On some possible mathematical connections between various equations concerning the Riemann zeta function, the Riemann's Hypothesis, the Einstein's type Universes, ϕ, ζ(2) and some parameters of Particle Physics.

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Abstract

In this paper we have described some possible mathematical connections between various equations concerning the Riemann zeta function, the Riemann's Hypothesis, the Einstein's type Universes, ϕ, ζ(2) and some parameters of Particle Physics.

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$$1729$$

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

https://funwithfunctions.es/post/168921716439/ramanujan

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

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

From:

RIEMANN'S HYPOTHESIS AND SOME INFINITE SET OF MICROSCOPIC UNIVERSES OF THE EINSTEIN'S TYPE IN THE EARLY PERIOD OF THE EVOLUTION OF THE UNIVERSE - *JAN MOSER* - arXiv:1307.1095v2 [physics.gen-ph] 28 Jul 2013

We have that (Definition (4.5)-(4.6):

$$E_1 = 2\left(\frac{2}{\mu^2} - 1\right)\Lambda + \mathcal{O}\left\{\left(1 + \frac{1}{\mu^2}\right)\frac{1}{t_0}\right\},$$

$$E_2 = \frac{2}{\mu^2}\Lambda + \mathcal{O}\left\{\left(1 + \frac{1}{\mu^2}\right)\frac{1}{t_0}\right\},$$

$$\kappa c^2 \rho = \left(\frac{3}{\mu^2} - 1\right)\Lambda + \mathcal{O}\left\{\left(1 + \frac{1}{\mu^2}\right)\frac{1}{t_0}\right\},$$

For $\Lambda = 1.1056e-52$ and $\mu = \sqrt{2}$, we obtain:

From:

$$E_2 = \frac{2}{\mu^2}\Lambda + \mathcal{O}\left\{\left(1+\frac{1}{\mu^2}\right)\frac{1}{t_0}\right\} \quad \text{(a)}$$

2/2 * 1.1056e-52+((1+1/2)*1/infinity) =

$1.1056 * 10^{-52}$

From:

$$\kappa c^2 \rho = \left(\frac{3}{\mu^2} - 1\right)\Lambda + \mathcal{O}\left\{\left(1+\frac{1}{\mu^2}\right)\frac{1}{t_0}\right\} \quad \text{(b)}$$

(3/2-1)*1.1056e-52+((1+1/2)*1/infinity)

Input interpretation:

$$\left(\frac{3}{2}-1\right)\times 1.1056\times 10^{-52} + \left(1+\frac{1}{2}\right)\times\frac{1}{\infty}$$

Result:

5.528×10^{-53}

$5.528 * 10^{-53}$

From which, from the ratio between (a) and (b):

Input interpretation:

$$\frac{\frac{2}{2}\times 1.1056\times 10^{-52} + \left(1+\frac{1}{2}\right)\times\frac{1}{\infty}}{\left(\frac{3}{2}-1\right)\times 1.1056\times 10^{-52} + \left(1+\frac{1}{2}\right)\times\frac{1}{\infty}}$$

Result:

2

2

and the inverse:

(((3/2-1)*1.1056e-52+((1+1/2)*1/infinity)))/(((2/2 * 1.1056e-52+((1+1/2)*1/infinity))))

Input interpretation:

$$\frac{\left(\frac{3}{2}-1\right)\times 1.1056\times 10^{-52}+\left(1+\frac{1}{2}\right)\times\frac{1}{\infty}}{\frac{2}{2}\times 1.1056\times 10^{-52}+\left(1+\frac{1}{2}\right)\times\frac{1}{\infty}}$$

Result:

0.5

0.5

Rational form:

$$\frac{1}{2}$$

From:

$$\frac{p(t;t_0,\Lambda,\epsilon)}{c^2\rho(t;t_0,\Lambda,\epsilon)}=-\frac{1}{3}+\frac{2\epsilon^2}{9-3\epsilon^2}+\mathcal{O}\left(\frac{1}{\Lambda t_0}\right) \quad (5.5)$$

We obtain:

-1/3+(2*(1.2183e-60)^2)/(9-3*(1.2183e-60)^2)+O(1/infinity)

Input interpretation:

$$-\frac{1}{3}+\frac{2\left(1.2183\times 10^{-60}\right)^2}{9-3\left(1.2183\times 10^{-60}\right)^2}+O\left(\frac{1}{\infty}\right)$$

Result:

$O(0)-0.333333$

Alternate forms:

$O(0)-0.333333$

$0.333333\,(3\,O(0)-1)$

That is:

$$-\frac{1}{3}+\frac{2(1.2183\times10^{-60})^2}{9-3(1.2183\times10^{-60})^2}+\frac{1}{\infty}$$

−0.333333333333333333333333333333333333333333333333333333333...

$$-\frac{1}{3}$$

From the previous expression

$$\frac{\left(\frac{3}{2}-1\right)\times1.1056\times10^{-52}+\left(1+\frac{1}{2}\right)\times\frac{1}{\infty}}{\frac{2}{2}\times1.1056\times10^{-52}+\left(1+\frac{1}{2}\right)\times\frac{1}{\infty}}$$

multiplied by

$$-\frac{1}{3}+\frac{2(1.2183\times10^{-60})^2}{9-3(1.2183\times10^{-60})^2}+\frac{1}{\infty}$$

we obtain:

[(((3/2-1)*1.1056e-52+((1+1/2)*1/infinity)))/(((2/2 * 1.1056e-52+((1+1/2)*1/infinity))))] (((-1/3+(2*(1.2183e-60)^2)/(9-3*(1.2183e-60)^2)+(1/infinity))))

Input interpretation:

$$\frac{\left(\frac{3}{2}-1\right)\times1.1056\times10^{-52}+\left(1+\frac{1}{2}\right)\times\frac{1}{\infty}}{\frac{2}{2}\times1.1056\times10^{-52}+\left(1+\frac{1}{2}\right)\times\frac{1}{\infty}}\left(-\frac{1}{3}+\frac{2(1.2183\times10^{-60})^2}{9-3(1.2183\times10^{-60})^2}+\frac{1}{\infty}\right)$$

Result:

−0.166666666666666666666666666666666666666666666666666666666...

-0.16666…

Rational approximation:

$$-\frac{1}{6}$$

-1/6

While summing the two expressions, we obtain:

[(((3/2-1)*1.1056e-52+((1+1/2)*1/infinity)))/(((2/2 * 1.1056e-52+((1+1/2)*1/infinity))))] + (((-1/3+(2*(1.2183e-60)^2)/(9-3*(1.2183e-60)^2)+(1/infinity))))

Input interpretation:

$$\frac{\left(\frac{3}{2}-1\right)\times 1.1056\times 10^{-52}+\left(1+\frac{1}{2}\right)\times\frac{1}{\infty}}{\frac{2}{2}\times 1.1056\times 10^{-52}+\left(1+\frac{1}{2}\right)\times\frac{1}{\infty}}+\left(-\frac{1}{3}+\frac{2\,(1.2183\times 10^{-60})^2}{9-3\,(1.2183\times 10^{-60})^2}+\frac{1}{\infty}\right)$$

Result:

0.16666666666666666666666666666666666666666666666666666...

