\,822\,866\,875\,000\,000\,000\,000\,x^2\,y^2 + 750\,000\,000\,000\,000\,000\,000\,000\,x^2\,y^4))$$

$$\frac{\partial y(x)}{\partial x} = (-5\,522\,136\,113\,194\,475\,776 - 8\,844\,691\,464\,806\,760\,000\,x - 2\,656\,192\,464\,657\,421\,875\,x^2 - 4\,699\,845\,152\,000\,000\,000\,000\,x\,y^2 + 2\,822\,866\,875\,000\,000\,000\,000\,x^2\,y^2 - 750\,000\,000\,000\,000\,000\,000\,000\,x^2\,y^4)/(2\,000\,000\,000\,000\,x^2\,y\,(2\,349\,922\,576 - 940\,955\,625\,x + 500\,000\,000\,000\,x\,y^2))$$

Limit:

$$\lim_{x\to\pm\infty} \frac{-0.06135 - \frac{0.096952}{\sqrt{-x}}}{\sqrt{2}} = -0.043381$$

For the following alternate form

$$y = -\frac{0.0685554}{\sqrt{-x}} - 0.043381$$

and from

$$\frac{-\frac{0.096952}{\sqrt{-x}} - 0.06135}{\sqrt{2}}$$

Performing the following calculations

((0.096952i)/sqrt(x) - 0.06135)/sqrt(2) = (0.0685554i)/sqrt(x) - 0.043381

We obtain:

Input interpretation:

$$\frac{\frac{0.096952\,i}{\sqrt{x}} - 0.06135}{\sqrt{2}} = \frac{0.0685554\,i}{\sqrt{x}} - 0.043381$$

i is the imaginary unit

Result:

$$\frac{-0.06135 + \frac{0.096952\,i}{\sqrt{x}}}{\sqrt{2}} = -0.043381 + \frac{0.0685554\,i}{\sqrt{x}}$$

Alternate form assuming x is real:

$$1 - \frac{16.2309\,i}{\sqrt{x}} = 0$$

Alternate form:

$$-\frac{0.043381\,(\sqrt{x} - 1.58031\,i)}{\sqrt{x}} = -\frac{0.043381\,(\sqrt{x} - 1.58031\,i)}{\sqrt{x}}$$

Expanded form:

$$-0.043381 + \frac{0.0685554\,i}{\sqrt{x}} = -0.043381 + \frac{0.0685554\,i}{\sqrt{x}}$$

Solution:

$x \approx -263.443$ (assuming a complex-valued square root)

$\mathcal{P} = -263.443$

Inserting this value in the initial equation, i.e.:

$$\mathcal{M}'(T) \equiv \frac{\partial \mathcal{M}(T)}{\partial T} = \frac{1}{\sqrt{2}}\left[\frac{\sqrt{3}H_0^2 \mathcal{Q}^2 T}{(-T)^{3/2}} + \frac{H_0^2 \mathcal{Q}}{\sqrt{\mathcal{P}(T)}}\mathcal{P}'(T)\right],$$

$T = -47526$; $H_0 = 71.47$; $q_0 = -0.545$; $j_0 = 0.776$ and $s_0 = -0.192$;
$\mathcal{Q} = 0.038880875$; $\mathcal{P}'(t) = -0.106423819$; $\mathcal{P} = -263.443$

we obtain:

1/sqrt2 (((((sqrt3*71.47^2*0.038880875^2*-47526)/(47526)^1.5 + ((71.47^2*0.038880875)*(-0.106423819)) /(sqrt(-263.443*-47526))))))

Input interpretation:

$$\frac{1}{\sqrt{2}}\left(\frac{\sqrt{3}\times 71.47^2\times 0.038880875^2\times(-47526)}{47526^{1.5}}+\frac{(71.47^2\times 0.038880875)\times(-0.106423819)}{\sqrt{-263.443\times(-47526)}}\right)$$

Result:

−0.04760475888894429602846562812611165886742362652196178121...

