On the new mathematical connections between some Ramanujan formulas and various parameters of Particle Physics, Planck units values, ϕ and $\zeta(2)$. IV

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Abstract

In this paper (part IV) we describe and analyze new mathematical connections between some Ramanujan formulas and various parameters of Particle Physics, Planck units values, ϕ and $\zeta(2)$.

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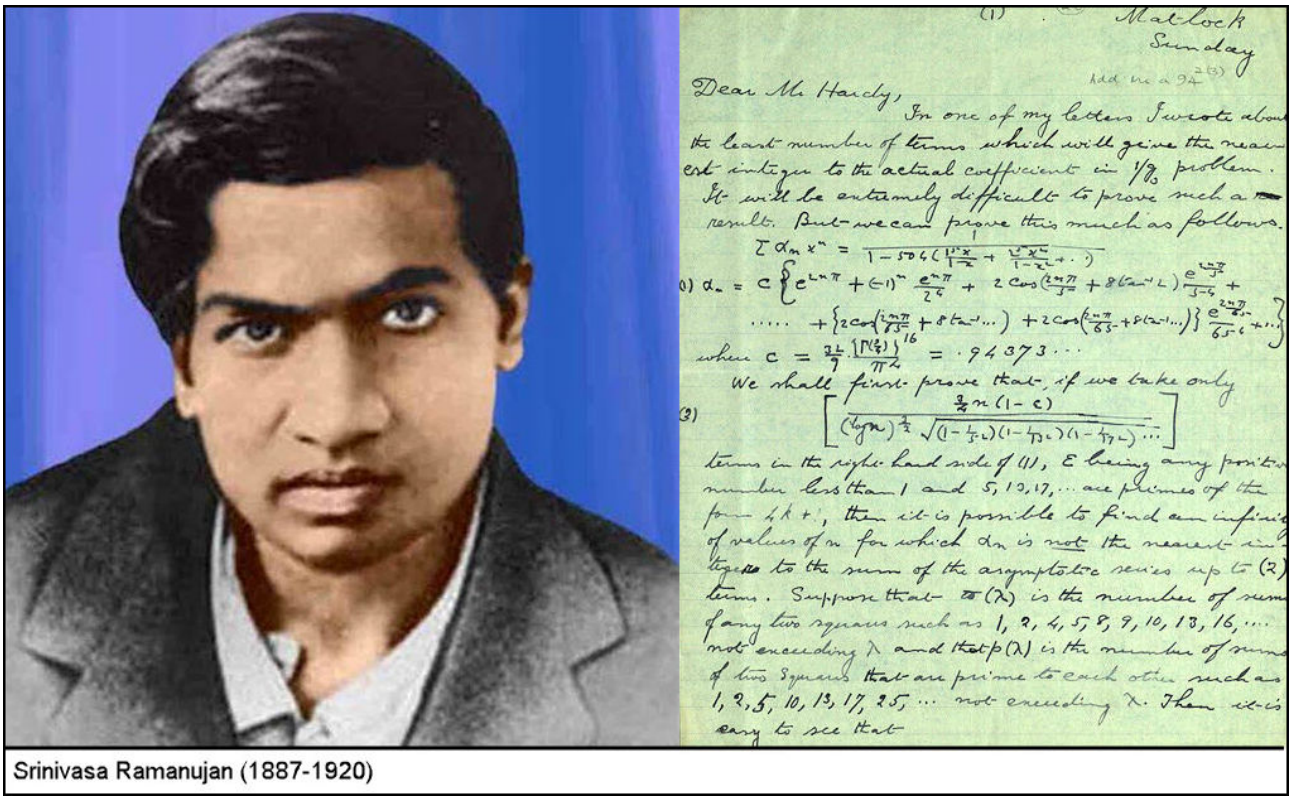

Srinivasa Ramanujan (1887-1920)

https://the-1000-year-view.com/2020/04/25/ramanujan-and-me/

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

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

From:

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8. It appears that

$$(8.1)\quad x\{(1-x)(1-x^2)(1-x^3)\dots\}^3\{(1-x^7)(1-x^{14})(1-x^{21})\dots\}^3 + 8x^2\cdot\frac{\{(1-x^7)(1-x^{14})(1-x^{21})\dots\}^7}{(1-x)(1-x^2)(1-x^3)\dots}$$
$$= x\cdot\frac{1+x}{(1-x)^3} + x^2\cdot\frac{1+x^2}{(1-x^2)^3} - x^3\frac{1+x^3}{(1-x^3)^3} + x^4\cdot\frac{1+x^4}{(1-x^4)^3}$$
$$- x^5\cdot\frac{1+x^5}{(1-x^5)^3} - x^6\cdot\frac{1+x^6}{(1-x^6)^3} + x^8\cdot\frac{1+x^8}{(1-x^8)^3} + \dots;$$

while the allied function

$$(8.2)\quad 49x\{(1-x)(1-x^2)(1-x^3)\dots\}^3\{(1-x^7)(1-x^{14})(1-x^{21})\dots\}^3 + 8\cdot\frac{\{(1-x)(1-x^2)(1-x^3)\dots\}^7}{(1-x^7)(1-x^{14})(1-x^{21})\dots}$$
$$= 8 - 7\left(\frac{x}{1-x} + \frac{4x^2}{1-x^2} - \frac{9x^3}{1-x^3} + \frac{16x^4}{1-x^4} - \frac{25x^5}{1-x^5} - \frac{36x^6}{1-x^6} + \frac{64x^8}{1-x^8} + \dots\right).$$

Now remembering that

$$\{(1-x)(1-x^2)\dots\}^3 = 1 - 3x + 5x^3 - 7x^6 + \dots$$

and picking out the terms $x^7, x^{14}, x^{21}, \dots$ from both sides in (8.1) we obtain

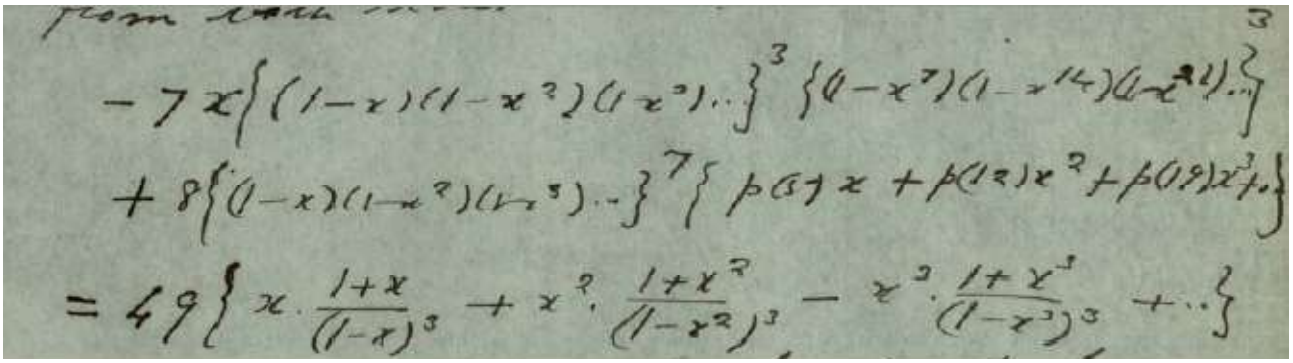
$$-7x\{(1-x)(1-x^2)(1-x^3)\dots\}^3\{(1-x^7)(1-x^{14})(1-x^{21})\dots\}^3 + 8\{(1-x)(1-x^2)(1-x^3)\dots\}^7\{p(3)x + p(12)x^2 + p(19)x^3 + \dots\}$$
$$= 49\left\{x\cdot\frac{1+x}{(1-x)^3} + x^2\cdot\frac{1+x^2}{(1-x^2)^3} - x^3\cdot\frac{1+x^3}{(1-x^3)^3} + \dots\right\}$$

the series in the right hand side being the same as that in (8.1). It follows from this and (8.1) that

$$(8.3)\quad p(5) + p(12)x + p(19)x^2 + p(26)x^3 + \dots$$
$$= 7\cdot\frac{\{(1-x^7)(1-x^{14})(1-x^{21})\dots\}^3}{\{(1-x)(1-x^2)(1-x^3)\dots\}^4} + \left(49x\cdot\frac{\{(1-x^7)(1-x^{14})(1-x^{21})\dots\}^7}{\{(1-x)(1-x^2)(1-x^3)\dots\}^8}\right) \text{ *}$$

* From a direct proof of this see §

We have:



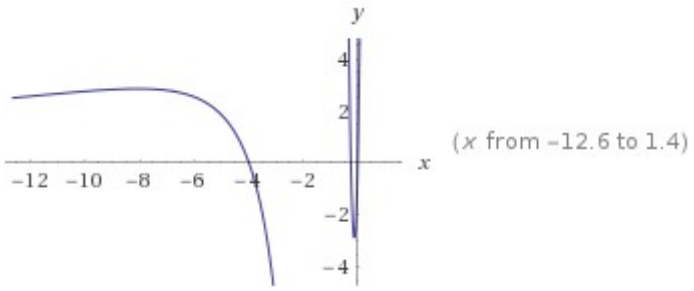
$$-7x\{(1-x)(1-x^2)(1-x^3)\ldots\}^3\{(1-x^7)(1-x^{14})(1-x^{21})\ldots\}^3$$
$$+8\{(1-x)(1-x^2)(1-x^3)\ldots\}^7\{p(1)x+p(2)x^2+p(3)x^3+\ldots\}$$
$$=49\left\{x\cdot\frac{1+x}{(1-x)^3}+x^2\cdot\frac{1+x^2}{(1-x^2)^3}-x^3\cdot\frac{1+x^3}{(1-x^3)^3}+\ldots\right\}$$

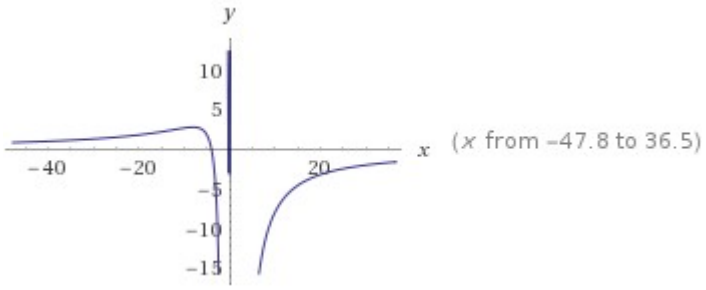
49(((x*((1+x)/(1-x)^3)+x^2*((1+x^2)/(1-x^2)^3)-x^3*((1+x^3)/(1-x^3)^3))))

Input:

$$49\left(x\times\frac{1+x}{(1-x)^3}+x^2\times\frac{1+x^2}{(1-x^2)^3}-x^3\times\frac{1+x^3}{(1-x^3)^3}\right)$$

Plots:





Alternate forms:

$$49\,x\left(-\frac{x\left(x^2+1\right)}{\left(x^2-1\right)^3}+\frac{x^5+x^2}{\left(x^3-1\right)^3}+\frac{x+1}{(1-x)^3}\right)$$

$$-\frac{49\,x\left(x^{10}+8\,x^9+26\,x^8+57\,x^7+90\,x^6+106\,x^5+90\,x^4+57\,x^3+26\,x^2+8\,x+1\right)}{(x-1)^3\,(x+1)^3\left(x^2+x+1\right)^3}$$

Partial fraction expansion:

$$-\frac{49\,(x+5)}{27\left(x^2+x+1\right)}+\frac{49\,(13\,x+11)}{27\left(x^2+x+1\right)^2}-\frac{98\,(2\,x+1)}{9\left(x^2+x+1\right)^3}-\frac{11515}{216\,(x-1)}+\frac{49}{8\,(x+1)}-\frac{11515}{72\,(x-1)^2}-\frac{147}{8\,(x+1)^2}-\frac{11515}{108\,(x-1)^3}+\frac{49}{4\,(x+1)^3}$$

Expanded form:

$$-\frac{49\,x^3}{\left(1-x^3\right)^3}+\frac{49\,x^2}{(1-x)^3}+\frac{49\,x^2}{\left(1-x^2\right)^3}-\frac{49\,x^6}{\left(1-x^3\right)^3}+\frac{49\,x^4}{\left(1-x^2\right)^3}+\frac{49\,x}{(1-x)^3}$$

Real roots:

$x = 0$

$x \approx -3.98788$

$x \approx -0.25076$

Complex roots:

$x \approx -1.03403 - 0.800491\,i$

$x \approx -1.03403 + 0.800491\,i$

$x \approx -0.604694 - 0.46812\,i$

$x \approx -0.604694 + 0.46812\,i$

$x \approx -0.165432 - 1.46099\,i$

Properties as a real function:

Domain

$\{x \in \mathbb{R} : x \neq -1 \text{ and } x \neq 1\}$

Range

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

Surjectivity

surjective onto $\mathbb{R}$

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

Series expansion at x = 0:

$$49\,x + 245\,x^2 + 392\,x^3 + 980\,x^4 + 1225\,x^5 + O\left(x^6\right)$$

(Taylor series)

Series expansion at x = ∞:

$$-\frac{49}{x} - \frac{245}{x^2} - \frac{392}{x^3} - \frac{980}{x^4} + O\left(\left(\frac{1}{x}\right)^5\right)$$

(Laurent series)

Derivative:

$$\frac{d}{dx}\left(49\left(\frac{x\,(1+x)}{(1-x)^3} + \frac{x^2\,(1+x^2)}{(1-x^2)^3} - \frac{x^3\,(1+x^3)}{(1-x^3)^3}\right)\right) = \frac{1}{(x^4+x^3-x-1)^4}$$
$$49\left(x^{14} + 14\,x^{13} + 70\,x^{12} + 236\,x^{11} + 574\,x^{10} + 1052\,x^9 + 1467\,x^8 + 1632\,x^7 + 1467\,x^6 + 1052\,x^5 + 574\,x^4 + 236\,x^3 + 70\,x^2 + 14\,x + 1\right)$$

Indefinite integral:

$$\int 49\left(\frac{x\,(1+x)}{(1-x)^3} + \frac{x^2\,(1+x^2)}{(1-x^2)^3} - \frac{x^3\,(1+x^3)}{(1-x^3)^3}\right)dx =$$
$$\frac{49}{216}\left(-\frac{96\,x}{x^3-1} - \frac{72\,x}{(x^3-1)^2} + \frac{162\,x}{x^2-1} + \frac{108\,x}{(x^2-1)^2} - 4\log(x^2+x+1) + \frac{648}{x-1} + \frac{216}{(x-1)^2} - 235\log(1-x) + 27\log(x+1) - 8\sqrt{3}\,\tan^{-1}\left(\frac{2\,x+1}{\sqrt{3}}\right)\right) + \text{constant}$$

(assuming a complex-valued logarithm)

For x = 2, we obtain:

49(((2*((1+2)/(1-2)^3)+2^2*((1+2^2)/(1-2^2)^3)-2^3*((1+2^3)/(1-2^3)^3))))

Input:

$$49\left(2\times\frac{1+2}{(1-2)^3}+2^2\times\frac{1+2^2}{(1-2^2)^3}-2^3\times\frac{1+2^3}{(1-2^3)^3}\right)$$

Exact result:

$$-\frac{60\,482}{189}$$

Decimal approximation:

−320.010582010582010582010582010582010582010582010582010582...