0.16666…

Rational approximation:

$$\frac{1}{6}$$

1/6

And, dividing the expressions, we obtain:

[(((3/2-1)*1.1056e-52+((1+1/2)*1/infinity)))/(((2/2 * 1.1056e-52+((1+1/2)*1/infinity))))] / (((-1/3+(2*(1.2183e-60)^2)/(9-3*(1.2183e-60)^2)+(1/infinity))))

Input interpretation:

$$\frac{\frac{\left(\frac{3}{2}-1\right)\times 1.1056\times 10^{-52}+\left(1+\frac{1}{2}\right)\times\frac{1}{\infty}}{\frac{2}{2}\times 1.1056\times 10^{-52}+\left(1+\frac{1}{2}\right)\times\frac{1}{\infty}}}{-\frac{1}{3}+\frac{2\,(1.2183\times 10^{-60})^2}{9-3\,(1.2183\times 10^{-60})^2}+\frac{1}{\infty}}$$

Result:

-1.5000000000000000000000000000000000000000000000000000...

-1.5

Rational form:

$$-\frac{3}{2}$$

-3/2

Now, we have that:

$$V = V(t_0, \Lambda, \epsilon) = 2\pi^2 R^3 = \frac{2\pi^2 c^3}{\Lambda^{3/2}}\epsilon^3 + \mathcal{O}\left(\frac{1}{t_0}\right). \quad (5.2)$$

that is the expression concerning the volume of the universes. We obtain:

((2*Pi^2*(3e+8)^3*(1.2183e-60)^3)) / ((1.1056e-52)^1.5) + O(1/infinity)

Input interpretation:

$$\frac{2\pi^2 (3\times 10^8)^3 (1.2183\times 10^{-60})^3}{(1.1056\times 10^{-52})^{1.5}} + O\left(\frac{1}{\infty}\right)$$

Result:

$O(0) + 8.29009\times 10^{-76}$

That is:

$$\frac{2\pi^2 (3\times 10^8)^3 (1.2183\times 10^{-60})^3}{(1.1056\times 10^{-52})^{1.5}} + \frac{1}{\infty}$$

$8.29009... \times 10^{-76}$

$8.29009...*10^{-76}$

Note that, from the above expression, we can to obtain also the Planck's volume:

(73493+1729) * 4/3*Pi*1.616199e-35*((2*Pi^2*(3e+8)^3*(1.2183e-60)^3)) / ((1.1056e-52)^1.5)

Input interpretation:

$$(73\,493 + 1729)\times \frac{4}{3}\pi\times 1.616199\times 10^{-35}\times \frac{2\pi^2 (3\times 10^8)^3 (1.2183\times 10^{-60})^3}{(1.1056\times 10^{-52})^{1.5}}$$

Result:

$4.22170\ldots \times 10^{-105}$

4.22170…*10^-105

where 73493 is given by Karatsuba's equation concerning the zeros of a special type of function connected with Dirichlet series:

$$\left(\begin{array}{c} I_{21} \ll \int_{-\infty}^{+\infty} \exp\left(-\left(\frac{t}{H}\right)^2\right) \left| \sum_{\lambda \leq P^{1-\varepsilon_2}} \frac{a(\lambda)}{\sqrt{\lambda}} B(\lambda) \lambda^{-i(T+t)} \right|^2 dt \ll \\ \ll H \left\{ \left(\frac{4}{\varepsilon_2 \log T} \right)^{2r} (\log T)(\log X)^{-2\beta} + (\varepsilon_2^{-2r} (\log T)^{-2r} + \varepsilon_2^{-r} h_1^r (\log T)^{-r}) T^{-\varepsilon_1} \right\} \end{array} \right) /$$

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

Now, we have that:

$$R(t; t_0, \Lambda, \epsilon) = \epsilon \frac{c}{\sqrt{\Lambda}} + \mathcal{O}\left(\frac{1}{t_0}\right),$$
$$\kappa c^2 \rho(t; t_0, \Lambda, \epsilon) = \left(\frac{3}{\epsilon^2} - 1\right)\Lambda + \mathcal{O}\left\{\left(1 + \frac{1}{\epsilon^2}\right)\frac{1}{t_0}\right\},$$
$$\kappa p(t; t_0, \Lambda, \epsilon) = \left(1 - \frac{1}{\epsilon^2}\right)\Lambda + \mathcal{O}\left\{\left(1 + \frac{1}{\epsilon^2}\right)\frac{1}{t_0}\right\},$$

From:

$$R(t; t_0, \Lambda, \epsilon) = \epsilon \frac{c}{\sqrt{\Lambda}} + \mathcal{O}\left(\frac{1}{t_0}\right)$$

For: $\Lambda = 2.036 \times 10^{-35}\ \text{s}^{-2}$; $\epsilon = 1.2183\text{e-}60$; we obtain:

((((1.2183e-60))*(3e+8)))/(sqrt(2.036e-35))+O(1/infinity)

Input interpretation:

$$\frac{1.2183\times 10^{-60}\times 3\times 10^{8}}{\sqrt{2.036\times 10^{-35}}}+O\left(\frac{1}{\infty}\right)$$

Result:

$O(0)+8.10003\times 10^{-35}$

Alternate form:

$O(0)+8.10003\times 10^{-35}$

Property as a function:

Parity

even

8.10003×10^{-35}

$8.10003 * 10^{-35}$ = Planck length

From:

$$\kappa c^2 \rho(t;t_0,\Lambda,\epsilon)=\left(\frac{3}{\epsilon^2}-1\right)\Lambda+\mathcal{O}\left\{\left(1+\frac{1}{\epsilon^2}\right)\frac{1}{t_0}\right\}$$

we obtain:

(3/(1.2183e-60^2)-1)*(1.1056e-52)+(((1+1/(1.2183e-60)^2))*1/infinity)

Input interpretation:

$$\left(\frac{3}{(1.2183\times 10^{-60})^2}-1\right)\times 1.1056\times 10^{-52}+\left(1+\frac{1}{(1.2183\times 10^{-60})^2}\right)\times\frac{1}{\infty}$$

Result:

$2.234656609418345928440902761654367869389333795625 8981\ldots\times 10^{68}$

$2.2346566\ldots * 10^{68}$

And from:

$$\kappa p(t; t_0, \Lambda, \epsilon) = \left(1 - \frac{1}{\epsilon^2}\right)\Lambda + \mathcal{O}\left\{\left(1 + \frac{1}{\epsilon^2}\right)\frac{1}{t_0}\right\}$$

we obtain:

(((1-1/(1.2183e-60)^2))*(1.1056e-52)+(((1+1/(1.2183e-60)^2))*1/infinity)

Input interpretation:

$$\left(1 - \frac{1}{(1.2183 \times 10^{-60})^2}\right) \times 1.1056 \times 10^{-52} + \left(1 + \frac{1}{(1.2183 \times 10^{-60})^2}\right) \times \frac{1}{\infty}$$

Result:

$-7.44885536472781976146967587218122623129777931875299\ldots \times 10^{67}$

$-7.44885536\ldots * 10^{67}$

Dividing the following two results, we obtain:

(2.2346566094183459284409027616543678693893337956258981 × 10^68 / -7.448855364727819761469675872181226231297779318752993 × 10^67)

Input interpretation:

$$-\frac{2.2346566094183459284409027616543678693893337956258981 \times 10^{68}}{7.448855364727819761469675872181226231297779318752993 \times 10^{67}}$$

Result:

$-3.000000000000000000000000000000000000000000000000026849\ldots$

-3

Subtracting the two results, we obtain:

(2.2346566094183459284409027616543678693893337956258981 × 10^68 - 7.448855364727819761469675872181226231297779318752993 × 10^67)

Input interpretation:

$2.2346566094183459284409027616543678693893337956258981 \times 10^{68} - 7.448855364727819761469675872181226231297779318752993 \times 10^{67}$

Result:

148 977 107 294 556 395 229 393 517 443 624 524 625 955 586 375 059 880 000 000 000 000 000

Scientific notation:

$1.489771072945563952293935174436245246259555863750598 8\times 10^{68}$

1.4897710729…*10^68

From which, we obtain also the Planck time:

1/(0.69897+1.61834) * 1/11468^2 * 1/(148977107294556395229393517443624524625955586375059880000000000000000)^1/2

Input interpretation:

$$\frac{1}{0.69897+1.61834}\times\frac{1}{11468^2}\times 1/\left(\sqrt{148977107294556395229393517443624524625955586375059880000000000000000}\right)$$

Result:

$2.68832\ldots\times 10^{-43}$

2.68832…*10^-43 = Planck time

From the following equation:

$$\frac{p}{c^2\rho}=-\frac{1}{3}+\frac{2\epsilon^2}{9-3\epsilon^2}+\mathcal{O}\left(\frac{1}{\Lambda t_0}\right)\in\left(-\frac{1}{3},-\frac{1}{3}+\delta\right),$$

we obtain, as above:

$$-\frac{1}{3}+\frac{2\,(1.2183\times 10^{-60})^2}{9-3\,(1.2183\times 10^{-60})^2}+\frac{1}{\infty}$$

$-0.33333333333333333333333333333333333333333333333333333\ldots$

$-\frac{1}{3}$

Now, from the various results, we obtain also:

-1/(2Pi)(((((((1/2)/(-1/3)))) + ((((2)/(-3)))))))^3

Input:

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

Result:

$$\frac{2197}{432\pi}$$

Decimal approximation:

1.618812083207842836501100130228768765693091859684179712493...

1.618812083…. result that is a very good approximation to the value of the golden ratio 1.618033988749...

Property:

$\frac{2197}{432\pi}$ is a transcendental number

Alternative representations:

$$\frac{\left(\frac{1}{\frac{2(-1)}{3}}+-\frac{2}{3}\right)^3(-1)}{2\pi}=-\frac{\left(-\frac{2}{3}+\frac{1}{\frac{2(-1)}{3}}\right)^3}{360°}$$

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

$$\frac{\left(\frac{1}{\frac{2(-1)}{3}}+-\frac{2}{3}\right)^3(-1)}{2\pi}=-\frac{\left(-\frac{2}{3}+\frac{1}{\frac{2(-1)}{3}}\right)^3}{2\cos^{-1}(-1)}$$

Series representations:

$$\frac{\left(\frac{1}{\frac{2(-1)}{3}}+-\frac{2}{3}\right)^3(-1)}{2\pi}=\frac{2197}{1728\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}}$$

$$\frac{\left(\frac{1}{\frac{2(-1)}{3}}+-\frac{2}{3}\right)^3(-1)}{2\pi}=\frac{2197}{1728\sum_{k=0}^{\infty}\frac{(-1)^{1+k}\,1195^{-1-2k}\left(5^{1+2k}-4\times 239^{1+2k}\right)}{1+2k}}$$

$$\frac{\left(\frac{1}{\frac{2(-1)}{3}}+-\frac{2}{3}\right)^3(-1)}{2\pi}=\frac{2197}{432\sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2k}+\frac{2}{1+4k}+\frac{1}{3+4k}\right)}$$

Integral representations:

$$\frac{\left(\frac{1}{\frac{2(-1)}{3}}+-\frac{2}{3}\right)^3(-1)}{2\pi}=\frac{2197}{1728\int_0^1\sqrt{1-t^2}\,dt}$$

$$\frac{\left(\frac{1}{\frac{2(-1)}{3}}+-\frac{2}{3}\right)^3(-1)}{2\pi}=\frac{2197}{864\int_0^{\infty}\frac{1}{1+t^2}\,dt}$$

$$\frac{\left(\frac{1}{\frac{2(-1)}{3}}+-\frac{2}{3}\right)^3(-1)}{2\pi}=\frac{2197}{864\int_0^1\frac{1}{\sqrt{1-t^2}}\,dt}$$

Now, we have that:

1.2. In this paper we will study the following quotient

$$0 < \frac{Z(t)}{Z(t_0)}, \quad t \in (\gamma', \gamma''), \ \gamma' < t_0 < \gamma'', \quad \gamma' \to \infty,$$

where $Z(t_0)$ is the local maximum or local minimum of the function $Z(t)$. We make use the estimate (1.2) to prove the following theorem.

Theorem. If

$$(1.4) \qquad \begin{aligned} &\Omega(t_0) = t_0 \ln^4 t_0 + \ln t_0 \ln w(t_0), \\ &w(t_0) = \max\left\{\frac{2}{\omega(t_0)} t_0 \ln^3 t_0, \frac{2}{m(t_0)}\right\}, \ \omega(t_0) \in (0,1), \\ &\Delta_1(t_0) = \{1-\omega(t_0)\}(t_0 - \gamma'), \ \Delta_2(t_0) = \{1-\omega(t_0)\}(\gamma'' - t_0), \\ &J(t_0) = [t_0 - \Delta_1(t_0), t_0 + \Delta_2(t_0)], \end{aligned}$$

For: γ' = 3; t_0 = 5; γ'' = 8; $\omega(t_0) = 10^{-58}, \ldots$

From

$$\Omega(t_0) = t_0 \ln^4 t_0 + \ln t_0 \ln w(t_0),$$

we obtain:

5 ln^4 (5) + ln (5) * ln(10^-58)

Input:

$$5 \log^4(5) + \log(5) \log\left(\frac{1}{10^{58}}\right)$$

log(x) is the natural logarithm

Exact result:

$$5 \log^4(5) - \log(5) \log(10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000)$$

Decimal approximation:

−181.39230759994111053753222232848206645466824168254958269 3...