-0.047604758888…

We have also this other method:

1/sqrt2 (((((sqrt3*71.47^2*0.038880875^2*-47526)/(47526)^1.5 + ((71.47^2*0.038880875)*(-0.106423819)) /(sqrt(x)))))) = y

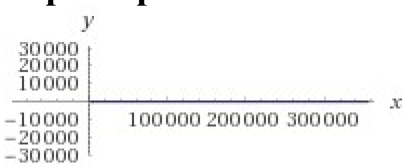
Input interpretation:

$$\frac{1}{\sqrt{2}}\left(\frac{\sqrt{3}\times 71.47^2\times 0.038880875^2\times(-47526)}{47526^{1.5}}+\frac{(71.47^2\times 0.038880875)\times(-0.106423819)}{\sqrt{x}}\right)=y$$

Result:

$$\frac{-\frac{21.136}{\sqrt{x}}-0.06135}{\sqrt{2}}=y$$

Implicit plot:



Alternate forms:

$$-\frac{14.9454}{\sqrt{x}}-0.043381=y$$

$$-\frac{0.043381\,(\sqrt{x}+344.515)}{\sqrt{x}}=y$$

Expanded form:

$$-\frac{14.9454}{\sqrt{x}}-0.043381=y$$

Solution:

$$x\neq 0,\quad y\approx -\frac{6.7206\times 10^{-16}\,(6.45493\times 10^{13}\sqrt{x}+2.22382\times 10^{16})}{\sqrt{x}}$$

Partial derivatives:

$$\frac{\partial}{\partial x}\left(\frac{-\frac{21.136}{\sqrt{x}}-0.06135}{\sqrt{2}}\right)=\frac{7.4727}{x^{3/2}}$$

$$\frac{\partial}{\partial y}\left(\frac{-\frac{21.136}{\sqrt{x}}-0.06135}{\sqrt{2}}\right)=0$$

Implicit derivatives:

$$\frac{\partial x(y)}{\partial y}= -((53\,652\,494\,422\,828\,802\,(-315\,256\,899\,000\,469\,308\,478\,282\,530\,480\,025\,x\,y-2\,656\,127\,825\,370\,075\,068\,628\,570\,724\,x^2\,y+1\,411\,398\,747\,473\,790\,015\,631\,462\,337\,378\,x^2\,y^3))/(-15\,915\,627\,481\,019\,106\,916\,598\,771\,051\,871\,537\,797\,028\,536\,450+134\,093\,626\,958\,173\,419\,367\,795\,458\,356\,970\,658\,589\,192\,x-8\,457\,159\,507\,690\,491\,248\,459\,318\,869\,262\,501\,906\,373\,727\,840\,025\,y^2-142\,507\,883\,336\,988\,346\,759\,238\,026\,916\,271\,998\,201\,192\,648\,x\,y^2+37\,862\,531\,713\,612\,537\,754\,785\,048\,988\,205\,807\,176\,829\,780\,578\,x\,y^4))$$

$$\frac{\partial y(x)}{\partial x}=(-52\,612\,604\,974\,178\,x\,(50\,484\,628\,667\,858-26\,826\,247\,211\,414\,401\,y^2)^2+315\,256\,899\,000\,469\,308\,478\,282\,530\,480\,025\,(50\,484\,628\,667\,858+26\,826\,247\,211\,414\,401\,y^2))/(53\,652\,494\,422\,828\,802\,x\,y\,(-315\,256\,899\,000\,469\,308\,478\,282\,530\,480\,025+52\,612\,604\,974\,178\,x\,(-50\,484\,628\,667\,858+26\,826\,247\,211\,414\,401\,y^2)))$$

Limit:

$$\lim_{x\to\pm\infty}\frac{-0.06135-\frac{21.136}{\sqrt{x}}}{\sqrt{2}}=-0.043381$$

1/sqrt2 (((((sqrt3*71.47^2*0.038880875^2*-47526)/(47526)^1.5 + ((71.47^2*0.038880875)*(-0.106423819)) /(sqrt(x)))))) = -(0.043381 (sqrt(x) + 344.515))/sqrt(x)