-320.010858201….

For x = 3, we obtain:

49(((3*((1+3)/(1-3)^3)+3^2*((1+3^2)/(1-3^2)^3)-3^3*((1+3^3)/(1-3^3)^3))))

Input:

$$49\left(3\times\frac{1+3}{(1-3)^3}+3^2\times\frac{1+3^2}{(1-3^2)^3}-3^3\times\frac{1+3^3}{(1-3^3)^3}\right)$$

Exact result:

$$-\frac{44\,997\,729}{562\,432}$$

Decimal approximation:

−80.005634458921256258534365043240782885753299954483386436 0...

-80.005634458…

For x = 5, we obtain:

49(((5*((1+5)/(1-5)^3)+5^2*((1+5^2)/(1-5^2)^3)-5^3*((1+5^3)/(1-5^3)^3))))

Input:

$$49\left(5\times\frac{1+5}{(1-5)^3}+5^2\times\frac{1+5^2}{(1-5^2)^3}-5^3\times\frac{1+5^3}{(1-5^3)^3}\right)$$

Exact result:

$$-\frac{5\,120\,691\,835}{205\,915\,392}$$

Decimal approximation:

−24.867941076498059941046077798788348954506518871595572612 6…

-24.867941…

For x = 12, we obtain:

49(((12*((1+12)/(1-12)^3)+12^2*((1+12^2)/(1-12^2)^3)-12^3*((1+12^3)/(1-12^3)^3))))

Input:

$$49\left(12\times\frac{1+12}{(1-12)^3}+12^2\times\frac{1+12^2}{(1-12^2)^3}-12^3\times\frac{1+12^3}{(1-12^3)^3}\right)$$

Exact result:

$$-\frac{68\,628\,200\,982\,348}{11\,316\,368\,199\,851}$$

Decimal approximation:

−6.064507602645899703457367890858760482513988481913710114 50…

-6.064507602…

For x = 19, we obtain:

49(((19*((1+19)/(1-19)^3)+19^2*((1+19^2)/(1-19^2)^3)-19^3*((1+19^3)/(1-19^3)^3))))

Input:

$$49\left(19\times\frac{1+19}{(1-19)^3}+19^2\times\frac{1+19^2}{(1-19^2)^3}-19^3\times\frac{1+19^3}{(1-19^3)^3}\right)$$

Exact result:

$$-\frac{4\,287\,068\,750\,376\,769}{1\,290\,186\,322\,848\,000}$$

Decimal approximation:

−3.322829171614028212020762747015382783240322865407192101 77...

-3.32282917…

From the algebraic sum of the three results, we obtain:

(-24.867941076498059-6.06450760264689-3.322829171614028212)

Input interpretation:

−24.867941076498059 − 6.06450760264689 − 3.322829171614028212

Result:

−34.255277850758977212

-34.2552778…

From the product:

(-24.867941076498059*-6.06450760264689*-3.322829171614028212)

Input interpretation:

−24.867941076498059 × (−6.06450760264689) × (−3.322829171614028212)

Result:

−501.121907346138361909577712322489567652967608220 12

-501.1219073…

We observe that:

501.1219073 + 34.2552778 = 535.3771851 result very near to the value of

$e^{2\pi}$ = 535.4916555…

And from the following calculation:

1+1/(-24.867941076498059/-6.06450760264689*1/-3.322829171614028212)^2

Input interpretation:

$$1+\frac{1}{\left(\frac{-24.867941076498059}{-6.06450760264689}\left(-\frac{1}{3.3228291716140282 12}\right)\right)^2}$$

Result:

1.656640188527297197624393880123122889544767566234987617058...

1.65664018852…. result very near to the 14th root of the following Ramanujan's class invariant $Q = \left(G_{505}/G_{101/5}\right)^3$ = 1164.2696 i.e. 1.65578...

For x = 8, we obtain:

Input:

$$49\left(8\times\frac{1+8}{(1-8)^3}+8^2\times\frac{1+8^2}{(1-8^2)^3}-8^3\times\frac{1+8^3}{(1-8^3)^3}\right)$$

Exact result:

$$-\frac{21\,845\,558\,792}{1\,985\,153\,751}$$

Decimal approximation:

−11.004466924033230713725206063396748960428506376179423696 4...

-11.004466924…

(((-49(((8*((1+8)/(1-8)^3)+8^2*((1+8^2)/(1-8^2)^3)-8^3*((1+8^3)/(1-8^3)^3)))))))^1/5

Input:

$$\sqrt[5]{-49\left(8\times\frac{1+8}{(1-8)^3}+8^2\times\frac{1+8^2}{(1-8^2)^3}-8^3\times\frac{1+8^3}{(1-8^3)^3}\right)}$$

Result:

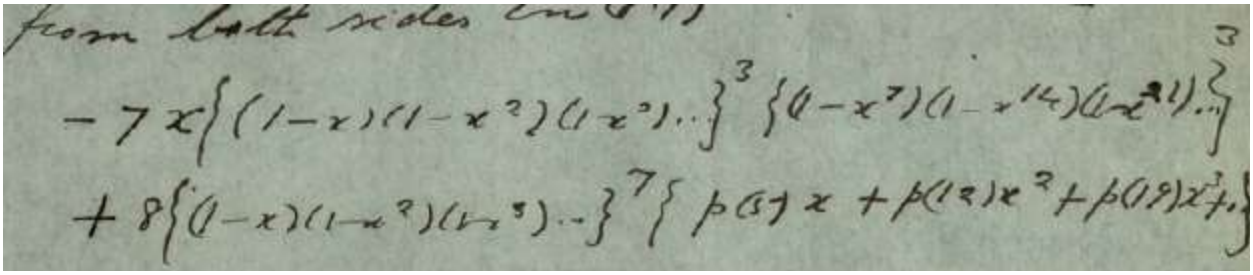
$$\frac{1}{3}\left(\frac{2}{73}\right)^{3/5}\sqrt[5]{\frac{2\,730\,694\,849}{21}}$$

Decimal approximation:

1.615525442050558024206563199702585096562717214817181383351...

1.61552544205…. result that is a very good approximation to the value of the golden ratio 1.618033988749...

From



(((-14(-1*-3*-7)^3 ((1-2^7)(1-2^14)(1-2^21))^3+8(-1*-3*-7)^7 (7*2+77*2^2+490*2^3))))x = 49(((2*((1+2)/(1-2)^3)+2^2*((1+2^2)/(1-2^2)^3)-2^3*((1+2^3)/(1-2^3)^3))))

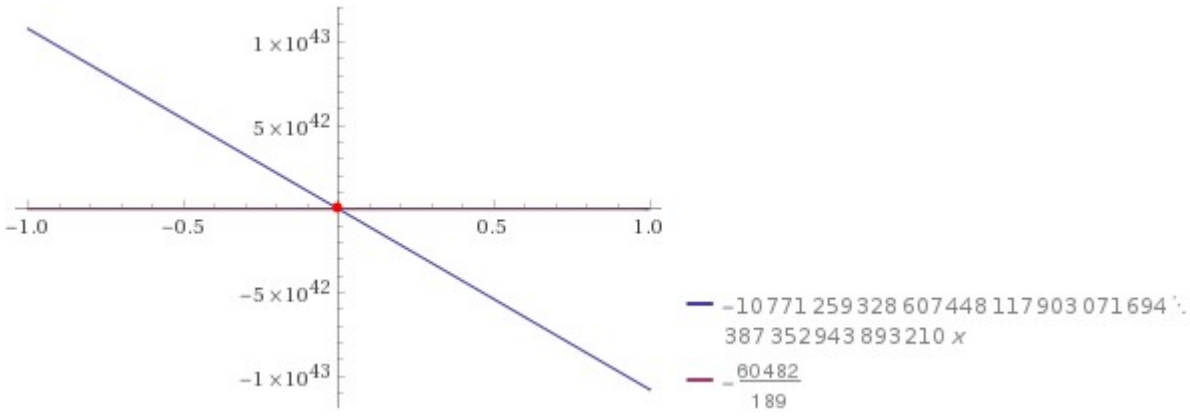
Input:

$$\left(-14\,(-(-3)\times(-7))^3\left((1-2^7)(1-2^{14})(1-2^{21})\right)^3+8\,(-(-3)\times(-7))^7\left(7\times2+77\times2^2+490\times2^3\right)\right)x=49\left(2\times\frac{1+2}{(1-2)^3}+2^2\times\frac{1+2^2}{(1-2^2)^3}-2^3\times\frac{1+2^3}{(1-2^3)^3}\right)$$

Exact result:

$$-10\,771\,259\,328\,607\,448\,117\,903\,071\,694\,387\,352\,943\,893\,210\,x=-\frac{60\,482}{189}$$

Plot:



Alternate form:

$$\frac{60\,482}{189} - 10\,771\,259\,328\,607\,448\,117\,903\,071\,694\,387\,352\,943\,893\,210\,x = 0$$

Solution:

$$x = \frac{30\,241}{1\,017\,884\,006\,553\,403\,847\,141\,840\,275\,119\,604\,853\,197\,908\,345}$$

Input:

$$\frac{30\,241}{1\,017\,884\,006\,553\,403\,847\,141\,840\,275\,119\,604\,853\,197\,908\,345}$$

Exact result:

$$\frac{30\,241}{1\,017\,884\,006\,553\,403\,847\,141\,840\,275\,119\,604\,853\,197\,908\,345}$$ (irreducible)

Decimal approximation:

$2.97096720307034210348781102949067557525706076601474 10\ldots \times 10^{-41}$

$2.9709672030703421\ldots\times10^{-41}$

From which:

(1/(2.9709672030703421 × 10^-41))^1/4

Input interpretation:

$$\sqrt[4]{\frac{1}{2.9709672030703421 \times 10^{-41}}}$$

Result:

$1.35448916587964895... \times 10^{10}$

$1.35448916...*10^{10}$

We have that p(139) = 13610949895 = $1.3610949895\times10^{10}$ value that is a good approximation to the above solution

Furthermore:

sqrt(2*golden ratio) * (2.9709672030703421 × 10^-41)

Input interpretation:

$\sqrt{2\,\phi} \times 2.9709672030703421 \times 10^{-41}$

ϕ is the golden ratio

Result:

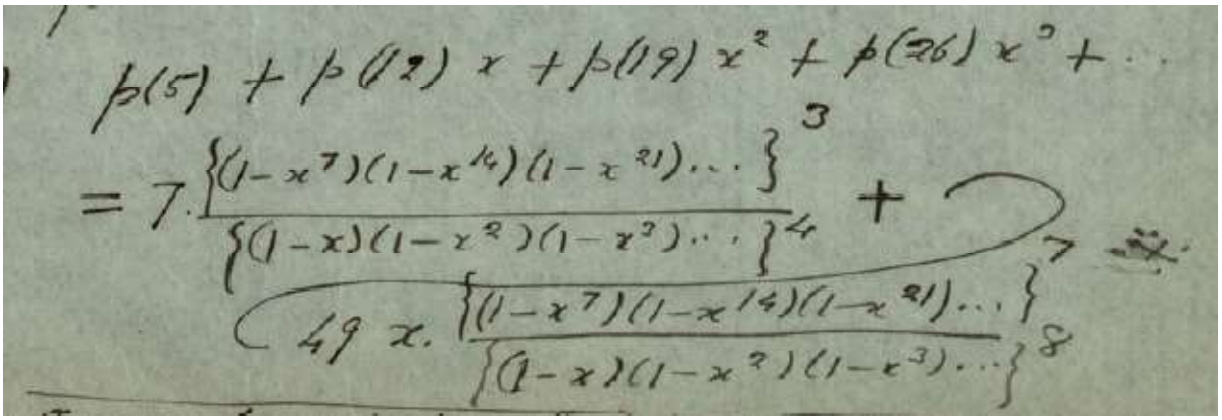
$5.3444950054443446... \times 10^{-41}$

$5.344495...*10^{-41}$ result practically equal to the value of Planck's time in milliseconds

5.391247×10^{-41} ms (milliseconds)

Indeed: $5.391247\times10^{-41} *1/10^3 = 5.391247 \times 10^{-44}$

From:



7+77*2+490*4+2436*8 = 7[(((1-2^7)(1-2^14)(1-2^21))^3)/(((1-2)(1-2^2)(1-2^3))^4)] + 49*2[(((1-2^7)(1-2^14)(1-2^21))^7)/(((1-2)(1-2^2)(1-2^3))^8)]

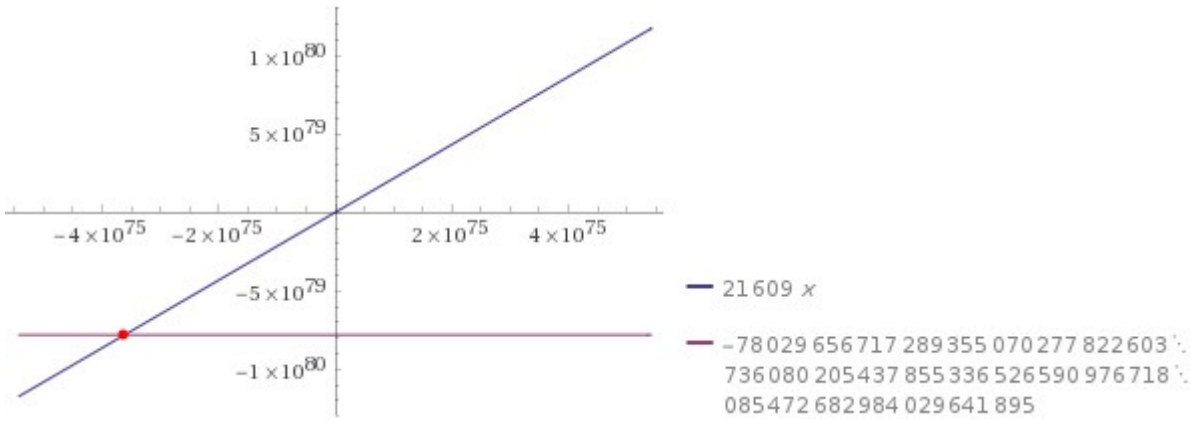
Input:

$$(7+77\times 2+490\times 4+2436\times 8)\,x = 7\times\frac{((1-2^7)(1-2^{14})(1-2^{21}))^3}{((1-2)(1-2^2)(1-2^3))^4}+49\times 2\times\frac{((1-2^7)(1-2^{14})(1-2^{21}))^7}{((1-2)(1-2^2)(1-2^3))^8}$$