-181.3923075…

Alternate forms:

$$5 \log^4(5) - 58 \log(5) \log(10)$$

$$\log(5) \left(5 \log^3(5) - \log(10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000)\right)$$

$$5 \log^4(5) - 58 \log^2(5) - 58 \log(2) \log(5)$$

Alternative representations:

$$5 \log^4(5) + \log(5) \log\left(\frac{1}{10^{58}}\right) = \log_e(5) \log_e\left(\frac{1}{10^{58}}\right) + 5 \log_e^4(5)$$

$$5 \log^4(5) + \log(5) \log\left(\frac{1}{10^{58}}\right) = \log^2(a) \log_a(5) \log_a\left(\frac{1}{10^{58}}\right) + 5 (\log(a) \log_a(5))^4$$

$$5 \log^4(5) + \log(5) \log\left(\frac{1}{10^{58}}\right) = \text{Li}_1(-4) \text{Li}_1\left(1 - \frac{1}{10^{58}}\right) + 5 (-\text{Li}_1(-4))^4$$

Series representations:

$$5 \log^4(5) + \log(5) \log\left(\frac{1}{10^{58}}\right) = \left(\log(4) - \sum_{k=1}^{\infty} \frac{\left(-\frac{1}{4}\right)^k}{k}\right) \left(5 \log^3(4) - \log(9\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999) - 15 \log^2(4) \sum_{k=1}^{\infty} \frac{\left(-\frac{1}{4}\right)^k}{k} + 15 \log(4) \left(\sum_{k=1}^{\infty} \frac{\left(-\frac{1}{4}\right)^k}{k}\right)^2 - 5 \left(\sum_{k=1}^{\infty} \frac{\left(-\frac{1}{4}\right)^k}{k}\right)^3 + \sum_{k=1}^{\infty} \frac{\left(-\frac{1}{9999\,999999\,999999\,999999\,999999\,999999\,999999\,999999\,999999\,999999}\right)^k}{k}\right)$$

$$5\log^4(5)+\log(5)\log\left(\frac{1}{10^{58}}\right)=$$
$$5\left(\log(z_0)+\left\lfloor\frac{\arg(5-z_0)}{2\pi}\right\rfloor\left(\log\left(\frac{1}{z_0}\right)+\log(z_0)\right)-\sum_{k=1}^{\infty}\frac{(-1)^k(5-z_0)^k z_0^{-k}}{k}\right)^4-$$
$$\left(\log(z_0)+\left\lfloor\frac{\arg(5-z_0)}{2\pi}\right\rfloor\left(\log\left(\frac{1}{z_0}\right)+\log(z_0)\right)-\sum_{k=1}^{\infty}\frac{(-1)^k(5-z_0)^k z_0^{-k}}{k}\right)$$
$$\left(\log(z_0)+\left\lfloor\frac{1}{2\pi}\arg(\right.\right.$$
$$10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,\ddots$$
$$\left.000\,000\,000\,000-z_0)\right\rfloor\left(\log\left(\frac{1}{z_0}\right)+\log(z_0)\right)-$$
$$\sum_{k=1}^{\infty}\frac{1}{k}(-1)^k$$
$$(10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,\ddots$$
$$\left.000\,000\,000-z_0)^k z_0^{-k}\right)$$

$$5\log^4(5)+\log(5)\log\left(\frac{1}{10^{58}}\right)=\left(\text{Res}_{s=0}\frac{4^{-s}\Gamma(-s)\Gamma(1+s)}{s}+\sum_{j=1}^{\infty}\text{Res}_{s=j}\frac{4^{-s}\Gamma(-s)\Gamma(1+s)}{s}\right)$$
$$\left(5\left(\text{Res}_{s=0}\frac{4^{-s}\Gamma(-s)\Gamma(1+s)}{s}\right)^3-\text{Res}_{s=0}\frac{1}{s}\right.$$
$$9\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,\ddots$$
$$999\,999^{-s}\,\Gamma(-s)\Gamma(1+s)+$$
$$15\left(\text{Res}_{s=0}\frac{4^{-s}\Gamma(-s)\Gamma(1+s)}{s}\right)^2\sum_{j=1}^{\infty}\text{Res}_{s=j}\frac{4^{-s}\Gamma(-s)\Gamma(1+s)}{s}+$$
$$15\left(\text{Res}_{s=0}\frac{4^{-s}\Gamma(-s)\Gamma(1+s)}{s}\right)\left(\sum_{j=1}^{\infty}\text{Res}_{s=j}\frac{4^{-s}\Gamma(-s)\Gamma(1+s)}{s}\right)^2+$$
$$5\left(\sum_{j=1}^{\infty}\text{Res}_{s=j}\frac{4^{-s}\Gamma(-s)\Gamma(1+s)}{s}\right)^3-\sum_{j=1}^{\infty}\text{Res}_{s=j}\frac{1}{s}$$
$$9\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,\ddots$$
$$\left.999\,999^{-s}\,\Gamma(-s)\Gamma(1+s)\right)$$

Integral representations:

$$5\log^4(5)+\log(5)\log\left(\frac{1}{10^{58}}\right)=\left(\int_1^5\frac{1}{t}\,dt\right)\left(5\left(\int_1^5\frac{1}{t}\,dt\right)^3-\right.$$
$$\left.\int_1^{10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000}\frac{1}{t}\,dt\right)$$

$$5\log^4(5)+\log(5)\log\left(\frac{1}{10^{58}}\right)=\frac{1}{16\pi^4}\left(\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{4^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\right)\left(5\left(\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{4^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\right)^3+4\pi^2\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{1}{\Gamma(1-s)}\,9\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)\,ds\right)\quad\text{for } -1<\gamma<0$$

From:

$$\Delta_1(t_0)=\{1-\omega(t_0)\}(t_0-\gamma'),\ \ \Delta_2(t_0)=\{1-\omega(t_0)\}(\gamma''-t_0),$$

we obtain (a):

(1-10^-58)(5-3)

Input:

$$\left(1-\frac{1}{10^{58}}\right)(5-3)$$

Exact result:

$$\frac{9\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999}{5\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000}$$

Decimal approximation:

1.9999999999999999999999999999999999999999999999999999999998

1.9999999999…… ≈ 2

and (b):

(1-10^-58)(8-5)

Input:

$$\left(1-\frac{1}{10^{58}}\right)(8-5)$$

Exact result:

$$\frac{29\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,997}{10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000}$$

Decimal approximation:

2.999999999999999999999999999999999999999999999999999999999999...

2.999999999999…… ≈ 3

We have:

$$(6.5)\quad \begin{aligned} &\sum_{\gamma''+1\le\gamma} \frac{1}{(t-\gamma)^2} < \sum_{\gamma''-1\le\gamma} \frac{1}{(\gamma-\gamma'')^2} = \\ &= \sum_{n=1}^{\infty} \left\{ \sum_{\gamma''+n\le\gamma\le\gamma''+n+1} \frac{1}{(\gamma-\gamma'')^2} \right\} < \\ &< A \sum_{n=1}^{\infty} \frac{\ln(\gamma''+n)}{n^2} < A \sum_{n\le\gamma''} \frac{\ln 2\gamma''}{n^2} + \sum_{\gamma''<n} \frac{\ln 2n}{n^2} < \\ &< A \ln t_0, \quad t \in J(t_0). \end{aligned}$$

For: γ’ = 3; t_0 = 5; γ’’ = 8; $\omega(t_0) = 10^{-58}, \dots$

γ = 2; t = 6; A = 2.5

From (6.5), we obtain:

1/(2-8)^2 < 2.5 ln(5)

Input:

$\frac{1}{(2-8)^2} < 2.5 \log(5)$

log(x) is the natural logarithm

Result:

True

1/(2-8)^2

Input:

$$\frac{1}{(2-8)^2}$$

Exact result:

$$\frac{1}{36}$$

Decimal approximation:

0.027777777777777777777777777777777777777777777777777777777777777...