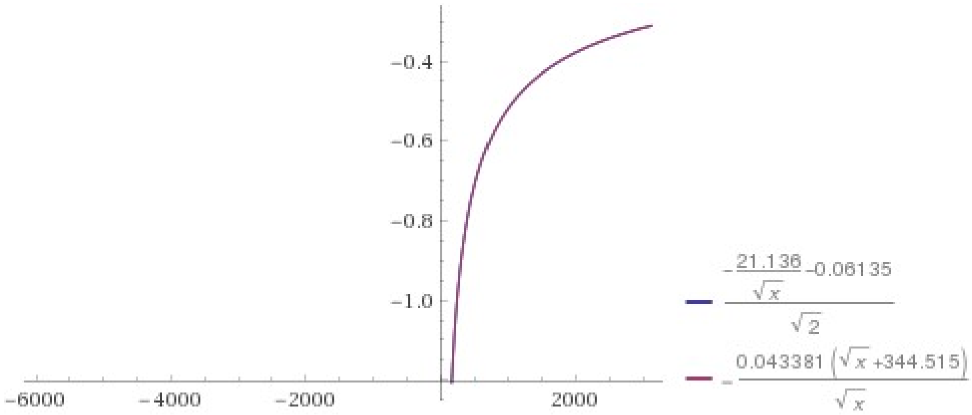
Input interpretation:

$$\frac{1}{\sqrt{2}}\left(\frac{\sqrt{3}\times 71.47^2\times 0.038880875^2\times(-47526)}{47526^{1.5}}+\frac{(71.47^2\times 0.038880875)\times(-0.106423819)}{\sqrt{x}}\right)=-\frac{0.043381\,(\sqrt{x}+344.515)}{\sqrt{x}}$$

Result:

$$\frac{-\frac{21.136}{\sqrt{x}}-0.06135}{\sqrt{2}}=-\frac{0.043381\,(\sqrt{x}+344.515)}{\sqrt{x}}$$

Plot:



Alternate form assuming x is real:

$$\frac{1416.29}{\sqrt{x}}=1$$

Alternate forms:

$$-\frac{14.9454}{\sqrt{x}}-0.043381=-\frac{14.9454}{\sqrt{x}}-0.043381$$

$$-\frac{0.043381\,(\sqrt{x}+344.515)}{\sqrt{x}}=-\frac{0.043381\,(\sqrt{x}+344.515)}{\sqrt{x}}$$

Alternate form assuming x is positive:

$$\sqrt{x}=1416.29$$

Expanded form:

$$-\frac{14.9454}{\sqrt{x}} - 0.043381 = -\frac{14.9454}{\sqrt{x}} - 0.043381$$

Solution:

$x \approx 2.00587 \times 10^6$

$2.00587*10^6 = \mathcal{P}(T)$

Thence, from

$$\mathcal{M}'(T) \equiv \frac{\partial \mathcal{M}(T)}{\partial T} = \frac{1}{\sqrt{2}} \left[\frac{\sqrt{3} H_0^2 Q^2 T}{(-T)^{3/2}} + \frac{H_0^2 Q}{\sqrt{\mathcal{P}(T)}} \mathcal{P}'(T) \right] ,$$

we obtain:

1/sqrt2 (((((sqrt3*71.47^2*0.038880875^2*-47526)/(47526)^1.5 + ((71.47^2*0.038880875)*(-0.106423819)) /(sqrt(2.00587×10^6))

Input interpretation:

$$\frac{1}{\sqrt{2}} \left(\frac{\sqrt{3} \times 71.47^2 \times 0.038880875^2 \times (-47526)}{47526^{1.5}} + \frac{(71.47^2 \times 0.038880875) \times (-0.106423819)}{\sqrt{2.00587 \times 10^6}} \right)$$

Result:

$-0.0539335\ldots$

$-0.0539335\ldots = \mathcal{M}'(T)$

From which:

-1/(((((((1/sqrt2 (((((sqrt3*71.47^2*0.038880875^2*-47526)/(47526)^1.5 + ((71.47^2*0.038880875)*(-0.106423819)) /(sqrt(2.00587×10^6))))))))))))

Input interpretation:

$$-\frac{1}{\frac{1}{\sqrt{2}} \left(\frac{\sqrt{3} \times 71.47^2 \times 0.038880875^2 \times (-47526)}{47526^{1.5}} + \frac{(71.47^2 \times 0.038880875) \times (-0.106423819)}{\sqrt{2.00587 \times 10^6}} \right)}$$

Result:

18.5413...