Result:

$$21\,609\,x = -78\,029\,656\,717\,289\,355\,070\,277\,822\,603\,736\,080\,205\,437\,855\,336\,526\,590\,976\,718\,085\,472\,682\,984\,029\,641\,895$$

Plot:



Alternate form:

$$21\,609\,x + 78\,029\,656\,717\,289\,355\,070\,277\,822\,603\,736\,080\,205\,437\,855\,336\,526\,590\,976\,718\,085\,472\,682\,984\,029\,641\,895 = 0$$

Solution:

$$x \approx -3\,610\,979\,532\,476\,715\,958\,052\,954\,420\,308\,180\,281\,443\,874\,351\,786\,483\,481\,555\,500\,463\,487\,786\,680\,320$$

Result:

$$-3.610979532476715958052954420308180281443874351786483481555500463487786680320\times 10^{75}$$

-3.610979532476…*10^{75}

From the previous result, we obtain:

-sqrt(3)/((-3610979532476715958052954420308180281443874351786483481555500463487786680320 * 2.9709672030703421×10^-41))

Input interpretation:

$$\left(-\sqrt{3}\right)\Big/ \left(-3\,610\,979\,532\,476\,715\,958\,052\,954\,420\,308\,180\,281\,443\,874\,351\,786\,483\,481\,555\,500\,463\,487\,786\,680\,320 \times 2.9709672030703421 \times 10^{-41}\right)$$

Result:

$1.6144988610311233... \times 10^{-35}$

$1.614498861\ldots * 10^{-35}$ result very near to the value of Planck length $1.616255 * 10^{-35}$

We have also:

(3610979532476715958052954420308180281443874351786483481555500463487786680320)^1/4

Input:

$$3\,610\,979\,532\,476\,715\,958\,052\,954\,420\,308\,180\,281\,443\,874\,351\,786\,483\,481\,555\,500\,463\,487\,786\,680\,320\,\hat{}\,(1/4)$$

Exact result:

$$281\,474\,976\,710\,656\,\sqrt[4]{575\,262\,228\,445\,350\,045}$$

Decimal approximation:

$7.751865997767592218954593369021056163762860545266380 8... \times 10^{18}$

$7.751865997767\ldots * 10^{18}$

From which:

(728-26)1/10^3*sqrt(7.751865997767*10^18)

where $728 = 9^3 - 1$ (see Ramanujan taxicab numbers) and 26 is the dimensions number of Bosonic String Theory

Input interpretation:

$$(728 - 26) \times \frac{1}{10^3} \sqrt{7.751865997767 \times 10^{18}}$$

Result:

$1.954520547644... \times 10^9$

$1.954520547644…*10^9$ result very near to the value of Planck energy 1.9561×10^9 J

From

p(402)= 76088028433398792 69
p(403)= 80912002764844655 81

The mean is:

1/2(7608802843339879269 + 8091200276484465581)

Input:

$$\frac{1}{2}(7\,608\,802\,843\,339\,879\,269 + 8\,091\,200\,276\,484\,465\,581)$$

Exact result:

7 850 001 559 912 172 425

Scientific notation:

$7.850001559912172425 \times 10^{18}$

$7.850001559912172425*10^{18}$

And also:

p(109) = 541946240
p(110) = 607163746

((361097953247671595805295442030818028144387435178648348155550046348778668032 0 * 2.9709672030703421×10^-41))^1/4

Input interpretation:

$$(3\,610\,979\,532\,476\,715\,958\,052\,954\,420\,308\,180\,281\,443\,874\,351\,786\,483\,481\,555\,500\,463\,487\,786\,680\,320 \times 2.9709672030703421 \times 10^{-41})^{(1/4)}$$

Result:

$5.72309191763322847... \times 10^8$

$5.72309191763322847…*10^8$

1/2(541946240 + 607163746)

Input:

$$\frac{1}{2}(541\,946\,240 + 607\,163\,746)$$

Exact result:

574554993

Scientific notation:

5.74554993×10^8

$5.74554993*10^8$

From which:

8(10/47(541946240 + 607163746))

Input:

$$8\left(\frac{10}{47}(541\,946\,240 + 607\,163\,746)\right)$$

Exact result:

$$\frac{91\,928\,798\,880}{47}$$

Decimal approximation:

$1.955931891063829787234042553191489361702127659574468 08\ldots \times 10^{9}$

$1.955931891\ldots * 10^{9}$ result very near to the value of Planck energy 1.9561×10^{9} J

From

https://trin-digital-library.trin.cam.ac.uk/iiif/2/Add.Ms.a.94.13%2F014_Add.Ms.a.94.13_013.jpg/full/1000,1554/0/default.jpg

where $\lambda(n)$ is the same as in (8.4). From the formulae (8.4) and (8.6) all the residues of $\tau(n)$ for modulus 49 can be completely ascertained.

Modulus 11

9. In this case we start with the series

$$(9.1)\quad \begin{cases} 1 - 264\left(\frac{1^9 x}{1-x} + \frac{2^9 x^2}{1-x^2} + \frac{3^9 x^3}{1-x^3} + \dots\right) = QR, \\ 691 + 65520\left(\frac{1^{11} x}{1-x} + \frac{2^{11} x^2}{1-x^2} + \frac{3^{11} x^3}{1-x^3} + \dots\right) = 441 Q^3 + 250 R^2. \end{cases}$$

It follows that

$$(9.2)\quad QR = 1 + 11J\,; \quad Q^3 - 3R^2 = -2P + 11J.$$

It is easy to see from this that

$$(Q^3 - R^2)^5 = (Q^3 - 3R^2)^5 - Q(Q^3 - 3R^2)^3 - R(Q^3 - 3R^2)^2$$

$$-5QR + 11J = P^5 - 3P^3Q - 4P^2R - 5QR + 11J;$$

But

$$(9.3)\quad \begin{cases} P^5 - 10P^3Q + 20P^2R - 15PQ^2 + 4QR = -20736 \sum_1^\infty n^4 \sigma_1(n) x^n, \\ P^3Q - 3P^2R + 3PQ^2 - QR = 345\cdot6 \sum_1^\infty n^3 \sigma_3(n) x^n, \\ P^2R - 2PQ^2 + QR = -1728 \sum_1^\infty n^2 \sigma_5(n) x^n, \\ PQ^2 - QR = 720 \sum_1^\infty n \sigma_7(n) x^n; \end{cases}$$

and it is obvious that

$$(9.4)\quad \{(1-x)(1-x^2)(1-x^3)\dots\}^{120} = \frac{(1-x^{121})(1-x^{242})(1-x^{363})\dots}{(1-x)(1-x^2)(1-x^3)\dots} + 11J.$$

It is easy to see from all these that

$$(9.5)\quad x^5 \frac{(1-x^{121})(1-x^{242})(1-x^{363})\dots}{(1-x)(1-x^2)(1-x^3)\dots} =$$

$$\sum_1^\infty \{-n^4\sigma_1(n) + 3n^3\sigma_3(n) + 3n^2\sigma_5(n) - 5n\sigma_7(n)\} x^n + 11J.$$

It follows from this that

$$(9.6)\quad p(11n - 5) \equiv 0 \pmod{11};$$

We have that:

691+65520(((x/(1-x)+2^11*x^2/(1-x^2)+3^11*x^3/(1-x^3))) = 441Q^3+250R^2

For x = 2:

691+65520((2/(1-2)+(2^11*2^2)/(1-2^2)+(3^11*2^3)/(1-2^3))) = 441Q^3+250R^2

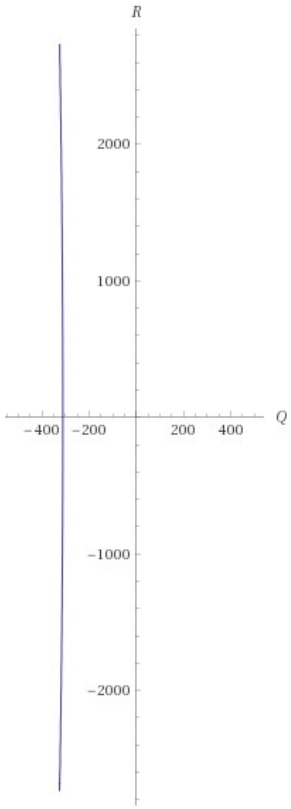
Input:

$$691 + 65520\left(\frac{2}{1-2} + \frac{2^{11}\times 2^2}{1-2^2} + \frac{3^{11}\times 2^3}{1-2^3}\right) = 441\,Q^3 + 250\,R^2$$

Result:

$$-13\,443\,810\,989 = 441\,Q^3 + 250\,R^2$$

Implicit plot:



Alternate form:

$$-441\,Q^3 - 250\,R^2 - 13\,443\,810\,989 = 0$$

Solutions:

$$R \approx -0.16733 \sqrt{-63\,Q^3 - 1\,920\,544\,427}$$
$$R \approx 0.16733 \sqrt{-63\,Q^3 - 1\,920\,544\,427}$$

Implicit derivatives:

$$\frac{\partial Q(R)}{\partial R} = -\frac{500\,R}{1323\,Q^2}$$

$$\frac{\partial R(Q)}{\partial Q} = -\frac{1323\,Q^2}{500\,R}$$

-13443810989 = 441 Q^3 + 250 ((-0.16733 sqrt(-63 Q^3 - 1920544427)))^2

Input:

$$-13\,443\,810\,989 = 441\,Q^3 + 250\left(-0.16733\sqrt{-63\,Q^3 - 1\,920\,544\,427}\right)^2$$

Result:

$$-13\,443\,810\,989 = 441\,Q^3 + 6.99983\left(-63\,Q^3 - 1\,920\,544\,427\right)$$

Alternate forms:

$$-0.0105698\,Q^3 - 322\,219. = 0$$
$$-13\,443\,810\,989 = 0.0105698\,(Q - 10\,834.6)\left(Q^2 + 10\,834.6\,Q + 1.1739 \times 10^8\right)$$
$$-441\,Q^3 - 6.99983\left(-63\,Q^3 - 1\,920\,544\,427\right) - 13\,443\,810\,989 = 0$$

Expanded form:

$$-13\,443\,810\,989 = 0.0105698\,Q^3 - 1.34435 \times 10^{10}$$

Real solution:

$$Q \approx -312.388$$

-312.388

Complex solutions:

$$Q = 156.194 - 270.536\,i$$
$$Q = 156.194 + 270.536\,i$$

and:

691+65520((2/(1-2)+(2^11*2^2)/(1-2^2)+(3^11*2^3)/(1-2^3))) = 441(-312.388)^3+250R^2

Input interpretation:

$$691 + 65520\left(\frac{2}{1-2} + \frac{2^{11}\times 2^2}{1-2^2} + \frac{3^{11}\times 2^3}{1-2^3}\right) = 441\,(-312.388)^3 + 250\,R^2$$

Result:

$$-13443810989 = 250\,R^2 - 1.34438\times 10^{10}$$

Alternate forms:

$$-250\,R^2 - 24162.8 = 0$$

$$-13443810989 = 250\,(R - 7333.15)\,(R + 7333.15)$$

Complex solutions:

$$R = -9.83114\,i$$

$$R = 9.83114\,i$$

9.83114i

691+65520((2/(1-2)+(2^11*2^2)/(1-2^2)+(3^11*2^3)/(1-2^3)))

Input:

$$691 + 65520\left(\frac{2}{1-2} + \frac{2^{11}\times 2^2}{1-2^2} + \frac{3^{11}\times 2^3}{1-2^3}\right)$$

Result:

$$-13443810989$$

-13443810989

441(-312.388)^3+250(-9.83114i)^2

Input interpretation:

$$441\,(-312.388)^3 + 250\,(-9.83114\,i)^2$$

i is the imaginary unit

Result:

$-1.34438109889938516 52 \times 10^{10}$

-13443810988.99385

Thence Q = -312.388 R = 9.83114 i

Now:

1-264(2/(1-2)+(2^9*2^2)/(1-2^2)+(3^9*2^3)/(1-2^3) = -312.388 * 9.83114i

1-264(2/(1-2)+(2^9*2^2)/(1-2^2)+(3^9*2^3)/(1-2^3))*(-1.63415×10^-7 - 0.000501868 i)

Input interpretation:

$$1-264\left(\frac{2}{1-2}+\frac{2^9\times 2^2}{1-2^2}+\frac{3^9\times 2^3}{1-2^3}\right)\left(-1.63415\times 10^{-7}+i\times(-0.000501868)\right)$$

i is the imaginary unit

Result:

$-8.172\times 10^{-7}-3071.13...\,i$

Polar coordinates:

$r = 3071.13$ (radius), $\theta = -90.°$ (angle)

3071.13

-312.388 * 9.83114i

Input interpretation:

$-312.388\times 9.83114\,i$

i is the imaginary unit

Result:

$-0-3071.13...\,i$

Polar coordinates:

$r = 3071.13$ (radius), $\theta = -90°$ (angle)

3071.13

Dividing the two results, we obtain:

(((691+65520((2/(1-2)+(2^11*2^2)/(1-2^2)+(3^11*2^3)/(1-2^3)))))) / (((1-264(2/(1-2)+(2^9*2^2)/(1-2^2)+(3^9*2^3)/(1-2^3))*(-1.63415×10^-7 - 0.000501868 i))))

Input interpretation:

$$\frac{691+65520\left(\frac{2}{1-2}+\frac{2^{11}\times 2^2}{1-2^2}+\frac{3^{11}\times 2^3}{1-2^3}\right)}{1-264\left(\frac{2}{1-2}+\frac{2^9\times 2^2}{1-2^2}+\frac{3^9\times 2^3}{1-2^3}\right)(-1.63415\times 10^{-7}+i\times(-0.000501868))}$$

i is the imaginary unit

Result:

$0.00116481... -$
$4.37748... \times 10^6\, i$

Polar coordinates:

$r = 4.37748\times 10^6$ (radius), $\theta = -90.°$ (angle)

$4.37748*10^6$

From which:

i-[1/8*1/15*(((691+65520((2/(1-2)+(2^11*2^2)/(1-2^2)+(3^11*2^3)/(1-2^3)))))) / (((1-264(2/(1-2)+(2^9*2^2)/(1-2^2)+(3^9*2^3)/(1-2^3))*(-1.63415×10^-7 - 0.000501868 i))))]

Input interpretation:

$$i-\frac{1}{8}\times\frac{1}{15}\times\frac{691+65520\left(\frac{2}{1-2}+\frac{2^{11}\times 2^2}{1-2^2}+\frac{3^{11}\times 2^3}{1-2^3}\right)}{1-264\left(\frac{2}{1-2}+\frac{2^9\times 2^2}{1-2^2}+\frac{3^9\times 2^3}{1-2^3}\right)(-1.63415\times 10^{-7}+i\times(-0.000501868))}$$

i is the imaginary unit

Result:

$-9.70675... \times 10^{-6} +$
$36480.0... \, i$

Polar coordinates:

$r = 36480.$ (radius), $\theta = 90.°$ (angle)

36480

1/64*(((i-[1/8*1/15*(((691+65520((2/(1-2)+(2^11*2^2)/(1-2^2)+(3^11*2^3)/(1-2^3)))))) / (((1-264(2/(1-2)+(2^9*2^2)/(1-2^2)+(3^9*2^3)/(1-2^3))*(-1.63415×10^-7 - 0.000501868 i))))])))

Input interpretation:

$$\frac{1}{64}\left(i-\frac{1}{8}\times\frac{1}{15}\times\frac{691+65520\left(\frac{2}{1-2}+\frac{2^{11}\times 2^2}{1-2^2}+\frac{3^{11}\times 2^3}{1-2^3}\right)}{1-264\left(\frac{2}{1-2}+\frac{2^9\times 2^2}{1-2^2}+\frac{3^9\times 2^3}{1-2^3}\right)\left(-1.63415\times 10^{-7}+i\times(-0.000501868)\right)}\right)$$

i is the imaginary unit

Result:

$$-1.51668\ldots\times 10^{-7}+570.000\ldots\, i$$

Polar coordinates:

$r = 570.$ (radius), $\theta = 90.°$ (angle)

570

36480 = 64*570

and:

[(1/32*(((i-[1/120(((691+65520((2/(1-2)+(2^11*2^2)/(1-2^2)+(3^11*2^3)/(1-2^3)))))) /(((1-264(2/(1-2)+(2^9*2^2)/(1-2^2)+(3^9*2^3)/(1-2^3))(-1.63415×10^-7 - 0.000501868 i))))])))]^1/14

Input interpretation:

$$\sqrt[14]{\frac{1}{32}\left(i-\frac{1}{120}\times\frac{691+65520\left(\frac{2}{1-2}+\frac{2^{11}\times 2^2}{1-2^2}+\frac{3^{11}\times 2^3}{1-2^3}\right)}{1-264\left(\frac{2}{1-2}+\frac{2^9\times 2^2}{1-2^2}+\frac{3^9\times 2^3}{1-2^3}\right)\left(-1.63415\times 10^{-7}+i\times(-0.000501868)\right)}\right)}$$

i is the imaginary unit

Result:

$$1.642899\ldots+0.1851103\ldots\, i$$

Polar coordinates:

$r = 1.6533$ (radius), $\theta = 6.42857°$ (angle)

1.6533 result very near to the 14th root of the following Ramanujan's class invariant

$Q = \left(G_{505}/G_{101/5}\right)^3 = 1164.2696$ i.e. 1.65578...

and again:

2(((i-[1/8*1/15*(((691+65520((2/(1-2)+(2^11*2^2)/(1-2^2)+(3^11*2^3)/(1-2^3))))))
/ (((1-264(2/(1-2)+(2^9*2^2)/(1-2^2)+(3^9*2^3)/(1-2^3))*(-1.63415×10^-7 -
0.000501868 i))))]))))+(64*8+16+2)i

Input interpretation:

$$2\left(i - \frac{1}{8}\times\frac{1}{15}\times\frac{691+65520\left(\frac{2}{1-2}+\frac{2^{11}\times 2^2}{1-2^2}+\frac{3^{11}\times 2^3}{1-2^3}\right)}{1-264\left(\frac{2}{1-2}+\frac{2^9\times 2^2}{1-2^2}+\frac{3^9\times 2^3}{1-2^3}\right)\left(-1.63415\times 10^{-7}+i\times(-0.000501868)\right)}\right)+$$
$$(64\times 8+16+2)\,i$$

i is the imaginary unit

Result:

$-0.0000194135... +$
$73490.0... \, i$

Polar coordinates:

$r = 73490.$ (radius), $\theta = 90.°$ (angle)

73490 result that can be mathematically linked to

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

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

$= 73490.8437525.... \Rightarrow$

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

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

$$= \ 73491.788325481187105491595720422205480251957265634133987 00\ldots$$

$$= \ 73491.7883254\ldots \Rightarrow$$

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

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

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

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

[(1/21*(((i-[1/120(((691+65520((2/(1-2)+(2^11*2^2)/(1-2^2)+(3^11*2^3)/(1-2^3))))))/(((1-264(2/(1-2)+(2^9*2^2)/(1-2^2)+(3^9*2^3)/(1-2^3))(-1.63415×10^-7 - 0.000501868 i))))])))))]-8i

Input interpretation:

$$\frac{1}{21} \left(i - \frac{1}{120} \times \frac{691 + 65520 \left(\frac{2}{1-2} + \frac{2^{11} \times 2^2}{1-2^2} + \frac{3^{11} \times 2^3}{1-2^3} \right)}{1 - 264 \left(\frac{2}{1-2} + \frac{2^9 \times 2^2}{1-2^2} + \frac{3^9 \times 2^3}{1-2^3} \right) (-1.63415 \times 10^{-7} + i \times (-0.000501868))} \right) - 8\,i$$

i is the imaginary unit

Result:

$-4.62226\ldots \times 10^{-7} + 1729.14\ldots\, i$

Polar coordinates:

$r = 1729.14$ (radius), $\theta = 90.°$ (angle)

1729.14

This result is very near to the mass of candidate glueball **$f_0(1710)$ scalar meson.** Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number)

((([(1/21*(((i-[1/120(((691+65520((2/(1-2)+(2^11*2^2)/(1-2^2)+(3^11*2^3)/(1-2^3))))))/(((1-264(2/(1-2)+(2^9*2^2)/(1-2^2)+(3^9*2^3)/(1-2^3))(-1.63415×10^-7 - 0.000501868 i))))])))]-8i)))^1/15

Input interpretation:

$$\left(\frac{1}{21}\left(i-\frac{1}{120}\times\frac{691+65520\left(\frac{2}{1-2}+\frac{2^{11}\times 2^2}{1-2^2}+\frac{3^{11}\times 2^3}{1-2^3}\right)}{1-264\left(\frac{2}{1-2}+\frac{2^9\times 2^2}{1-2^2}+\frac{3^9\times 2^3}{1-2^3}\right)\left(-1.63415\times 10^{-7}+i\times(-0.000501868)\right)}\right)-8i\right)\text{^}(1/15)$$

i is the imaginary unit

Result:

1.634819... +
0.1718264... i

Polar coordinates:

$r = 1.64382$ (radius), $\theta = 6.°$ (angle)

$1.64382 \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

[(1/256*(((i-[1/120(((691+65520((2/(1-2)+(2^11*2^2)/(1-2^2)+(3^11*2^3)/(1-2^3))))))/(((1-264(2/(1-2)+(2^9*2^2)/(1-2^2)+(3^9*2^3)/(1-2^3))(-1.63415×10^-7 - 0.000501868 i))))]))))]-3i

Input interpretation:

$$\frac{1}{256}\left(i-\frac{1}{120}\times\frac{691+65520\left(\frac{2}{1-2}+\frac{2^{11}\times 2^2}{1-2^2}+\frac{3^{11}\times 2^3}{1-2^3}\right)}{1-264\left(\frac{2}{1-2}+\frac{2^9\times 2^2}{1-2^2}+\frac{3^9\times 2^3}{1-2^3}\right)(-1.63415\times 10^{-7}+i\times(-0.000501868))}\right)-3\,i$$

i is the imaginary unit

Result:

$$-3.79170...\times 10^{-8}+139.500...\,i$$

Polar coordinates:

$r = 139.5$ (radius), $\theta = 90.°$ (angle)

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

[(1/256*(((i-[1/120(((691+65520((2/(1-2)+(2^11*2^2)/(1-2^2)+(3^11*2^3)/(1-2^3))))))/(((1-264(2/(1-2)+(2^9*2^2)/(1-2^2)+(3^9*2^3)/(1-2^3))(-1.63415×10^-7 - 0.000501868 i))))]))))]-18i+(1/golden ratio)i

Input interpretation:

$$\frac{1}{256}\left(i-\frac{1}{120}\times\frac{691+65520\left(\frac{2}{1-2}+\frac{2^{11}\times 2^2}{1-2^2}+\frac{3^{11}\times 2^3}{1-2^3}\right)}{1-264\left(\frac{2}{1-2}+\frac{2^9\times 2^2}{1-2^2}+\frac{3^9\times 2^3}{1-2^3}\right)(-1.63415\times 10^{-7}+i\times(-0.000501868))}\right)-18\,i+\frac{1}{\phi}\,i$$

i is the imaginary unit

ϕ is the golden ratio

Result:

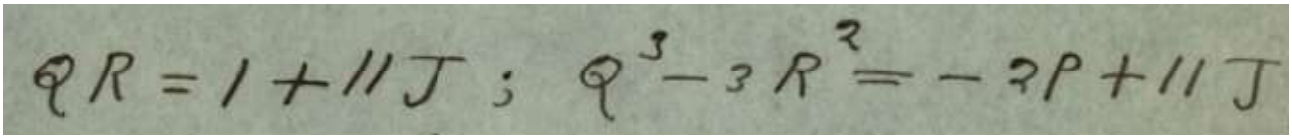
$$-3.79170...\times 10^{-8}+125.118...\,i$$

Polar coordinates:

$r = 125.118$ (radius), $\theta = 90.°$ (angle)

125.118 result very near to the Higgs boson mass 125.18 GeV

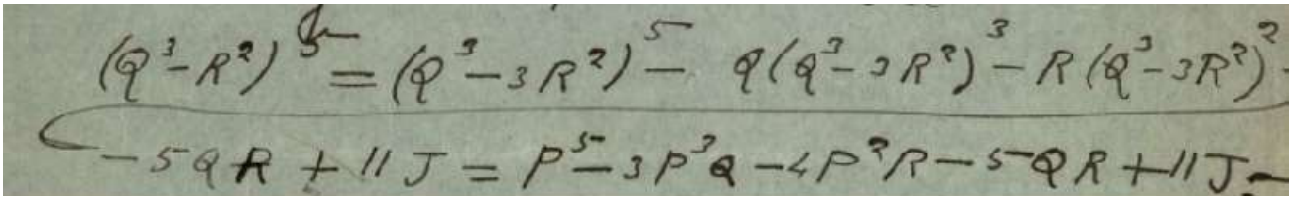
Now, we have that:



11J = (-312.388 * 9.83114i – 1) = 3071.13

P = -1/2*((((-312.388^3-3*(9.83114i)^2-3071.13))) =

= 1.52437792798269866 × 10^7 = 15243779.279



15243779.279^5-3*15243779.279^3*(-312.388)-4*15243779.279^2*9.83114i-5*(-312.388 * 9.83114i)+3071.13

Input interpretation:

$15\,243\,779^5 - 3 \times 15\,243\,779^3 \times (-312.388) + 4 \times 15\,243\,779^2\, i \times (-9.83114) - 5\,(-312.388 \times 9.83114\, i) + 3071.13$

i is the imaginary unit

Result:

$8.2312012342757838... \times 10^{35} - 9.1379580452015083... \times 10^{15}\, i$

Alternate form:

8.2312×10^{35}

$8.2312*10^{35}$

From which:

[((((15243779)^5-3*(15243779)^3*(-312.388)-4*(15243779)^2*9.83114i-5*(-312.388 * 9.83114i)+3071.13)))^2]^1/344

Input interpretation:

$$\left(15\,243\,779^5 - 3\times 15\,243\,779^3\times(-312.388) + 4\times 15\,243\,779^2\, i\times(-9.83114) - 5\,(-312.388\times 9.83114\, i) + 3071.13\right)^2 \,\hat{}\, (1/344)$$

i is the imaginary unit

Result:

$1.6173753977270181939\ldots -$
$1.0439226634825093776\ldots \times 10^{-22}\, i$

Alternate form:

1.61738

1.61738 result that is a very good approximation to the value of the golden ratio 1.618033988749...

[((((15243779)^5-3*(15243779)^3*(-312.388)-4*(15243779)^2*9.83114i-5*(-312.388 * 9.83114i)+3071.13)))]^1/11-123+11

Input interpretation:

$$\left(15\,243\,779^5 - 3\times 15\,243\,779^3\times(-312.388) + 4\times 15\,243\,779^2\, i\times(-9.83114) - 5\,(-312.388\times 9.83114\, i) + 3071.13\right) \,\hat{}\, (1/11) - 123 + 11$$

i is the imaginary unit

Result:

$1728.95049839444387\ldots -$
$1.85795574875512108\ldots \times 10^{-18}\, i$

Alternate form:

1728.95

1728.95 ≈ 1729

This result is very near to the mass of candidate glueball **f_0(1710) scalar meson.** Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number)

((([((((15243779)^5-3*(15243779)^3*(-312.388)-4*(15243779)^2*9.83114i-5*(-312.388 * 9.83114i)+3071.13)))]^1/11-123+11)))^1/15

Input interpretation:

$$\left(\left(15\,243\,779^5 - 3\times 15\,243\,779^3\times(-312.388) + 4\times 15\,243\,779^2\, i\times(-9.83114) - 5\,(-312.388\times 9.83114\, i) + 3071.13\right)\,\hat{}\,(1/11) - 123 + 11\right)\,\hat{}\,(1/15)$$

i is the imaginary unit

Result:

1.6438120911902062296... −
1.1776431723700511996... × 10^{-22} i

Alternate form:

1.64381

$1.64381 \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

[((((15243779)^5-3*(15243779)^3*(-312.388)-4*(15243779)^2*9.83114i-5*(-312.388 * 9.83114i)+3071.13)))]^1/17-4

Input interpretation:

$$\left(15\,243\,779^5 - 3\times 15\,243\,779^3\times(-312.388) + 4\times 15\,243\,779^2\, i\times(-9.83114) - 5\,(-312.388\times 9.83114\, i) + 3071.13\right)\,\hat{}\,(1/17) - 4$$

i is the imaginary unit

Result:

125.6206834486363928... −
8.464695230857076970... × 10^{-20} i

Alternate form:

125.621

125.621 result very near to the Higgs boson mass 125.18 GeV

[((((15243779)^5-3*(15243779)^3*(-312.388)-4*(15243779)^2*9.83114i-5*(-312.388 * 9.83114i)+3071.13)))]^1/17-4+11+3

Input interpretation:

$$(15\,243\,779^5 - 3\times 15\,243\,779^3\times(-312.388) + 4\times 15\,243\,779^2\, i\times(-9.83114) - 5\,(-312.388\times 9.83114\, i) + 3071.13)\,\hat{}\,(1/17) - 4 + 11 + 3$$

i is the imaginary unit

Result:

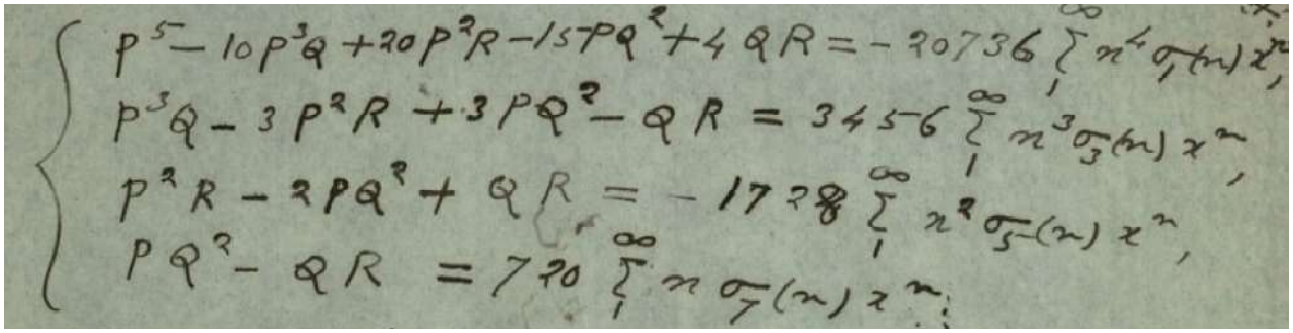
139.6206834486363928... −
8.464695230857076970... × 10^{-20} i

Alternate form:

139.621

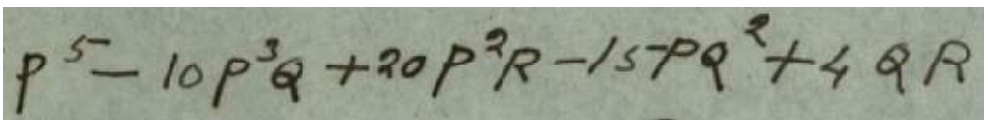
139.621 result practically equal to the rest mass of Pion meson 139.57 MeV

Now, we have that:



For P = 15243779.279; Q = -312.388; R = 9.83114i

we obtain:



15243779.279^5 – 10*15243779.279^3*(-312.388) + 20*15243779.279^2*(9.83114i) – 15*15243779.279*(-312.388)^2 + 4*(-312.388)(9.83114i)

Result:

$8.231201988... \times 10^{35} + 4.568979190... \times 10^{16}\, i$

Alternate form:

8.2312×10^{35}

or, approximating by defect:

Input interpretation:

$15\,243\,779^5 - 10 \times 15\,243\,779^3 \times (-312.388) + 20 \times 15\,243\,779^2\,(9.83114\, i) - 15 \times 15\,243\,779\,(-312.388)^2 + 4 \times (-312.388)\,(9.83114\, i)$

i is the imaginary unit

Result:

$8.2312012343532425... \times 10^{35} + 4.5689790226072035... \times 10^{16}\, i$

Alternate form:

8.2312×10^{35}

$8.2312*10^{35}$

From which:

(64*(34+3))/(8.2312*10^35)^3

Input interpretation:

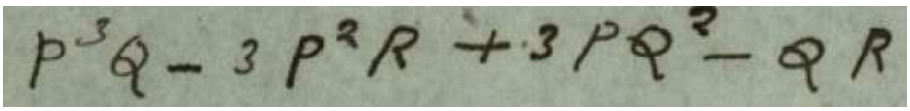
$$\frac{64\,(34+3)}{(8.2312 \times 10^{35})^3}$$

Result:

$4.24611972396082880561442497706307377114778302254836 5... \times 10^{-105}$

$4.24611972396…*10^{-105}$ result practically equal to the value of Planck volume 4.2217×10^{-105}

For P = 15243779.279; Q = -312.388; R = 9.83114i



15243779.279^3*(-312.388) – 3*15243779.279^2*9.83114i + 3*15243779.279*(-312.388)^2 – (-312.388)(9.83114i)

Result:

$-1.10655... \times 10^{24} - 6.85347... \times 10^{15}\, i$

Polar coordinates:

$r = 1.10655 \times 10^{24}$ (radius), $\theta = -180.°$ (angle)

Or:

Input interpretation:

$15\,243\,779^3 \times (-312.388) + 3 \times 15\,243\,779^2\, i \times (-9.83114) + 3 \times 15\,243\,779\, (-312.388)^2 - -312.388\, (9.83114\, i)$

i is the imaginary unit

Result:

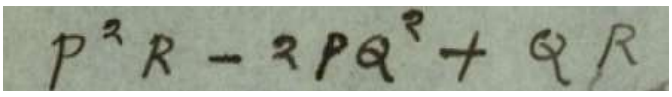
$-1.10655... \times 10^{24} - 6.85347... \times 10^{15}\, i$

Polar coordinates:

$r = 1.10655 \times 10^{24}$ (radius), $\theta = -180.°$ (angle)

$1.10655*10^{24}$

For P = 15243779.279; Q = -312.388; R = 9.83114i



15243779.279^2*(9.83114i) – 2*15243779.279*(-312.388)^2 + (-312.388)(9.83114i)

Input interpretation:

$15\,243\,779^2\,(9.83114\,i) - 2 \times 15\,243\,779\,(-312.388)^2 - 312.388\,(9.83114\,i)$

i is the imaginary unit

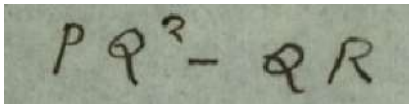
Result:

$-2.97517... \times 10^{12} + 2.28449... \times 10^{15}\,i$

Polar coordinates:

$r = 2.28449 \times 10^{15}$ (radius), $\theta = 90.0746°$ (angle)

$2.28449*10^{15}$



15243779*(-312.388)^2 – (-312.388)(9.83114i)

Input interpretation:

$15\,243\,779\,(-312.388)^2 - -312.388\,(9.83114\,i)$

i is the imaginary unit

Result:

$1.48758... \times 10^{12} + 3071.13...\,i$

Polar coordinates:

$r = 1.48758 \times 10^{12}$ (radius), $\theta = 1.18288 \times 10^{-7}°$ (angle)

$1.48758*10^{12}$

Now, we perform the following calculation:

$8.2312*10^{35}$; $1.10655*10^{24}$; $2.28449*10^{15}$; $1.48758*10^{12}$

From the following calculation, we obtain:

1/3(8.2312*10^35 * 1.10655*10^24 * 2.28449*10^15 * 1.48758*10^12)^1/2

Input interpretation:

$$\frac{1}{3}\sqrt{8.2312\times10^{35}\times1.10655\times10^{24}\times2.28449\times10^{15}\times1.48758\times10^{12}}$$

Result:

$1.8545162353420782517126312646449357412222495781820880\ldots\times10^{43}$

$1.854516235342\ldots.*10^{43}$ result practically equal to the Planck frequency

1.8549×10^{43} Hz

Now, we have:

15243779^5 – 10*15243779^3*(-312.388) + 20*15243779^2*(9.83114i) – 15*15243779*(-312.388)^2 + 4*(-312.388)(9.83114i) = -20736x

Input interpretation:

$$15\,243\,779^5 - 10\times15\,243\,779^3\times(-312.388) + 20\times15\,243\,779^2\,(9.83114\,i) - 15\times15\,243\,779\,(-312.388)^2 + 4\times(-312.388)\,(9.83114\,i) = -20\,736\,x$$

i is the imaginary unit

Result:

$$8.2312\times10^{35} + 4.56898\times10^{16}\,i = -20\,736\,x$$

Alternate form:

$$20\,736\,x + \left(8.2312\times10^{35} + 4.56898\times10^{16}\,i\right) = 0$$

Complex solution:

$$x = -3.96952\times10^{31} - 2.2034\times10^{12}\,i$$

Input interpretation:

$$-3.96952\times10^{31} - 2.2034\times10^{12}\,i$$

i is the imaginary unit

Result:

$-3.96952\ldots\times10^{31} -$
$2.20340\ldots\times10^{12}\,i$

Alternate form:

-3.96952×10^{31}

-3.96952*10^31

15243779^3*(-312.388) – 3*15243779^2*9.83114i + 3*15243779*(-312.388)^2 – (-312.388)(9.83114i) = 3456x

Input interpretation:

$$15\,243\,779^3 \times (-312.388) + 3 \times 15\,243\,779^2\, i \times (-9.83114) + 3 \times 15\,243\,779\,(-312.388)^2 - -312.388\,(9.83114\,i) = 3456\,x$$

i is the imaginary unit

Result:

$$-1.10655 \times 10^{24} - 6.85347 \times 10^{15}\, i = 3456\, x$$

Alternate form:

$$-3456\, x - (1.10655 \times 10^{24} + 6.85347 \times 10^{15}\, i) = 0$$

Complex solution:

$$x = -3.20183 \times 10^{20} - 1.98306 \times 10^{12}\, i$$

Input interpretation:

$$-3.20183 \times 10^{20} - 1.98306 \times 10^{12}\, i$$

i is the imaginary unit

Result:

$$-3.20183\ldots \times 10^{20} - 1.98306\ldots \times 10^{12}\, i$$

Polar coordinates:

$r = 3.20183 \times 10^{20}$ (radius), $\theta = -180.°$ (angle)

3.20183*10^20

15243779^2*(9.83114i) – 2*15243779*(-312.388)^2 + (-312.388)(9.83114i) =

-1728x

Input interpretation:

$$15\,243\,779^2\,(9.83114\,i) - 2 \times 15\,243\,779\,(-312.388)^2 - 312.388\,(9.83114\,i) = -1728\,x$$

i is the imaginary unit

Result:

$$-2.97517 \times 10^{12} + 2.28449 \times 10^{15}\,i = -1728\,x$$

Alternate form:

$$1728\,x - \left(2.97517 \times 10^{12} - 2.28449 \times 10^{15}\,i\right) = 0$$

Complex solution:

$$x = 1.72174 \times 10^{9} - 1.32204 \times 10^{12}\,i$$

Input interpretation:

$$1.72174 \times 10^{9} - 1.32204 \times 10^{12}\,i$$

i is the imaginary unit

Result:

$1.72174\ldots \times 10^{9} -$
$1.32204\ldots \times 10^{12}\,i$

Polar coordinates:

$r = 1.32204 \times 10^{12}$ (radius), $\theta = -89.9254°$ (angle)

$1.32204*10^{12}$

15243779*(-312.388)^2 – (-312.388)(9.83114i) = 720x

Input interpretation:

$$15\,243\,779\,(-312.388)^2 - -312.388\,(9.83114\,i) = 720\,x$$

i is the imaginary unit

Result:

$$1.48758 \times 10^{12} + 3071.13\,i = 720\,x$$

Alternate form:

$$-720\,x + \left(1.48758 \times 10^{12} + 3071.13\,i\right) = 0$$

Complex solution:

$x = 2.06609 \times 10^9 + 4.26546\, i$

Input interpretation:

$2.06609 \times 10^9 + 4.26546\, i$

i is the imaginary unit

Result:

$2.06609\ldots \times 10^9 +$
$4.26546\ldots\, i$

Polar coordinates:

$r = 2.06609 \times 10^9$ (radius), $\theta = 1.18288 \times 10^{-7}{}^\circ$ (angle)

$2.06609*10^9$

Multiplying the above results, we have:

(-3.96952*10^31 * 3.20183*10^20 * 1.32204*10^12 * 2.06609*10^9)

Input interpretation:

$-3.96952 \times 10^{31} \times 3.20183 \times 10^{20} \times 1.32204 \times 10^{12} \times 2.06609 \times 10^9$

Result:

$-3.4716033205860503789 76 \times 10^{73}$

$-3.4716033205860503789 76*10^{73}$

From which:

(71*128)/((([-(-3.4716033205860503789 76*10^73)]^1/2)))^2

Input interpretation:

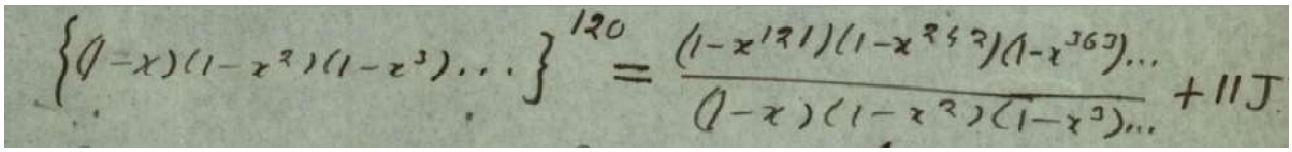
$$\frac{71 \times 128}{\sqrt{-(-3.4716033205860503789 76 \times 10^{73})^2}}$$

Result:

$2.617810608173352910894385676375534897013928331970334 1\ldots \times 10^{-70}$

$2.6178106\ldots*10^{-70}$ result practically equal to the Planck area 2.6121×10^{-70} m^2

Now, we have that:



For x = 2 and 11J = 3071.13 , we obtain:

((1-2)(1-2^2)(1-2^3))^120 = (((1-2^121)(1-2^242)(1-3^363) / (1-2)(1-2^2)(1-2^3))) + 3071.13

(((((1-2)(1-2^2)(1-2^3))^120)))x = (([(1-2^121)(1-2^242)(1-3^363)] / [(1-2)(1-2^2)(1-2^3)])) + 3071.13

Input interpretation:

$$((1-2)(1-2^2)(1-2^3))^{120}\, x = \frac{(1-2^{121})(1-2^{242})(1-3^{363})}{(1-2)(1-2^2)(1-2^3)} + 3071.13$$

Alternate form:

$$463\,783\,579\,413\,749\,714\,672\,244\,307\,661\,553\,107\,910\,340\,113\,718\,265\,334\,069\,477\ldots$$
$$953\,807\,858\,334\,859\,355\,377\,987\,702\,951\,413\,102\,245\,031\,848\,242\,324\,741\,975\,028\ldots$$
$$455\,074\,785\,225\,795\,018\,578\,217\,952\,725\,297\,578\,401\, x - 1.4018\times 10^{281} = 0$$

Solution:

$$x = 302\,252\,030\,059\,693\,121\,920\,271\,165\,577\,239\,944\,204\,860\,131\,722\,348\,961\,160\,855\ldots$$
$$747\,578\,442\,732\,735\,478\,450\,443\,267\,310\,789\,872\,483\,163\,320\,605\,426\,706\,460\ldots$$
$$704\,768$$

Integer solution:

$$x = 302\,252\,030\,059\,693\,121\,920\,271\,165\,577\,239\,944\,204\,860\,131\,722\,348\,961\,160\,855\ldots$$
$$747\,578\,442\,732\,735\,478\,450\,443\,267\,310\,789\,872\,483\,163\,320\,605\,426\,706\,460\ldots$$
$$704\,768$$

Decimal approximation:

$$3.022520300596931219202711655772399442048601317223489 6\ldots \times 10^{122}$$

$3.022520300596….*10^{122}$

From which:

(43/5)*1/(3.022520300596931219202711655772399442048601317223489 6 × 10^122)

Input interpretation:

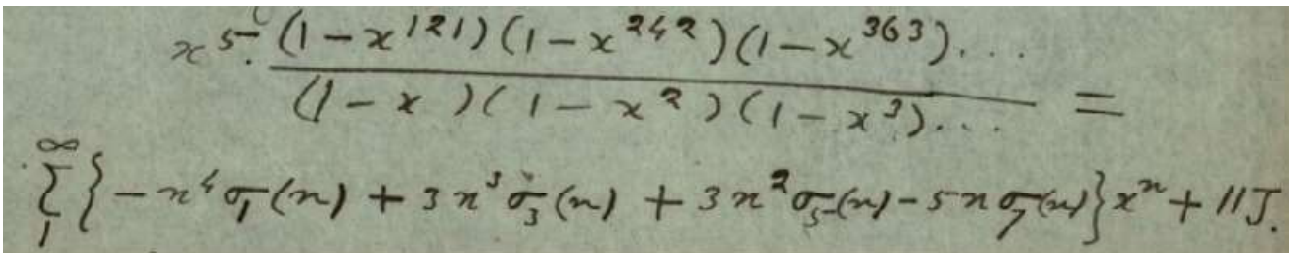
$$\frac{43}{5} \times \frac{1}{3.022520300596931219202711655772399442048601317223489 6 \times 10^{122}}$$

Result:

$2.845307605808816920719372643621897802358226776773819\ldots \times 10^{-122}$

$2.8453076058\ldots.*10^{-122}$ result very near to the value of the Cosmological Constant 2.888×10^{-122} in Planck units

Now, we have that:



$$x^5 \frac{(1-x^{121})(1-x^{242})(1-x^{363})\ldots}{(1-x)(1-x^2)(1-x^3)\ldots} = \sum_1^\infty \{-n^4\sigma_1(n) + 3n^3\sigma_3(n) + 3n^2\sigma_5(n) - 5n\sigma_7(n)\}x^n + 11J.$$

2^5 * (((1-2^121)(1-2^242)(1-3^363))) / (((1-2)(1-2^2)(1-2^3)))

Input:

$$2^5 \times \frac{(1-2^{121})(1-2^{242})(1-3^{363})}{(1-2)(1-2^2)(1-2^3)}$$

Exact result:

31 400 214 358 499 113 105 859 822 655 726 158 505 161 680 071 040 368 398 298 ⋱
764 383 007 903 590 429 341 136 334 266 963 215 111 771 108 518 591 053 828 941 ⋱
466 463 690 981 277 001 411 409 076 312 643 903 044 336 979 161 696 959 097 033 ⋱
047 922 433 822 829 327 741 006 040 268 410 830 443 662 359 577 416 952 672 760 ⋱
138 904 149 817 302 047 927 587 318 791 917 554 653 392 832 / 7

Decimal approximation:

$4.485744908357016157979974665103736929308811438720052 6\ldots \times 10^{282}$

$4.485744908357\ldots.*10^{282}$

3*8*13[2^5 * (((1-2^121)(1-2^242)(1-3^363))) / (((1-2)(1-2^2)(1-2^3)))]^1/3

Input:

$$3\times 8\times 13\sqrt[3]{2^5\times\frac{(1-2^{121})(1-2^{242})(1-3^{363})}{(1-2)(1-2^2)(1-2^3)}}$$

Exact result:

$$28\,704\times 64\,703^{2/3}$$
$$(9\,632\,084\,764\,481\,917\,157\,222\,567\,301\,822\,264\,757\,853\,490\,734\,877\,744\,056\,071\cdot$$
$$235\,182\,988\,271\,383\,927\,248\,329\,899\,853\,125\,185\,339\,266\,624\,170\,768\,012\cdot$$
$$481\,494\,318\,164\,647\,562\,405\,867\,170\,094\,736\,873\,079\,039\,555\,981\,606\,452\cdot$$
$$559\,175\,605\,626\,096\,756\,333\,417\,162\,703\,710\,192\,820\,847\,932\,912\,978\,125\cdot$$
$$652\,219\,524\,486\,084\,986\,667\,423\,829\,341\,779\,307\,707\,856\,074\,121/7)^{\wedge}$$
$$(1/3)$$

Decimal approximation:

$5.145561638522130239121680533662018615388992667897029 8\ldots\times 10^{96}$

$5.1455616385\ldots.*10^{96}$ result very near to the Planck density 5.1550×10^{96} kg/m^3

From the two previous solutions, we obtain also:

(((2^5 * (((1-2^121)(1-2^242)(1-3^363))) / (((1-2)(1-2^2)(1-2^3)))))) *1/ 3.022520300596*10^122

Input interpretation:

$$\left(2^5\times\frac{(1-2^{121})(1-2^{242})(1-3^{363})}{(1-2)(1-2^2)(1-2^3)}\right)\times\frac{1}{3.022520300596\times 10^{122}}$$

Result:

$1.484107454124456373484670612967222501030132643974 6636\ldots\times 10^{160}$

$1.48410745\ldots.*10^{160}$

From which:

3ln[(((2^5 * (((1-2^121)(1-2^242)(1-3^363))) / (((1-2)(1-2^2)(1-2^3)))))) *1/ 3.022520300596*10^122]+8+Pi-2

Input interpretation:

$$3\log\left(\left(2^5\times\frac{(1-2^{121})(1-2^{242})(1-3^{363})}{(1-2)(1-2^2)(1-2^3)}\right)\times\frac{1}{3.022520300596\times10^{122}}\right)+8+\pi-2$$

$\log(x)$ is the natural logarithm

Result:

1115.566877942422...

1115.56687…. result practically equal to the rest mass of Lambda baryon 1115.683

Alternative representations:

$$3\log\left(\frac{2^5\left((1-2^{121})(1-2^{242})(1-3^{363})\right)}{(3.0225203005960000\times10^{122})\left((1-2)(1-2^2)(1-2^3)\right)}\right)+8+\pi-2=$$
$$6+\pi+3\log_e\left(-\frac{2^5(1-2^{121})(1-2^{242})(1-3^{363})}{21\,(3.0225203005960000\times10^{122})}\right)$$

$$3\log\left(\frac{2^5\left((1-2^{121})(1-2^{242})(1-3^{363})\right)}{(3.0225203005960000\times10^{122})\left((1-2)(1-2^2)(1-2^3)\right)}\right)+8+\pi-2=$$
$$6+\pi+3\log(a)\log_a\left(-\frac{2^5(1-2^{121})(1-2^{242})(1-3^{363})}{21\,(3.0225203005960000\times10^{122})}\right)$$

$$3\log\left(\frac{2^5\left((1-2^{121})(1-2^{242})(1-3^{363})\right)}{(3.0225203005960000\times10^{122})\left((1-2)(1-2^2)(1-2^3)\right)}\right)+8+\pi-2=$$
$$6+\pi-3\,\mathrm{Li}_1\left(1--\frac{2^5(1-2^{121})(1-2^{242})(1-3^{363})}{21\,(3.0225203005960000\times10^{122})}\right)$$

Series representations:

$$3\log\left(\frac{2^5\left((1-2^{121})(1-2^{242})(1-3^{363})\right)}{(3.0225203005960000\times10^{122})\left((1-2)(1-2^2)(1-2^3)\right)}\right)+8+\pi-2=$$
$$6+\pi+3\log\left(1.4841074541244564\times10^{160}\right)-3\sum_{k=1}^{\infty}\frac{(-1)^k\,e^{-368.80842842961079\,42\,k}}{k}$$

$$3\log\left(\frac{2^5\left(\left(1-2^{121}\right)\left(1-2^{242}\right)\left(1-3^{363}\right)\right)}{\left(3.0225203005960000\times 10^{122}\right)\left((1-2)\left(1-2^2\right)\left(1-2^3\right)\right)}\right)+8+\pi-2=$$
$$6+\pi+6\,i\,\pi\left\lfloor\frac{\arg\left(1.4841074541244564\times 10^{160}-x\right)}{2\,\pi}\right\rfloor+3\log(x)-$$
$$3\sum_{k=1}^{\infty}\frac{(-1)^k\left(1.4841074541244564\times 10^{160}-x\right)^k x^{-k}}{k}\quad\text{for } x<0$$

$$3\log\left(\frac{2^5\left(\left(1-2^{121}\right)\left(1-2^{242}\right)\left(1-3^{363}\right)\right)}{\left(3.0225203005960000\times 10^{122}\right)\left((1-2)\left(1-2^2\right)\left(1-2^3\right)\right)}\right)+8+\pi-2=$$
$$6+\pi+3\left\lfloor\frac{\arg\left(1.4841074541244564\times 10^{160}-z_0\right)}{2\,\pi}\right\rfloor\log\left(\frac{1}{z_0}\right)+$$
$$3\log(z_0)+3\left\lfloor\frac{\arg\left(1.4841074541244564\times 10^{160}-z_0\right)}{2\,\pi}\right\rfloor\log(z_0)-$$
$$3\sum_{k=1}^{\infty}\frac{(-1)^k\left(1.4841074541244564\times 10^{160}-z_0\right)^k z_0^{-k}}{k}$$

Integral representations:

$$3\log\left(\frac{2^5\left(\left(1-2^{121}\right)\left(1-2^{242}\right)\left(1-3^{363}\right)\right)}{\left(3.0225203005960000\times 10^{122}\right)\left((1-2)\left(1-2^2\right)\left(1-2^3\right)\right)}\right)+8+\pi-2=$$
$$6+\pi+3\int_1^{1.4841074541244564\times 10^{160}}\frac{1}{t}\,dt$$

$$3\log\left(\frac{2^5\left(\left(1-2^{121}\right)\left(1-2^{242}\right)\left(1-3^{363}\right)\right)}{\left(3.0225203005960000\times 10^{122}\right)\left((1-2)\left(1-2^2\right)\left(1-2^3\right)\right)}\right)+8+\pi-2=$$
$$6+\pi+\frac{3}{2\,i\,\pi}\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{e^{-368.80842842961079 42\,s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\quad\text{for } -1<\gamma<0$$

3ln[(((2^5 * (((1-2^121)(1-2^242)(1-3^363))) / (((1-2)(1-2^2)(1-2^3)))))) *1/ 3.022520300596*10^122]+47+11

Input interpretation:

$$3\log\left(\left(2^5\times\frac{\left(1-2^{121}\right)\left(1-2^{242}\right)\left(1-3^{363}\right)}{(1-2)\left(1-2^2\right)\left(1-2^3\right)}\right)\times\frac{1}{3.022520300596\times 10^{122}}\right)+47+11$$

$\log(x)$ is the natural logarithm

Result:

1164.425285288832...

1164.4252852…. result very near to the following Ramanujan's class invariant

$Q = \left(G_{505}/G_{101/5}\right)^3 = 1164.2696$

Alternative representations:

$$3\log\left(\frac{2^5\left(\left(1-2^{121}\right)\left(1-2^{242}\right)\left(1-3^{363}\right)\right)}{\left(3.0225203005960000\times 10^{122}\right)\left((1-2)\left(1-2^2\right)\left(1-2^3\right)\right)}\right)+47+11=$$
$$58+3\log_e\left(-\frac{2^5\left(1-2^{121}\right)\left(1-2^{242}\right)\left(1-3^{363}\right)}{21\left(3.0225203005960000\times 10^{122}\right)}\right)$$

$$3\log\left(\frac{2^5\left(\left(1-2^{121}\right)\left(1-2^{242}\right)\left(1-3^{363}\right)\right)}{\left(3.0225203005960000\times 10^{122}\right)\left((1-2)\left(1-2^2\right)\left(1-2^3\right)\right)}\right)+47+11=$$
$$58+3\log(a)\log_a\left(-\frac{2^5\left(1-2^{121}\right)\left(1-2^{242}\right)\left(1-3^{363}\right)}{21\left(3.0225203005960000\times 10^{122}\right)}\right)$$

$$3\log\left(\frac{2^5\left(\left(1-2^{121}\right)\left(1-2^{242}\right)\left(1-3^{363}\right)\right)}{\left(3.0225203005960000\times 10^{122}\right)\left((1-2)\left(1-2^2\right)\left(1-2^3\right)\right)}\right)+47+11=$$
$$58-3\,\mathrm{Li}_1\left(1--\frac{2^5\left(1-2^{121}\right)\left(1-2^{242}\right)\left(1-3^{363}\right)}{21\left(3.0225203005960000\times 10^{122}\right)}\right)$$

Series representations:

$$3\log\left(\frac{2^5\left(\left(1-2^{121}\right)\left(1-2^{242}\right)\left(1-3^{363}\right)\right)}{\left(3.0225203005960000\times 10^{122}\right)\left((1-2)\left(1-2^2\right)\left(1-2^3\right)\right)}\right)+47+11=$$
$$58+3\log\left(1.4841074541244564\times 10^{160}\right)-3\sum_{k=1}^{\infty}\frac{(-1)^k\,e^{-368.80842842961079 42\,k}}{k}$$

$$3\log\left(\frac{2^5\left(\left(1-2^{121}\right)\left(1-2^{242}\right)\left(1-3^{363}\right)\right)}{\left(3.0225203005960000\times 10^{122}\right)\left((1-2)\left(1-2^2\right)\left(1-2^3\right)\right)}\right)+47+11=$$
$$58+6\,i\,\pi\left\lfloor\frac{\arg\left(1.4841074541244564\times 10^{160}-x\right)}{2\,\pi}\right\rfloor+3\log(x)-$$
$$3\sum_{k=1}^{\infty}\frac{(-1)^k\left(1.4841074541244564\times 10^{160}-x\right)^k x^{-k}}{k}\quad\text{for } x<0$$

$$3\log\left(\frac{2^5\left(\left(1-2^{121}\right)\left(1-2^{242}\right)\left(1-3^{363}\right)\right)}{\left(3.0225203005960000\times 10^{122}\right)\left((1-2)\left(1-2^2\right)\left(1-2^3\right)\right)}\right)+47+11=$$
$$58+3\left\lfloor\frac{\arg\left(1.4841074541244564\times 10^{160}-z_0\right)}{2\pi}\right\rfloor\log\left(\frac{1}{z_0}\right)+$$
$$3\log(z_0)+3\left\lfloor\frac{\arg\left(1.4841074541244564\times 10^{160}-z_0\right)}{2\pi}\right\rfloor\log(z_0)-$$
$$3\sum_{k=1}^{\infty}\frac{(-1)^k\left(1.4841074541244564\times 10^{160}-z_0\right)^k z_0^{-k}}{k}$$

Integral representations:

$$3\log\left(\frac{2^5\left(\left(1-2^{121}\right)\left(1-2^{242}\right)\left(1-3^{363}\right)\right)}{\left(3.0225203005960000\times 10^{122}\right)\left((1-2)\left(1-2^2\right)\left(1-2^3\right)\right)}\right)+47+11=$$
$$58+3\int_1^{1.4841074541244564\times 10^{160}}\frac{1}{t}\,dt$$

$$3\log\left(\frac{2^5\left(\left(1-2^{121}\right)\left(1-2^{242}\right)\left(1-3^{363}\right)\right)}{\left(3.0225203005960000\times 10^{122}\right)\left((1-2)\left(1-2^2\right)\left(1-2^3\right)\right)}\right)+47+11=$$
$$58+\frac{3}{2i\pi}\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{e^{-368.80842842961079 42 s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\quad \text{for } -1<\gamma<0$$

From which:

(((((3ln[(((2^5 * (((1-2^121)(1-2^242)(1-3^363))) / (((1-2)(1-2^2)(1-2^3)))))) *1/ 3.022520300596*10^122]+47+11)))))^1/14

Input interpretation:

$$\sqrt[14]{3\log\left(\left(2^5\times\frac{\left(1-2^{121}\right)\left(1-2^{242}\right)\left(1-3^{363}\right)}{(1-2)\left(1-2^2\right)\left(1-2^3\right)}\right)\times\frac{1}{3.022520300596\times 10^{122}}\right)+47+11}$$

$\log(x)$ is the natural logarithm

Result:

1.6558003627165322...