0.02777777777…………

2.5 ln(5)

Input:

$2.5 \log(5)$

$\log(x)$ is the natural logarithm

Result:

4.02359...

4.02359…

Alternative representations:

$$2.5 \log(5) = 2.5 \log_e(5)$$

$$2.5 \log(5) = 2.5 \log(a) \log_a(5)$$

$$2.5 \log(5) = -2.5 \operatorname{Li}_1(-4)$$

Series representations:

$$2.5 \log(5) = 2.5 \log(4) - 2.5 \sum_{k=1}^{\infty} \frac{\left(-\frac{1}{4}\right)^k}{k}$$

$$2.5 \log(5) = 5 i \pi \left\lfloor \frac{\arg(5-x)}{2\pi} \right\rfloor + 2.5 \log(x) - 2.5 \sum_{k=1}^{\infty} \frac{(-1)^k (5-x)^k x^{-k}}{k} \quad \text{for } x < 0$$

$$2.5 \log(5) = 2.5 \left\lfloor \frac{\arg(5-z_0)}{2\pi} \right\rfloor \log\left(\frac{1}{z_0}\right) + 2.5 \log(z_0) + 2.5 \left\lfloor \frac{\arg(5-z_0)}{2\pi} \right\rfloor \log(z_0) - 2.5 \sum_{k=1}^{\infty} \frac{(-1)^k (5-z_0)^k z_0^{-k}}{k}$$

Integral representations:

$$2.5 \log(5) = 2.5 \int_1^5 \frac{1}{t} \, dt$$

$$2.5 \log(5) = \frac{1.25}{i \pi} \int_{-i \infty+\gamma}^{i \infty+\gamma} \frac{4^{-s} \Gamma(-s)^2 \Gamma(1+s)}{\Gamma(1-s)} \, ds \quad \text{for } -1 < \gamma < 0$$

From:

$$(6.6) \qquad \sum_{\gamma \leq \gamma'+1} \frac{1}{(t-\gamma)^2} < A \ln t_0, \quad t \in J(t_0).$$

we obtain:

1/(6-2)^2

Input:

$$\frac{1}{(6-2)^2}$$

Exact result:

$$\frac{1}{16}$$

Decimal form:

0.0625

0.0625

From these results, we obtain:

1/(2-8)^2 - 1/(6-2)^2 - 2.5 ln(5)

Input:

$$\frac{1}{(2-8)^2} - \frac{1}{(6-2)^2} - 2.5 \log(5)$$

log(x) is the natural logarithm

Result:

−4.05832...

-4.05832…

Alternative representations:

$$\frac{1}{(2-8)^2} - \frac{1}{(6-2)^2} - 2.5 \log(5) = -2.5 \log_e(5) + \frac{1}{(-6)^2} - \frac{1}{4^2}$$

$$\frac{1}{(2-8)^2} - \frac{1}{(6-2)^2} - 2.5 \log(5) = -2.5 \log(a) \log_a(5) + \frac{1}{(-6)^2} - \frac{1}{4^2}$$

$$\frac{1}{(2-8)^2} - \frac{1}{(6-2)^2} - 2.5 \log(5) = 2.5 \operatorname{Li}_1(-4) + \frac{1}{(-6)^2} - \frac{1}{4^2}$$

Series representations:

$$\frac{1}{(2-8)^2} - \frac{1}{(6-2)^2} - 2.5 \log(5) = -0.0347222 - 2.5 \log(4) + 2.5 \sum_{k=1}^{\infty} \frac{\left(-\frac{1}{4}\right)^k}{k}$$

$$\frac{1}{(2-8)^2} - \frac{1}{(6-2)^2} - 2.5 \log(5) = -0.0347222 - 5 i \pi \left\lfloor \frac{\arg(5-x)}{2\pi} \right\rfloor - 2.5 \log(x) + 2.5 \sum_{k=1}^{\infty} \frac{(-1)^k (5-x)^k x^{-k}}{k} \quad \text{for } x < 0$$

$$\frac{1}{(2-8)^2} - \frac{1}{(6-2)^2} - 2.5 \log(5) = -\frac{5}{144} - 2.5 \left\lfloor \frac{\arg(5-z_0)}{2\pi} \right\rfloor \log\left(\frac{1}{z_0}\right) - 2.5 \log(z_0) - 2.5 \left\lfloor \frac{\arg(5-z_0)}{2\pi} \right\rfloor \log(z_0) + 2.5 \sum_{k=1}^{\infty} \frac{(-1)^k (5-z_0)^k z_0^{-k}}{k}$$

Integral representations:

$$\frac{1}{(2-8)^2} - \frac{1}{(6-2)^2} - 2.5 \log(5) = -0.0347222 - 2.5 \int_1^5 \frac{1}{t} \, dt$$

$$\frac{1}{(2-8)^2} - \frac{1}{(6-2)^2} - 2.5\log(5) = -0.0347222 - \frac{1.25}{i\pi}\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{4^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds$$
for $-1 < \gamma < 0$

1/(2-8)^2 + 1/(6-2)^2 + 2.5 ln(5)

Input:

$$\frac{1}{(2-8)^2} + \frac{1}{(6-2)^2} + 2.5\log(5)$$

$\log(x)$ is the natural logarithm

Result:

4.11387...

4.11387...

Alternative representations:

$$\frac{1}{(2-8)^2} + \frac{1}{(6-2)^2} + 2.5\log(5) = 2.5\log_e(5) + \frac{1}{(-6)^2} + \frac{1}{4^2}$$

$$\frac{1}{(2-8)^2} + \frac{1}{(6-2)^2} + 2.5\log(5) = 2.5\log(a)\log_a(5) + \frac{1}{(-6)^2} + \frac{1}{4^2}$$

$$\frac{1}{(2-8)^2} + \frac{1}{(6-2)^2} + 2.5\log(5) = -2.5\,\text{Li}_1(-4) + \frac{1}{(-6)^2} + \frac{1}{4^2}$$

Series representations:

$$\frac{1}{(2-8)^2} + \frac{1}{(6-2)^2} + 2.5\log(5) = 0.0902778 + 2.5\log(4) - 2.5\sum_{k=1}^{\infty}\frac{\left(-\frac{1}{4}\right)^k}{k}$$

$$\frac{1}{(2-8)^2} + \frac{1}{(6-2)^2} + 2.5\log(5) = 0.0902778 + 5i\pi\left\lfloor\frac{\arg(5-x)}{2\pi}\right\rfloor + 2.5\log(x) - 2.5\sum_{k=1}^{\infty}\frac{(-1)^k(5-x)^k x^{-k}}{k} \quad \text{for } x < 0$$

$$\frac{1}{(2-8)^2} + \frac{1}{(6-2)^2} + 2.5\log(5) = \frac{13}{144} + 2.5\left\lfloor\frac{\arg(5-z_0)}{2\pi}\right\rfloor\log\left(\frac{1}{z_0}\right) + 2.5\log(z_0) + 2.5\left\lfloor\frac{\arg(5-z_0)}{2\pi}\right\rfloor\log(z_0) - 2.5\sum_{k=1}^{\infty}\frac{(-1)^k (5-z_0)^k z_0^{-k}}{k}$$

Integral representations:

$$\frac{1}{(2-8)^2} + \frac{1}{(6-2)^2} + 2.5\log(5) = 0.0902778 + 2.5\int_1^5 \frac{1}{t}\,dt$$

$$\frac{1}{(2-8)^2} + \frac{1}{(6-2)^2} + 2.5\log(5) = 0.0902778 + \frac{1.25}{i\pi}\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{4^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds \quad \text{for } -1 < \gamma < 0$$

1/((1/(2-8)^2 * 1/(6-2)^2 * 2.5 ln(5)))

Input:

$$\frac{1}{\frac{1}{(2-8)^2} \times \frac{1}{(6-2)^2} \times 2.5\log(5)}$$

log(x) is the natural logarithm

Result:

143.156…

143.156….