18.5413... result very near to the value of the entropy black hole 18.2773 that is equal to the ln(86645620)

Now, we have that:

For:

$T = -47526$; $H_0 = 71.47$; $q_0 = -0.545$; $j_0 = 0.776$ and $s_0 = -0.192$;
$\mathcal{Q} = 0.038880875$; $\mathcal{P}'(t) = -0.106423819$; $2.00587*10^6 = \mathcal{P}(T)$

$7.5190294556...*10^{-7} = \mathcal{P}''(T)$

$$\mathcal{M}''(T) \equiv \frac{\partial^2 \mathcal{M}(T)}{\partial T^2} = -\frac{\sqrt{-3T}H_0^2\mathcal{Q}^2\mathcal{P}(T)^2 + H_0^2\mathcal{Q}T^2\mathcal{P}(T)^{1/2}\mathcal{P}'(T)^2 - 2H_0^2\mathcal{Q}T^2\mathcal{P}(T)^{3/2}\mathcal{P}''(T)}{2\sqrt{2}T^2\mathcal{P}(T)^2}, \quad (61)$$

we obtain:

((((2sqrt2 *47526^2*(2.00587e+6)^2))))

Input interpretation:

$2\sqrt{2} \times 47526^2 (2.00587 \times 10^6)^2$

Result:

$2.57047... \times 10^{22}$

2.57047…*10^{22}

-[sqrt(-3*-47526)*71.47^2*0.038880875^2*(2.00587e+6)^2
+71.47^2*0.038880875*(47526)^2*(2.00587e+6)^1/2*(0.106423819)^2 –
2*71.47^2*0.038880875*(47526)^2*(2.00587e+6)^1.5*(7.519029e-
7)]/(2.57047e+22)

Input interpretation:

$$-\frac{1}{2.57047\times 10^{22}}\left(\sqrt{-3\times(-47526)}\times 71.47^2\times 0.038880875^2\,(2.00587\times 10^6)^2+71.47^2\times 0.038880875\times 47526^2\,\sqrt{2.00587\times 10^6}\times 0.106423819^2+2\times 71.47^2\times 47526^2\,(2.00587\times 10^6)^{1.5}\times 7.519029\times 10^{-7}\times(-0.038880875)\right)$$

Result:

$-3.82117\ldots\times 10^{-7}$

$-3.82117\ldots*10^{-7} = \mathcal{M}''(T)$

From which:

0.29+1/((-[sqrt(3*47526)*71.47^2*0.03888^2*(2.00587e+6)^2 +71.47^2*0.03888*(47526)^2*(2.00587e+6)^1/2*(0.106423819)^2 – 2*71.47^2*0.03888*(47526)^2*(2.00587e+6)^1.5*(7.519029e-7)]/(2.57047e+22)))^1/12

Input interpretation:

$$0.29+1\Big/\left(\left(-\frac{1}{2.57047\times 10^{22}}\left(\sqrt{3\times 47526}\times 71.47^2\times 0.03888^2\,(2.00587\times 10^6)^2+71.47^2\times 0.03888\times 47526^2\,\sqrt{2.00587\times 10^6}\times 0.106423819^2-2\times 71.47^2\times 0.03888\times 47526^2\,(2.00587\times 10^6)^{1.5}\times 7.519029\times 10^{-7}\right)\right)\hat{}\,(1/12)\right)$$

Result:

$3.59950\ldots -$
$0.886778\ldots\, i$

Polar coordinates:

$r = 3.70713$ (radius), $\theta = -13.8399°$ (angle)

3.70713… result very near to the value of coefficient of q^n in $f(q)$ of Ramanujan mock theta function

From which:

1/((-[sqrt(3*47526)*71.47^2*0.03888^2*(2.00587e+6)^2 +71.47^2*0.03888*(47526)^2*(2.00587e+6)^1/2*(0.1064238)^2 – 2*71.47^2*0.03888*(47526)^2*(2.00587e+6)^1.5*(7.519029e-7)]/(2.57047e+22)))^1/30+8/10^3

Input interpretation:

$$1/\left(\left(-\frac{1}{2.57047\times 10^{22}}\left(\sqrt{3\times 47526}\times 71.47^2\times 0.03888^2\left(2.00587\times 10^6\right)^2+71.47^2\times 0.03888\times 47526^2\sqrt{2.00587\times 10^6}\times 0.1064238^2-2\times 71.47^2\times 0.03888\times 47526^2\left(2.00587\times 10^6\right)^{1.5}\times 7.519029\times 10^{-7}\right)\right)\wedge(1/30)\right)+\frac{8}{10^3}$$

Result:

1.63558... −
0.171065... i

Polar coordinates:

$r = 1.6445$ (radius), $\theta = -5.97087°$ (angle)

1.6445

and:

1/((-[sqrt(3*47526)*71.47^2*0.03888^2*(2.00587e+6)^2 +71.47^2*0.03888*(47526)^2*(2.00587e+6)^1/2*(0.1064238)^2 – 2*71.47^2*0.03888*(47526)^2*(2.00587e+6)^1.5*(7.519029e-7)]/(2.57047e+22)))^1/31+8/10^3

Input interpretation:

$$1/\left(\left(-\frac{1}{2.57047\times 10^{22}}\left(\sqrt{3\times 47526}\times 71.47^2\times 0.03888^2\left(2.00587\times 10^6\right)^2+71.47^2\times 0.03888\times 47526^2\sqrt{2.00587\times 10^6}\times 0.1064238^2-2\times 71.47^2\times 0.03888\times 47526^2\left(2.00587\times 10^6\right)^{1.5}\times 7.519029\times 10^{-7}\right)\right)\wedge(1/31)\right)+\frac{8}{10^3}$$

Result:

1.61048... −
0.162956... i

Polar coordinates:

$r = 1.6187$ (radius), $\theta = -5.7778°$ (angle)

1.6187

We have:

$-3.82117\ldots*10^{-7} = \mathcal{M}''(T)$; $-0.0539335\ldots = \mathcal{M}'(T)$; $2.00587*10^{6} = \mathcal{P}(T)$;
$0.038880875 = \mathcal{Q}$; $7.5190294556\ldots*10^{-7} = \mathcal{P}''(T)$; $-0.106423819\ldots. = \mathcal{P}'(T)$;

From the sum of the results of the eqs.(60)-(63), performing the 30th root and subtracting $4/10^3$, where 4 is a Lucas number, we obtain:

(-3.82117*10^-7 -0.0539335 + 2.00587*10^6 + 7.5190294556*10^-7 - 0.106423819)^1/30-4/10^3

Input interpretation:

$$\left(-3.82117\times 10^{-7} - 0.0539335 + 2.00587\times 10^{6} + 7.5190294556\times 10^{-7} - 0.106423819\right)\hat{}\,(1/30) - \frac{4}{10^3}$$

Result:

1.618096765409247052057236000073767459370959518199623270272...

1.6180967654....

and:

(-3.82117*10^-7 -0.0539335 + 2.00587*10^6 + 7.5190294556*10^-7 - 0.106423819)^1/29-5/10^3

Input interpretation:

$$\left(-3.82117\times 10^{-7} - 0.0539335 + 2.00587\times 10^{6} + 7.5190294556\times 10^{-7} - 0.106423819\right)\hat{}\,(1/29) - \frac{5}{10^3}$$

Result:

1.644380229089467909630420679553024960170624080134395528653...

1.644380229089....