1.6558…. result very near to the 14th root of the following Ramanujan's class invariant $Q=\left(G_{505}/G_{101/5}\right)^3$ = 1164.2696 i.e. 1.65578...

Now, we have that:

https://trin-digital-library.trin.cam.ac.uk/iiif/2/Add.Ms.a.94.13%2F018_Add.Ms.a.94.13_017.jpg/full/1000,1589/0/default.jpg

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Moduli 2 and 3

11. Before we proceed to consider higher moduli we shall see what the analogous formulae are in the cases of moduli 2 and 3. It is easy to see that

$$(11.1)\qquad \frac{(1-x^4)(1-x^8)(1-x^{12})\cdots}{(1-x)(1-x^2)(1-x^3)\cdots} = \frac{(1-x^2)(1-x^4)(1-x^6)\cdots}{(1-x)(1-x^3)(1-x^5)\cdots} + 2J = 1+x+x^3+x^6+\cdots + 2J.$$

It follows that

$$(11.2)\qquad p(n) - p(n-4) - p(n-8) + p(n-20) + p(n-28) - \cdots$$

is odd or even according as n is a triangular number or not, 4, 8, 20, ... being numbers of the form $2V(3V+1)$ and $2V(3V-1)$!

$p(n)$ is odd for 110 values of n not exceeding 200 and even for 90 values of n in the same range. Thus $p(n)$ seems to be odd for more values of n than those for which $p(n)$ is even.

Again we have

$$(11.3)\qquad \frac{(1-x^9)(1-x^{18})(1-x^{27})\cdots}{(1-x)(1-x^2)(1-x^3)\cdots} = \frac{\{(1-x^2)^5(1-x^6)^5(1-x^9)\cdots\}^3}{(1-x)(1-x^2)(1-x^3)\cdots} + 3J.$$

But it can be shown that — Insert (H)

$$(11.4)\qquad x\cdot\frac{\{(1-x^9)(1-x^{18})(1-x^{27})\cdots\}^3}{(1-x^3)(1-x^6)(1-x^9)\cdots} = \frac{x}{1+x+x^2} + \frac{x^2}{1+x^2+x^4} + \frac{x^4}{1+x^4+x^8} + \frac{x^5}{1+x^5+x^{10}} + \frac{x^7}{1+x^7+x^{14}} + \cdots.$$

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

$$\frac{x}{(1-x)^2} + \frac{x^2}{(1-x^2)^2} + \frac{x^4}{(1-x^4)^2} + \frac{x^5}{(1-x^5)^2} + \cdots + 3J;$$

and the coefficient of x^{3n+1} in the above series and (11.3) is $\sigma_1(3n+1)$. It follows from this and (11.4) that

$$(11.5)\qquad \frac{(1-x^9)(1-x^{18})(1-x^{27})\cdots}{(1-x)(1-x^2)(1-x^3)\cdots} = \sum_0^\infty \sigma_1(3n+1)\,x^n + 3J.$$

From this we easily deduce that

From (11.1) for x = 2 and J = 279.1936 we obtain:

[(((1-2^2)(1-2^4)(1-2^6))) / (((1-2)(1-2^3)(1-2^5)))] + 2*279.1936

Input interpretation:

$$\frac{(1-2^2)(1-2^4)(1-2^6)}{(1-2)(1-2^3)(1-2^5)} + 2 \times 279.1936$$

Result:

571.451716129032258064516129032258064516129032258064516129...

Repeating decimal:

$571.451\overline{6161290322580645}$ (period 15)

571.451716129…

(1+2+2^3+2^6+2*279.1936)

Input interpretation:

$$1 + 2 + 2^3 + 2^6 + 2 \times 279.1936$$

Result:

633.3872

633.3872

From the ratio of the two results, we obtain:

(1 + 2 + 2^3 + 2^6 + 2×279.1936)/(((1 - 2^2) (1 - 2^4) (1 - 2^6))/((1 - 2) (1 - 2^3) (1 - 2^5)) + 2×279.1936)

Input interpretation:

$$\frac{1 + 2 + 2^3 + 2^6 + 2 \times 279.1936}{\frac{(1-2^2)(1-2^4)(1-2^6)}{(1-2)(1-2^3)(1-2^5)} + 2 \times 279.1936}$$

Result:

1.108382706924941453016502983188848647794768673821069363397...

1.1083827…

Input interpretation:

$$\frac{1+2+2^3+2^6+2\times 279.1936}{\frac{(1-2^2)(1-2^4)(1-2^6)}{(1-2)(1-2^3)(1-2^5)}+2\times 279.1936}$$

Result:

1.10838270692494145301650298318884864779476867382106936339 7...

1.1083827…

or:

(((1 - 2^2) (1 - 2^4) (1 - 2^6))/((1 - 2) (1 - 2^3) (1 - 2^5)) + 2×279.1936)x = (1 + 2 + 2^3 + 2^6 + 2×279.1936)

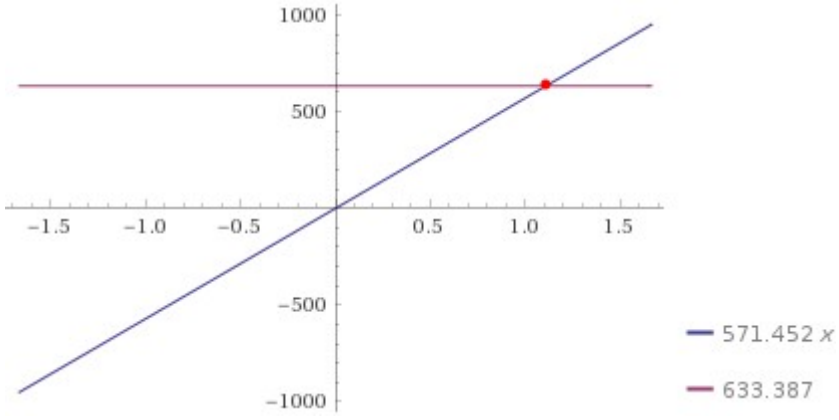
Input interpretation:

$$\left(\frac{(1-2^2)(1-2^4)(1-2^6)}{(1-2)(1-2^3)(1-2^5)}+2\times 279.1936\right)x = 1+2+2^3+2^6+2\times 279.1936$$

Result:

$571.452\,x = 633.387$

Plot:



Alternate form:

$571.452\,x - 633.387 = 0$

Alternate form assuming x is real:

$571.452\,x + 0 = 633.387$

Solution:

$x \approx 1.10838$

1.10838

From the sum of the two results, we obtain:

(1 + 2 + 2^3 + 2^6 + 2×279.1936)+(((1 - 2^2) (1 - 2^4) (1 - 2^6))/((1 - 2) (1 - 2^3) (1 - 2^5)) + 2×279.1936)

Input interpretation:

$$\left(1+2+2^3+2^6+2\times 279.1936\right)+\left(\frac{\left(1-2^2\right)\left(1-2^4\right)\left(1-2^6\right)}{\left(1-2\right)\left(1-2^3\right)\left(1-2^5\right)}+2\times 279.1936\right)$$

Result:

1204.838916129032258064516129032258064516129032258064516129...

Repeating decimal:

$1204.8\overline{389161290322580645}$ (period 15)

1204.838916…

From which:

27+(1 + 2 + 2^3 + 2^6 + 2×279.1936)+(((1 - 2^2) (1 - 2^4) (1 - 2^6))/((1 - 2) (1 - 2^3) (1 - 2^5)) + 2×279.1936)

Input interpretation:

$$27+\left(1+2+2^3+2^6+2\times 279.1936\right)+\left(\frac{\left(1-2^2\right)\left(1-2^4\right)\left(1-2^6\right)}{\left(1-2\right)\left(1-2^3\right)\left(1-2^5\right)}+2\times 279.1936\right)$$

Result:

1231.838916129032258064516129032258064516129032258064516129...

Repeating decimal:

$1231.8\overline{389161290322580645}$ (period 15)

1231.838916… result practically equal to the rest mass of Delta baryon 1232

and:

((((((1 + 2 + 2^3 + 2^6 + 2×279.1936)+(((1 - 2^2) (1 - 2^4) (1 - 2^6))/((1 - 2) (1 - 2^3) (1 - 2^5)) + 2×279.1936))))))^1/14

Input interpretation:

$$\sqrt[14]{\left(1+2+2^3+2^6+2\times 279.1936\right)+\left(\frac{(1-2^2)(1-2^4)(1-2^6)}{(1-2)(1-2^3)(1-2^5)}+2\times 279.1936\right)}$$

Result:

1.6598405...

1.6598405…. result very near to the 14th root of the following Ramanujan's class invariant $Q = \left(G_{505}/G_{101/5}\right)^3$ = 1164.2696 i.e. 1.65578...

We have also:

((((1 + 2 + 2^3 + 2^6 + 2×279.1936)/(((1 - 2^2) (1 - 2^4) (1 - 2^6))/((1 - 2) (1 - 2^3) (1 - 2^5)) + 2×279.1936))))^5

Input interpretation:

$$\left(\frac{1+2+2^3+2^6+2\times 279.1936}{\frac{(1-2^2)(1-2^4)(1-2^6)}{(1-2)(1-2^3)(1-2^5)}+2\times 279.1936}\right)^5$$

Result:

1.67281805147027398068641052618506418572315019810678821065 0...

1.67281805147…. result near to the 14th root of the following Ramanujan's class invariant $Q = \left(G_{505}/G_{101/5}\right)^3$ = 1164.2696 i.e. 1.65578...

From (11.3), we have that:

(((1-2^9)(1-2^18)(1-2^27)))/(((1-2)(1-2^2)(1-2^3))) = [(((1-2^3)(1-2^6)(1-2^9)))]^3 / (((1-2)(1-2^2)(1-2^3)))+3J

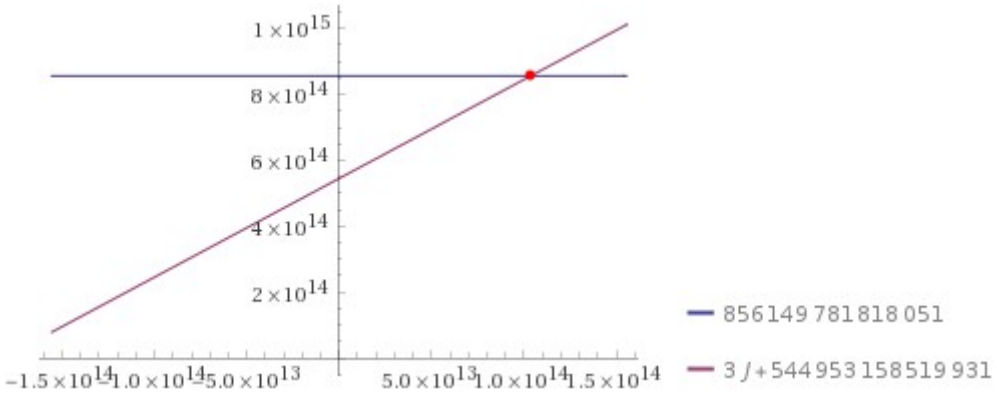
Input:

$$\frac{(1-2^9)(1-2^{18})(1-2^{27})}{(1-2)(1-2^2)(1-2^3)} = \frac{((1-2^3)(1-2^6)(1-2^9))^3}{(1-2)(1-2^2)(1-2^3)} + 3J$$

Result:

$$856\,149\,781\,818\,051 = 3J + 544\,953\,158\,519\,931$$

Plot:



Alternate forms:

$$856\,149\,781\,818\,051 = 3\,(J + 181\,651\,052\,839\,977)$$

$$311\,196\,623\,298\,120 - 3J = 0$$

Solution:

$$J = 103\,732\,207\,766\,040$$

Thence:

[(((1-2^3)(1-2^6)(1-2^9)))]^3 / (((1-2)(1-2^2)(1-2^3)))+3*103732207766040

Input:

$$\frac{((1-2^3)(1-2^6)(1-2^9))^3}{(1-2)(1-2^2)(1-2^3)} + 3 \times 103\,732\,207\,766\,040$$

Result:

856 149 781 818 051

Scientific notation:

$8.56149781818051 \times 10^{14}$

$8.56149781818051*10^{14}$

(((1-2^9)(1-2^18)(1-2^27)))/(((1-2)(1-2^2)(1-2^3)))

Input:

$$\frac{(1-2^9)(1-2^{18})(1-2^{27})}{(1-2)(1-2^2)(1-2^3)}$$

Result:

856 149 781 818 051

Scientific notation:

$8.56149781818051 \times 10^{14}$

$8.56149781818051*10^{14}$

From which:

[(((1-2^9)(1-2^18)(1-2^27)))/(((1-2)(1-2^2)(1-2^3)))]^1/72

Input:

$$\sqrt[72]{\frac{(1-2^9)(1-2^{18})(1-2^{27})}{(1-2)(1-2^2)(1-2^3)}}$$

Result:

$\sqrt[36]{21}\ \sqrt[24]{73}\ \sqrt[72]{4990483}$

Decimal approximation:

1.612116876060196336136095972758626166811796194060593106313...

1.612116876…. result that is a good approximation to the value of the golden ratio 1.618033988749...