Alternative representations:

$$\frac{1}{\frac{2.5\log(5)}{(2-8)^2 (6-2)^2}} = \frac{1}{\frac{2.5\log_e(5)}{(-6)^2 4^2}}$$

$$\frac{1}{\frac{2.5\log(5)}{(2-8)^2 (6-2)^2}} = \frac{1}{\frac{2.5\log(a)\log_a(5)}{(-6)^2 4^2}}$$

$$\frac{1}{\frac{2.5\log(5)}{(2-8)^2 (6-2)^2}} = -\frac{1}{\frac{2.5\,\text{Li}_1(-4)}{(-6)^2 4^2}}$$

Series representations:

$$\frac{1}{\frac{2.5\log(5)}{(2-8)^2(6-2)^2}} = \frac{230.4}{\log(4) - \sum_{k=1}^{\infty}\frac{\left(-\frac{1}{4}\right)^k}{k}}$$

$$\frac{1}{\frac{2.5\log(5)}{(2-8)^2(6-2)^2}} = \frac{230.4}{2\,i\,\pi\left\lfloor\frac{\arg(5-x)}{2\pi}\right\rfloor + \log(x) - \sum_{k=1}^{\infty}\frac{(-1)^k(5-x)^k x^{-k}}{k}} \quad \text{for } x < 0$$

$$\frac{1}{\frac{2.5\log(5)}{(2-8)^2(6-2)^2}} = \frac{230.4}{\log(z_0) + \left\lfloor\frac{\arg(5-z_0)}{2\pi}\right\rfloor\left(\log\left(\frac{1}{z_0}\right) + \log(z_0)\right) - \sum_{k=1}^{\infty}\frac{(-1)^k(5-z_0)^k z_0^{-k}}{k}}$$

Integral representations:

$$\frac{1}{\frac{2.5\log(5)}{(2-8)^2(6-2)^2}} = \frac{230.4}{\int_1^5 \frac{1}{t}\,dt}$$

$$\frac{1}{\frac{2.5\log(5)}{(2-8)^2(6-2)^2}} = \frac{460.8\,i\,\pi}{\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{4^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds} \quad \text{for } -1 < \gamma < 0$$

((((1/((1/(2-8)^2 * 1/(6-2)^2 * 2.5 ln(5)))))))^1/10

Input:

$$\sqrt[10]{\frac{1}{\frac{1}{(2-8)^2}\times\frac{1}{(6-2)^2}\times 2.5\log(5)}}$$

log(x) is the natural logarithm

Result:

1.642785363126584884785003045638089762771246344213172677529...

$1.64278536.... \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 ...$

((((1/((1/(2-8)^2 * 1/(6-2)^2 * 2.5 ln(5)))))))^1/10 - 24/10^3

Input:

$$\sqrt[10]{\frac{1}{\frac{1}{(2-8)^2} \times \frac{1}{(6-2)^2} \times 2.5 \log(5)}} - \frac{24}{10^3}$$

log(x) is the natural logarithm

Result:

1.618785...

1.618785…. result that is a very good approximation to the value of the golden ratio 1.618033988749...

Alternative representations:

$$\sqrt[10]{\frac{1}{\frac{2.5 \log(5)}{(2-8)^2 (6-2)^2}}} - \frac{24}{10^3} = -\frac{24}{10^3} + \sqrt[10]{\frac{1}{\frac{2.5 \log_e(5)}{(-6)^2 4^2}}}$$

$$\sqrt[10]{\frac{1}{\frac{2.5 \log(5)}{(2-8)^2 (6-2)^2}}} - \frac{24}{10^3} = -\frac{24}{10^3} + \sqrt[10]{-\frac{1}{\frac{2.5 \operatorname{Li}_1(-4)}{(-6)^2 4^2}}}$$

$$\sqrt[10]{\frac{1}{\frac{2.5 \log(5)}{(2-8)^2 (6-2)^2}}} - \frac{24}{10^3} = -\frac{24}{10^3} + \sqrt[10]{\frac{1}{\frac{2.5 \log(a) \log_a(5)}{(-6)^2 4^2}}}$$

Series representations:

$$\sqrt[10]{\frac{1}{\frac{2.5 \log(5)}{(2-8)^2 (6-2)^2}}} - \frac{24}{10^3} = -0.024 + 1.72285 \sqrt[10]{\frac{1}{\log(4) - \sum_{k=1}^{\infty} \frac{\left(-\frac{1}{4}\right)^k}{k}}}$$

$$\sqrt[10]{\frac{1}{\frac{2.5 \log(5)}{(2-8)^2 (6-2)^2}}} - \frac{24}{10^3} =$$

$$-0.024 + 1.72285 \sqrt[10]{\frac{1}{2 i \pi \left\lfloor \frac{\arg(5-x)}{2 \pi} \right\rfloor + \log(x) - \sum_{k=1}^{\infty} \frac{(-1)^k (5-x)^k x^{-k}}{k}}} \quad \text{for } x < 0$$

$$\sqrt[10]{\frac{1}{\frac{2.5\log(5)}{(2-8)^2(6-2)^2}}} - \frac{24}{10^3} =$$

$$-\frac{3}{125} + 1.72285\sqrt[10]{\frac{1}{\log(z_0) + \left\lfloor \frac{\arg(5-z_0)}{2\pi} \right\rfloor \left(\log\left(\frac{1}{z_0}\right) + \log(z_0)\right) - \sum_{k=1}^{\infty} \frac{(-1)^k (5-z_0)^k z_0^{-k}}{k}}}$$

Integral representations:

$$\sqrt[10]{\frac{1}{\frac{2.5\log(5)}{(2-8)^2(6-2)^2}}} - \frac{24}{10^3} = -0.024 + 1.72285\sqrt[10]{\frac{1}{\int_1^5 \frac{1}{t}\,dt}}$$

$$\sqrt[10]{\frac{1}{\frac{2.5\log(5)}{(2-8)^2(6-2)^2}}} - \frac{24}{10^3} = -0.024 + 1.84651\sqrt[10]{\frac{i\pi}{\int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{4^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds}} \quad \text{for } -1 < \gamma < 0$$

Now, we have that:

(A). If

$$\gamma \leq \gamma' - 1,$$

then we have for $t \in J(t_0)$ by (1.7) that

$$\left|\frac{t-t_0}{t_0-\gamma}\right| \leq \frac{|t-t_0|}{t_0-\gamma'+1} < \gamma'' - \gamma' < \frac{A}{\ln\ln t_0}. \tag{8.2}$$