Note that, we obtain also the following interesting mathematical connections:

(-3.82117*10^-7 -0.0539335 + 2.00587*10^6 + 7.5190294556*10^-7 - 0.106423819)^1/3-1/golden ratio

Input interpretation:

$$\left(-3.82117\times10^{-7}-0.0539335+2.00587\times10^{6}+7.5190294556\times10^{-7}-0.106423819\right)\verb|^|(1/3)-\frac{1}{\phi}$$

ϕ is the golden ratio

Result:

125.497...

125.497...

(-3.82117*10^-7 -0.0539335 + 2.00587*10^6 + 7.5190294556*10^-7 - 0.106423819)^1/3+13+1/golden ratio

Input interpretation:

$$\left(-3.82117\times10^{-7}-0.0539335+2.00587\times10^{6}+7.5190294556\times10^{-7}-0.106423819\right)\verb|^|(1/3)+13+\frac{1}{\phi}$$

ϕ is the golden ratio

Result:

139.733...

139.733...

27*1/2(((-3.82117*10^-7 -0.0539335 + 2.00587*10^6 + 7.5190294556*10^-7 - 0.106423819)^1/3+2))-1/2

Input interpretation:

$$27\times\frac{1}{2}\left(\left(-3.82117\times10^{-7}-0.0539335+2.00587\times10^{6}+7.5190294556\times10^{-7}-0.106423819\right)\verb|^|(1/3)+2\right)-\frac{1}{2}$$

Result:

1729.06...

1729.06

From the following Ramanujan Taxicab Numbers

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

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

we obtain:

135^3+138^3 – 9^3+10^3 = 5088718

Input:

$$135^3 + 138^3 - 9^3 + 10^3$$

Result:

5 088 718

5088718

From which:

(5088718 - 135^3+9^3 - 10^3)^1/3+golden ratio

Input:

$$\sqrt[3]{5\,088\,718 - 135^3 + 9^3 - 10^3} + \phi$$

ϕ is the golden ratio

Result:

$$\phi + 138$$

Decimal approximation:

139.6180339887498948482045868343656381177203091798057628621...

139.61803398….

Alternate forms:

$$\frac{1}{2}\left(277 + \sqrt{5}\right)$$

$$\frac{277}{2}+\frac{\sqrt{5}}{2}$$

$$138+\frac{1}{2}\left(1+\sqrt{5}\right)$$

Alternative representations:

$$\sqrt[3]{5\,088\,718-135^3+9^3-10^3}+\phi=\sqrt[3]{5\,088\,718+9^3-10^3-135^3}+2\sin(54\,°)$$

$$\sqrt[3]{5\,088\,718-135^3+9^3-10^3}+\phi=-2\cos(216\,°)+\sqrt[3]{5\,088\,718+9^3-10^3-135^3}$$

$$\sqrt[3]{5\,088\,718-135^3+9^3-10^3}+\phi=\sqrt[3]{5\,088\,718+9^3-10^3-135^3}-2\sin(666\,°)$$

(5088718 - 138^3+9^3 - 10^3)^1/3-10+1/golden ratio

Input:

$$\sqrt[3]{5\,088\,718-138^3+9^3-10^3}-10+\frac{1}{\phi}$$

ϕ is the golden ratio

Result:

$$\frac{1}{\phi}+125$$

Decimal approximation:

125.6180339887498948482045868343656381177203091798057628621...

125.61803398….

Alternate forms:

$$\frac{1}{2}\left(249+\sqrt{5}\right)$$

$$\frac{125\,\phi+1}{\phi}$$

$$\frac{\sqrt{5}}{2}+\frac{249}{2}$$

Alternative representations:

$$\sqrt[3]{5\,088\,718-138^3+9^3-10^3}-10+\frac{1}{\phi}=$$
$$-10+\sqrt[3]{5\,088\,718+9^3-10^3-138^3}+\frac{1}{2\sin(54\,°)}$$