Alternate form:

root of $x^{72} - 856\,149\,781\,818\,051$ near $x = 1.61212$

All 72nd roots of 856149781818051:

$\sqrt[36]{21}\ \sqrt[24]{73}\ \sqrt[72]{4990483}\ e^{0} \approx 1.61212$ (real, principal root)

$\sqrt[36]{21}\ \sqrt[24]{73}\ \sqrt[72]{4990483}\ e^{(i\pi)/36} \approx 1.60598 + 0.14051\,i$

$\sqrt[36]{21}\ \sqrt[24]{73}\ \sqrt[72]{4990483}\ e^{(i\pi)/18} \approx 1.58763 + 0.27994\,i$

$\sqrt[36]{21}\ \sqrt[24]{73}\ \sqrt[72]{4990483}\ e^{(i\pi)/12} \approx 1.55719 + 0.41725\,i$

$\sqrt[36]{21}\ \sqrt[24]{73}\ \sqrt[72]{4990483}\ e^{(i\pi)/9} \approx 1.51489 + 0.5514\,i$

From (11.4), we obtain:

2*(((1-2^9)(1-2^18)(1-2^27)))^3 / (((1-2^3)(1-2^6)(1-2^9))) = ((2/(1+2+2^2)+2^2/(1+2^2+2^4)+2^4/(1+2^4+2^8)+2^5/(1+2^5+2^10)+2^7(1+2^7+2^14)))x

2*(((1-2^9)(1-2^18)(1-2^27)))^3 / (((1-2^3)(1-2^6)(1-2^9)))

Input:

$2 \times \frac{((1-2^9)(1-2^{18})(1-2^{27}))^3}{(1-2^3)(1-2^6)(1-2^9)}$

Result:

51 579 560 975 842 965 917 574 108 089 172 337 273 807 122

Scientific notation:

$5.157956097584296591757410808917233727380712 2 \times 10^{43}$

$5.1579560975842\ldots*10^{43}$

(((2/(1+2+2^2)+2^2/(1+2^2+2^4)+2^4/(1+2^4+2^8)+2^5/(1+2^5+2^10)+2^7/(1+2^7+2^14)))) * 900442860864951818241435874665111521276723 20

Input:

$$\left(\frac{2}{1+2+2^2}+\frac{2^2}{1+2^2+2^4}+\frac{2^4}{1+2^4+2^8}+\frac{2^5}{1+2^5+2^{10}}+\frac{2^7}{1+2^7+2^{14}}\right)\times 90\,044\,286\,086\,495\,181\,824\,143\,587\,466\,511\,152\,127\,672\,320$$

Exact result:

$$\frac{5\,015\,857\,347\,130\,824\,843\,703\,550\,956\,767\,100\,898\,889\,278\,066\,524\,160}{97\,245\,057}$$

Decimal approximation:

$5.157956097584296591757410309057766194624450748714 3125\ldots \times 10^{43}$

$5.1579560975842\ldots*10^{43}$

From which:

(((3^(1/17) log^(15/17)(2))/(2^(14/17) (e log(3))^(3/17)))) * 2*(((1-2^9)(1-2^18)(1-2^27)))^3 / (((1-2^3)(1-2^6)(1-2^9)))

where

$$\frac{\sqrt[17]{3}\,\log^{15/17}(2)}{2^{14/17}\,(e\log(3))^{3/17}} \approx 0.359635645906519$$

Input:

$$\frac{\sqrt[17]{3}\,\log^{15/17}(2)}{2^{14/17}\,(e\log(3))^{3/17}}\times 2\times\frac{\left((1-2^9)(1-2^{18})(1-2^{27})\right)^3}{(1-2^3)(1-2^6)(1-2^9)}$$

$\log(x)$ is the natural logarithm

Exact result:

$$25\,789\,780\,487\,921\,482\,958\,787\,054\,044\,586\,168\,636\,903\,561\,\sqrt[17]{3}\,\log^{15/17}(2)\left(\frac{2}{e\log(3)}\right)^{3/17}$$

Decimal approximation:

$$1.85498487271220046878383716516410191440939874182125 64\ldots\times 10^{43}$$

$1.8549848727\ldots*10^{43}$ result very near to the Planck frequency 1.8549×10^{43}

Alternative representations:

$$\frac{(2((1-2^9)(1-2^{18})(1-2^{27}))^3)\left(\sqrt[17]{3}\,\log^{15/17}(2)\right)}{((1-2^3)(1-2^6)(1-2^9))\left(2^{14/17}(e\log(3))^{3/17}\right)}=-\frac{2\sqrt[17]{3}\,\log_e^{15/17}(2)((1-2^9)(1-2^{18})(1-2^{27}))^3}{(7(1-2^6)(1-2^9))\left(2^{14/17}(e\log_e(3))^{3/17}\right)}$$

$$\frac{(2((1-2^9)(1-2^{18})(1-2^{27}))^3)\left(\sqrt[17]{3}\,\log^{15/17}(2)\right)}{((1-2^3)(1-2^6)(1-2^9))\left(2^{14/17}(e\log(3))^{3/17}\right)}=-\frac{2\sqrt[17]{3}\,(\log(a)\log_a(2))^{15/17}((1-2^9)(1-2^{18})(1-2^{27}))^3}{(7(1-2^6)(1-2^9))\left(2^{14/17}(e\log(a)\log_a(3))^{3/17}\right)}$$

$$\frac{(2((1-2^9)(1-2^{18})(1-2^{27}))^3)\left(\sqrt[17]{3}\,\log^{15/17}(2)\right)}{((1-2^3)(1-2^6)(1-2^9))\left(2^{14/17}(e\log(3))^{3/17}\right)}=-\frac{2\sqrt[17]{3}\,(2\coth^{-1}(3))^{15/17}((1-2^9)(1-2^{18})(1-2^{27}))^3}{(7(1-2^6)(1-2^9))\left(2^{14/17}(2e\coth^{-1}(2))^{3/17}\right)}$$

Series representations:

$$\frac{\left(2\left(\left(1-2^{9}\right)\left(1-2^{18}\right)\left(1-2^{27}\right)\right)^{3}\right)\left(\sqrt[17]{3}\,\log^{15/17}(2)\right)}{\left(\left(1-2^{3}\right)\left(1-2^{6}\right)\left(1-2^{9}\right)\right)\left(2^{14/17}\,(e\log(3))^{3/17}\right)} =$$

$$25\,789\,780\,487\,921\,482\,958\,787\,054\,044\,586\,168\,636\,903\,561\,\sqrt[17]{3}$$

$$\left(\frac{2}{e}\right)^{3/17}\left(2\,i\,\pi\left\lfloor\frac{\arg(2-x)}{2\,\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k\,(2-x)^k\,x^{-k}}{k}\right)^{15/17}$$

$$\left(-\frac{i}{2\,\pi\left\lfloor\frac{\arg(3-x)}{2\,\pi}\right\rfloor-i\log(x)+i\sum_{k=1}^{\infty}\frac{(-1)^k\,(3-x)^k\,x^{-k}}{k}}\right)^{3/17}\quad\text{for } x<0$$

$$\frac{\left(2\left(\left(1-2^{9}\right)\left(1-2^{18}\right)\left(1-2^{27}\right)\right)^{3}\right)\left(\sqrt[17]{3}\,\log^{15/17}(2)\right)}{\left(\left(1-2^{3}\right)\left(1-2^{6}\right)\left(1-2^{9}\right)\right)\left(2^{14/17}\,(e\log(3))^{3/17}\right)} =$$

$$25\,789\,780\,487\,921\,482\,958\,787\,054\,044\,586\,168\,636\,903\,561\,\sqrt[17]{3}\,\left(\frac{2}{e}\right)^{3/17}$$

$$\left(2\,i\,\pi\left\lfloor\frac{\pi-\arg\left(\frac{1}{z_0}\right)-\arg(z_0)}{2\,\pi}\right\rfloor+\log(z_0)-\sum_{k=1}^{\infty}\frac{(-1)^k\,(2-z_0)^k\,z_0^{-k}}{k}\right)^{15/17}$$

$$\left(-\frac{i}{2\,\pi\left\lfloor\frac{\pi-\arg\left(\frac{1}{z_0}\right)-\arg(z_0)}{2\,\pi}\right\rfloor-i\log(z_0)+i\sum_{k=1}^{\infty}\frac{(-1)^k\,(3-z_0)^k\,z_0^{-k}}{k}}\right)^{3/17}$$

$$\frac{\left(2\left(\left(1-2^{9}\right)\left(1-2^{18}\right)\left(1-2^{27}\right)\right)^{3}\right)\left(\sqrt[17]{3}\,\log^{15/17}(2)\right)}{\left(\left(1-2^{3}\right)\left(1-2^{6}\right)\left(1-2^{9}\right)\right)\left(2^{14/17}\,(e\log(3))^{3/17}\right)} = \frac{1}{e^{3/17}}$$

$$25\,789\,780\,487\,921\,482\,958\,787\,054\,044\,586\,168\,636\,903\,561\times 2^{3/17}\,\sqrt[17]{3}$$

$$\left(\left\lfloor\frac{\arg(2-z_0)}{2\,\pi}\right\rfloor\log\left(\frac{1}{z_0}\right)+\log(z_0)+\left\lfloor\frac{\arg(2-z_0)}{2\,\pi}\right\rfloor\log(z_0)-\sum_{k=1}^{\infty}\frac{(-1)^k\,(2-z_0)^k\,z_0^{-k}}{k}\right)^{15/17}$$

$$\left(\frac{1}{\left\lfloor\frac{\arg(3-z_0)}{2\,\pi}\right\rfloor\log\left(\frac{1}{z_0}\right)+\log(z_0)+\left\lfloor\frac{\arg(3-z_0)}{2\,\pi}\right\rfloor\log(z_0)-\sum_{k=1}^{\infty}\frac{(-1)^k\,(3-z_0)^k\,z_0^{-k}}{k}}\right)^{3/17}$$

Integral representations:

$$\frac{(2((1-2^9)(1-2^{18})(1-2^{27}))^3)\left(\sqrt[17]{3}\,\log^{15/17}(2)\right)}{((1-2^3)(1-2^6)(1-2^9))\left(2^{14/17}\,(e\log(3))^{3/17}\right)}=\frac{1}{e^{3/17}}$$

$$25\,789\,780\,487\,921\,482\,958\,787\,054\,044\,586\,168\,636\,903\,561\times 2^{3/17}\sqrt[17]{3}\left(\int_1^2\frac{1}{t}\,dt\right)^{15/17}\left(\frac{1}{\int_1^3\frac{1}{t}\,dt}\right)^{3/17}$$

$$\frac{(2((1-2^9)(1-2^{18})(1-2^{27}))^3)\left(\sqrt[17]{3}\,\log^{15/17}(2)\right)}{((1-2^3)(1-2^6)(1-2^9))\left(2^{14/17}\,(e\log(3))^{3/17}\right)}=\frac{1}{2^{9/17}\,e^{3/17}\,\pi^{12/17}}$$

$$25\,789\,780\,487\,921\,482\,958\,787\,054\,044\,586\,168\,636\,903\,561\,\sqrt[17]{3}\left(-i\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\right)^{15/17}\left(\frac{i}{\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{2^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds}\right)^{3/17}\quad\text{for}\quad -1<\gamma<0$$

or:

(64*8*70+123)1/10^5 * 2*(((1-2^9)(1-2^18)(1-2^27)))^3 / (((1-2^3)(1-2^6)(1-2^9)))

where 123 is a Lucas number

Input:

$$(64\times 8\times 70+123)\times\frac{1}{10^5}\times 2\times\frac{((1-2^9)(1-2^{18})(1-2^{27}))^3}{(1-2^3)(1-2^6)(1-2^9)}$$

Exact result:

$$\frac{927\,477\,875\,687\,120\,291\,646\,858\,824\,605\,452\,382\,688\,962\,764\,243}{50\,000}$$

Scientific notation:

$1.854955751374240583293717649210904765377925528486\times 10^{43}$

$1.854955751374\ldots.*10^{43}$ as above

From (11.5):

(((1-2^9)(1-2^18)(1-2^27)))^3 / (((1-2)(1-2^2)(1-2^3))) = x+3*279.1936

(8.5615e+14)+3*279.1936

Input interpretation:

$8.5615 \times 10^{14} + 3 \times 279.1936$

Result:

$8.561500000008375808 \times 10^{14}$

$8.5615\ldots*10^{14}$

(((1-2^9)(1-2^18)(1-2^27))) / (((1-2)(1-2^2)(1-2^3)))

Input:

$$\frac{(1-2^9)(1-2^{18})(1-2^{27})}{(1-2)(1-2^2)(1-2^3)}$$

Result:

856 149 781 818 051

Scientific notation:

$8.56149781818051 \times 10^{14}$

$8.56149781818051*10^{14}$

We have that, from the two results

$5.1579560975842\ldots*10^{43}$; $8.56149781818051*10^{14}$

we obtain:

1/10^6 (8.56149781818051*10^14) / (5.1579560975842 * 10^43)

Input interpretation:

$$\frac{1}{10^6} \times \frac{8.56149781818051 \times 10^{14}}{5.1579560975842 \times 10^{43}}$$

Result:

$1.659862483550491208671061908011886987051928686116589 7\ldots \times 10^{-35}$

$1.659862483\ldots.*10^{-35}$ result very near to the value of Planck length $1.616255*10^{-35}$

From the following three results

$8.2312*10^{35}$; $5.1579560975842\ldots*10^{43}$; $8.561497818180 51*10^{14}$

we obtain also:

1/2[8.561497818180 51*10^14 *1/(5.1579560975842*10^43 / 8.2312*10^35)]^1/2+21

where 21 is a Fibonacci number

Input interpretation:

$$\frac{1}{2}\sqrt{8.561497818180 51\times 10^{14}\times\frac{1}{\frac{5.1579560975842\times 10^{43}}{8.2312\times 10^{35}}}}+21$$

Result:

1869.15...

1869.15… result practically equal to the rest mass of D meson 1869.62

and:

144[8.561497818180 51*10^14 *5.1579560975842*10^43 * 8.2312*10^35]

where 144 is a Fibonacci number

Input interpretation:

$144\left(8.561497818180 51\times 10^{14}\times 5.1579560975842\times 10^{43}\times 8.2312\times 10^{35}\right)$

Result:

5 234 232 840 093 712 952 365 241 558 468 021 760 000 000 000 000 000 000 000 000 ·.
000 000 000 000 000 000 000 000 000 000 000 000

Scientific notation:

$5.234232840093712952365241558468021 76 \times 10^{96}$

$5.2342328400937129523652415584680217 6 \times 10^{96}$ result practically equal to the value of Planck density 5.1550×10^{96}

Observations

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

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

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

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

From Wikipedia

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

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

Note that:

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

Hence

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

so that

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

Hence

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

Thence:

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

And

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

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

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

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

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

The beginning of the sequence is thus:

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

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

The Lucas sequence has the same recursive relationship as the Fibonacci sequence, where each term is the sum of the two previous terms, but with different starting

values. This produces a sequence where the ratios of successive terms approach the golden ratio, and in fact the terms themselves are roundings of integer powers of the golden ratio.[1] The sequence also has a variety of relationships with the Fibonacci numbers, like the fact that adding any two Fibonacci numbers two terms apart in the Fibonacci sequence results in the Lucas number in between.

The sequence of Lucas numbers is:

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

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

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

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

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

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

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

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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