Next,

$$\begin{aligned} &\frac{t-t_0}{t_0-\gamma} - \ln\left|\frac{t-\gamma}{t_0-\gamma}\right| = \frac{t-t_0}{t_0-\gamma} - \ln\left(1+\frac{t-t_0}{t_0-\gamma}\right) = \\ &= \left(\frac{t-t_0}{t_0-\gamma}\right)^2 \sum_{k=0}^{\infty} \frac{(-1)^k}{k+2}\left(\frac{t-t_0}{t_0-\gamma}\right)^k, \end{aligned} \tag{8.3}$$

$$\begin{aligned} &\sum_{k=0}^{\infty} \frac{(-1)^k}{k+2}\left(\frac{t-t_0}{t_0-\gamma}\right)^k = \frac{1}{2} + \mathcal{O}\left\{\sum_{k=1}^{\infty}\left|\frac{t-t_0}{t_0-\gamma}\right|^k\right\} = \\ &= \frac{1}{2} + \mathcal{O}\left(\frac{1}{\ln\ln t_0}\right). \end{aligned} \tag{8.4}$$

Consequently,

$$\begin{aligned} &\sum_{\gamma\leq\gamma'-1}\left\{\frac{t-t_0}{t_0-\gamma} - \ln\left|\frac{t-\gamma}{t_0-\gamma}\right|\right\} = \\ &= (t-t_0)^2 \sum_{\gamma\leq\gamma'-1} \frac{1}{(t_0-\gamma)^2}\left\{\frac{1}{2} + \mathcal{O}\left(\frac{1}{\ln\ln t_0}\right)\right\}, \end{aligned}$$

and from this (see (1.7), (6.6))

$$0 \leq \sum_{\gamma\leq\gamma'-1}\left\{\frac{t-t_0}{t_0-\gamma} - \ln\left|\frac{t-\gamma}{t_0-\gamma}\right|\right\} < A\frac{\ln t_0}{(\ln\ln t_0)^2}, \quad t \in J(t_0). \tag{8.5}$$

From (8.2), we obtain:

$$\left|\frac{t-t_0}{t_0-\gamma}\right| \leq \frac{|t-t_0|}{t_0-\gamma'+1} < \gamma'' - \gamma' < \frac{A}{\ln\ln t_0}.$$

For: $\gamma' = 3$; $t_0 = 5$; $\gamma'' = 8$; $\omega(t_0) = 10^{-58}, \ldots$

$\gamma = 2$; $t = 6$; $A = 2.5$

2.5/(ln ln(5))

Input:

$$\frac{2.5}{\log(\log(5))}$$

$\log(x)$ is the natural logarithm

Result:

5.25337…

5.25337…

Alternative representations:

$$\frac{2.5}{\log(\log(5))} = \frac{2.5}{\log_e(\log(5))}$$

$$\frac{2.5}{\log(\log(5))} = \frac{2.5}{\log(a)\log_a(\log(5))}$$

$$\frac{2.5}{\log(\log(5))} = -\frac{2.5}{\mathrm{Li}_1(1-\log(5))}$$

Series representations:

$$\frac{2.5}{\log(\log(5))} = -\frac{2.5}{\sum_{k=1}^{\infty}\frac{(-1)^k(-1+\log(5))^k}{k}}$$

$$\frac{2.5}{\log(\log(5))} = \frac{2.5}{2 i \pi \left\lfloor \frac{\arg(-x+\log(5))}{2\pi} \right\rfloor + \log(x) - \sum_{k=1}^{\infty}\frac{(-1)^k x^{-k}(-x+\log(5))^k}{k}} \quad \text{for } x < 0$$

$$\frac{2.5}{\log(\log(5))} = \frac{2.5}{\log(z_0) + \left\lfloor \frac{\arg(\log(5)-z_0)}{2\pi} \right\rfloor \left(\log\left(\frac{1}{z_0}\right) + \log(z_0)\right) - \sum_{k=1}^{\infty}\frac{(-1)^k(\log(5)-z_0)^k z_0^{-k}}{k}}$$

Integral representations:

$$\frac{2.5}{\log(\log(5))} = \frac{2.5}{\int_1^{\log(5)} \frac{1}{t}\, dt}$$

$$\frac{2.5}{\log(\log(5))} = \frac{5\, i\, \pi}{\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma} \frac{\Gamma(-s)^2\, \Gamma(1+s)\, (-1+\log(5))^{-s}}{\Gamma(1-s)}\, ds} \quad \text{for } -1 < \gamma < 0$$

Thence:

$5 < 5.25337$

From (8.3), we obtain:

$$\frac{t-t_0}{t_0-\gamma} - \ln\left|\frac{t-\gamma}{t_0-\gamma}\right| = \frac{t-t_0}{t_0-\gamma} - \ln\left(1+\frac{t-t_0}{t_0-\gamma}\right) =$$
$$= \left(\frac{t-t_0}{t_0-\gamma}\right)^2 \sum_{k=0}^{\infty} \frac{(-1)^k}{k+2} \left(\frac{t-t_0}{t_0-\gamma}\right)^k,$$

For: $\gamma' = 3$; $t_0 = 5$; $\gamma'' = 8$; $\omega(t_0) = 10^{-58}, \ldots$

$\gamma = 2$; $t = 6$; $A = 2.5$

(1/3)^2 sum((-1)^k/(k+2) (1/3)^k, k = 0..infinity

Input interpretation:

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

Result:

$$\frac{1}{9}\left(3 - 9\log\left(\frac{4}{3}\right)\right) \approx 0.0456513$$

log(x) is the natural logarithm

0.0456513

Alternate forms:

$$\frac{1}{3} - \log\left(\frac{4}{3}\right)$$

$$\frac{1}{3}\left(1 - 3\log\left(\frac{4}{3}\right)\right)$$

$$\frac{1}{3}(1 - 6\log(2) + 3\log(3))$$

From (8.4), we obtain:

$$\sum_{k=0}^{\infty} \frac{(-1)^k}{k+2}\left(\frac{t-t_0}{t_0-\gamma}\right)^k = \frac{1}{2} + \mathcal{O}\left\{\sum_{k=1}^{\infty}\left|\frac{t-t_0}{t_0-\gamma}\right|^k\right\} =$$
$$= \frac{1}{2} + \mathcal{O}\left(\frac{1}{\ln\ln t_0}\right).$$

1/2+(1/(ln ln (5))

Input:

$$\frac{1}{2} + \frac{1}{\log(\log(5))}$$

$\log(x)$ is the natural logarithm

Decimal approximation:

2.601348035385370238791927163840092024061482830296524086601...