$$\sqrt[3]{5088718 - 138^3 + 9^3 - 10^3} - 10 + \frac{1}{\phi} =$$

$$-10 + -\frac{1}{2\cos(216°)} + \sqrt[3]{5088718 + 9^3 - 10^3 - 138^3}$$

$$\sqrt[3]{5088718 - 138^3 + 9^3 - 10^3} - 10 + \frac{1}{\phi} =$$

$$-10 + \sqrt[3]{5088718 + 9^3 - 10^3 - 138^3} + -\frac{1}{2\sin(666°)}$$

135^3+138^3 – x = 5086718

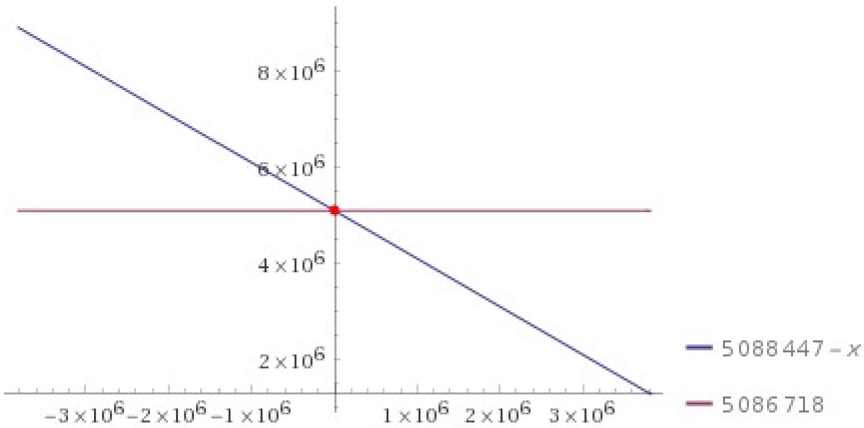
Input:

$135^3 + 138^3 - x = 5086718$

Result:

$5088447 - x = 5086718$

Plot:



Alternate form:

$1729 - x = 0$

Solution:

$x = 1729$

1729

Observations

Figs.

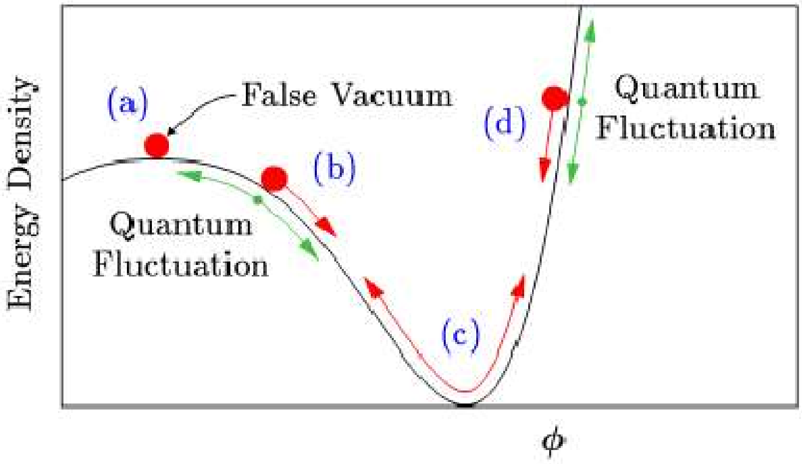
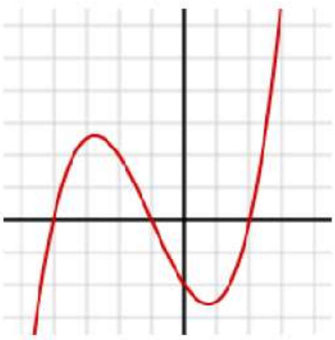


FIG. 1: In simple inflationary models, the universe at early times is dominated by the potential energy density of a scalar field, ϕ. Red arrows show the classical motion of ϕ. When ϕ is near region (a), the energy density will remain nearly constant, $\rho \cong \rho_f$, even as the universe expands. Moreover, cosmic expansion acts like a frictional drag, slowing the motion of ϕ: Even near regions (b) and (d), ϕ behaves more like a marble moving in a bowl of molasses, slowly creeping down the side of its potential, rather than like a marble sliding down the inside of a polished bowl. During this period of "slow roll," ρ remains nearly constant. Only after ϕ has slid most of the way down its potential will it begin to oscillate around its minimum, as in region (c), ending inflation.



Graph of a cubic function with 3 real roots (where the curve crosses the horizontal axis at $y = 0$). The case shown has two critical points. Here the function is $f(x) = (x^3 + 3x^2 - 6x - 8)/4$.

The ratio between M_0 and q

$$M_0 = \sqrt{3q^2 - \Sigma^2},$$

$$q = \frac{(3\sqrt{3})\, M_s}{2}.$$

i.e. the gravitating mass M_0 and the Wheelerian mass q of the wormhole, is equal to:

$$\frac{\sqrt{3\,(2.17049\times 10^{37})^2 - 0.001^2}}{\frac{1}{2}\,((3\sqrt{3})\,(4.2\times 10^6 \times 1.9891\times 10^{30}))}$$

1.7320507879051944207039476256710181600835665488020824605 20...

1.7320507879

$1.7320507879 \approx \sqrt{3}$ that is the ratio between the gravitating mass M_0 and the Wheelerian mass q of the wormhole

We note that:

$$\left(-\frac{1}{2}+\frac{i}{2}\sqrt{3}\right)-\left(-\frac{1}{2}-\frac{i}{2}\sqrt{3}\right)$$

i is the imaginary unit

$i\sqrt{3}$

1.7320508075688772935274463415058723669428052538103806280 55... i

$r \approx 1.73205$ (radius), $\theta = 90°$ (angle)

1.73205

This result is very near to the ratio between M_0 and q, that is equal to 1.7320507879 $\approx \sqrt{3}$

With regard $\sqrt{3}$, we note that is a fundamental value of the formula structure that we need to calculate a Cubic Equation

We have that the previous result

$$\left(-\frac{1}{2}+\frac{i}{2}\sqrt{3}\right)-\left(-\frac{1}{2}-\frac{i}{2}\sqrt{3}\right) = i\sqrt{3} =$$

$$= 1.7320508075688772935274463415058723669428052538103806280558...\, i$$

$r \approx 1.73205$ (radius), $\theta = 90°$ (angle)

can be related with:

$$u^2(-u)\left(\frac{1}{2}\pm\frac{i\sqrt{3}}{2}\right)+v^2(-v)\left(\frac{1}{2}\pm\frac{i\sqrt{3}}{2}\right)=q$$

Considering:

$$(-1)\left(\frac{1}{2}-\frac{i\sqrt{3}}{2}\right)-(-1)\left(\frac{1}{2}+\frac{i\sqrt{3}}{2}\right)=q$$

$$= i\sqrt{3} = 1.7320508075688772935274463415058723669428052538103806280558...\, i$$

$r \approx 1.73205$ (radius), $\theta = 90°$ (angle)

Thence:

$$\left(-\frac{1}{2}+\frac{i}{2}\sqrt{3}\right)-\left(-\frac{1}{2}-\frac{i}{2}\sqrt{3}\right) \Rightarrow$$

$$\Rightarrow (-1)\left(\frac{1}{2}-\frac{i\sqrt{3}}{2}\right)-(-1)\left(\frac{1}{2}+\frac{i\sqrt{3}}{2}\right)=q=1.73205\approx\sqrt{3}$$

We observe how the graph above, concerning the cubic function, is very similar to the graph that represent the scalar field (in red). It is possible to hypothesize that cubic functions and cubic equations, with their roots, are connected to the scalar field.

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

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

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

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

From Wikipedia

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

Can be this the motivation that from the development of the Ramanujan's equations we obtain results very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0 and to the Higgs boson mass 125.18 GeV and practically equal to the rest mass of Pion meson 139.57 MeV

Note that:

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

Hence

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

so that

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

Hence

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

Thence:

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

And

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

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

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

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

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

Fibonacci numbers are also closely related to Lucas numbers ,in that the Fibonacci and Lucas numbers form a complementary pair of Lucas sequences

The beginning of the sequence is thus:

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

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

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

The sequence of Lucas numbers is:

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

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

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

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

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

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

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

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

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A 6% measurement of the Hubble parameter at z ≈ 0.45: direct evidence of the epoch of cosmic re-acceleration
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