2.60134803538……

Alternate form:

$$\frac{2 + \log(\log(5))}{2\log(\log(5))}$$

Alternative representations:

$$\frac{1}{2} + \frac{1}{\log(\log(5))} = \frac{1}{2} + \frac{1}{\log_e(\log(5))}$$

$$\frac{1}{2} + \frac{1}{\log(\log(5))} = \frac{1}{2} + \frac{1}{\log(a)\log_a(\log(5))}$$

$$\frac{1}{2}+\frac{1}{\log(\log(5))}=\frac{1}{2}+-\frac{1}{\text{Li}_1(1-\log(5))}$$

Series representations:

$$\frac{1}{2}+\frac{1}{\log(\log(5))}=\frac{1}{2}-\frac{1}{\sum_{k=1}^{\infty}\frac{(1-\log(5))^k}{k}}$$

$$\frac{1}{2}+\frac{1}{\log(\log(5))}=\frac{1}{2}+\frac{1}{2 i \pi \left\lfloor \frac{\arg(-x+\log(5))}{2\pi} \right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k x^{-k}(-x+\log(5))^k}{k}} \quad \text{for } x<0$$

$$\frac{1}{2}+\frac{1}{\log(\log(5))}=$$
$$\frac{1}{2}+\frac{1}{\log(z_0)+\left\lfloor \frac{\arg(\log(5)-z_0)}{2\pi} \right\rfloor \left(\log\left(\frac{1}{z_0}\right)+\log(z_0)\right)-\sum_{k=1}^{\infty}\frac{(-1)^k(\log(5)-z_0)^k z_0^{-k}}{k}}$$

Integral representations:

$$\frac{1}{2}+\frac{1}{\log(\log(5))}=\frac{1}{2}+\frac{1}{\int_1^{\log(5)}\frac{1}{t}\,dt}$$

$$\frac{1}{2}+\frac{1}{\log(\log(5))}=\frac{1}{2}+\frac{2 i \pi}{\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{\Gamma(-s)^2\,\Gamma(1+s)(-1+\log(5))^{-s}}{\Gamma(1-s)}\,ds} \quad \text{for } -1<\gamma<0$$

We obtain also:

(((1/2+(1/(ln ln (5))))))^1/2

Input:

$$\sqrt{\frac{1}{2}+\frac{1}{\log(\log(5))}}$$

log(x) is the natural logarithm

Decimal approximation:

1.612869503520160876748055117184761672996826390050388052755...

1.6128695035….. result that is a good approximation to the value of the golden ratio 1.618033988749...

Alternate form:

$$\sqrt{\frac{2+\log(\log(5))}{2\log(\log(5))}}$$

All 2nd roots of 1/2 + 1/log(log(5)):

$$e^{0}\sqrt{\frac{1}{2}+\frac{1}{\log(\log(5))}} \approx 1.6129 \text{ (real, principal root)}$$

$$e^{i\pi}\sqrt{\frac{1}{2}+\frac{1}{\log(\log(5))}} \approx -1.6129 \text{ (real root)}$$

Alternative representations:

$$\sqrt{\frac{1}{2}+\frac{1}{\log(\log(5))}} = \sqrt{\frac{1}{2}+\frac{1}{\log_e(\log(5))}}$$

$$\sqrt{\frac{1}{2}+\frac{1}{\log(\log(5))}} = \sqrt{\frac{1}{2}+\frac{1}{\log(a)\log_a(\log(5))}}$$

$$\sqrt{\frac{1}{2}+\frac{1}{\log(\log(5))}} = \sqrt{\frac{1}{2}+-\frac{1}{\text{Li}_1(1-\log(5))}}$$

Series representations:

$$\sqrt{\frac{1}{2}+\frac{1}{\log(\log(5))}} = \sqrt{\frac{1}{2}-\frac{1}{\sum_{k=1}^{\infty}\frac{(1-\log(5))^k}{k}}}$$

$$\sqrt{\frac{1}{2}+\frac{1}{\log(\log(5))}} = \sqrt{\frac{1}{2}+\frac{1}{2i\pi\left\lfloor\frac{\arg(-x+\log(5))}{2\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k x^{-k}(-x+\log(5))^k}{k}}}$$

for $x < 0$

$$\sqrt{\frac{1}{2}+\frac{1}{\log(\log(5))}} = \sqrt{\frac{1}{2}+\frac{1}{\log(z_0)+\left\lfloor \frac{\arg(\log(5)-z_0)}{2\pi} \right\rfloor \left(\log\left(\frac{1}{z_0}\right)+\log(z_0)\right)-\sum_{k=1}^{\infty}\frac{(-1)^k(\log(5)-z_0)^k z_0^{-k}}{k}}}$$

Integral representations:

$$\sqrt{\frac{1}{2}+\frac{1}{\log(\log(5))}} = \sqrt{\frac{1}{2}+\frac{1}{\int_1^{\log(5)}\frac{1}{t}\,dt}}$$

$$\sqrt{\frac{1}{2}+\frac{1}{\log(\log(5))}} = \sqrt{\frac{1}{2}+\frac{2i\pi}{\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{\Gamma(-s)^2\,\Gamma(1+s)(-1+\log(5))^{-s}}{\Gamma(1-s)}\,ds}} \quad \text{for } -1<\gamma<0$$

From (8.5), we obtain:

$$0 \leq \sum_{\gamma\leq\gamma'-1}\left\{\frac{t-t_0}{t_0-\gamma}-\ln\left|\frac{t-\gamma}{t_0-\gamma}\right|\right\} < A\frac{\ln t_0}{(\ln\ln t_0)^2},$$

(2.5*ln(5)) / (ln ln(5))^2

Input:

$$\frac{2.5\log(5)}{\log^2(\log(5))}$$

$\log(x)$ is the natural logarithm

Result:

17.7668...

17.7668… result very near to the black hole entropy 17.7715

Alternative representations:

$$\frac{2.5\log(5)}{\log^2(\log(5))} = \frac{2.5\log_e(5)}{\log_e^2(\log(5))}$$

$$\frac{2.5\log(5)}{\log^2(\log(5))} = \frac{2.5\log(a)\log_a(5)}{(\log(a)\log_a(\log(5)))^2}$$

$$\frac{2.5 \log(5)}{\log^2(\log(5))} = -\frac{2.5 \operatorname{Li}_1(-4)}{(-\operatorname{Li}_1(1-\log(5)))^2}$$

Series representations:

$$\frac{2.5 \log(5)}{\log^2(\log(5))} = \frac{1.25 \left(i \pi \left\lfloor \frac{\arg(5-x)}{2\pi} \right\rfloor + 0.5 \log(x) - 0.5 \sum_{k=1}^{\infty} \frac{(-1)^k (5-x)^k x^{-k}}{k}\right)}{\left(i \pi \left\lfloor \frac{\arg(-x+\log(5))}{2\pi} \right\rfloor + 0.5 \log(x) - 0.5 \sum_{k=1}^{\infty} \frac{(-1)^k x^{-k} (-x+\log(5))^k}{k}\right)^2} \quad \text{for } x < 0$$

$$\frac{2.5 \log(5)}{\log^2(\log(5))} = \frac{1.25 \left(i \pi \left\lfloor -\frac{-\pi + \arg\left(\frac{5}{z_0}\right) + \arg(z_0)}{2\pi} \right\rfloor + 0.5 \log(z_0) - 0.5 \sum_{k=1}^{\infty} \frac{(-1)^k (5-z_0)^k z_0^{-k}}{k}\right)}{\left(i \pi \left\lfloor -\frac{-\pi + \arg\left(\frac{\log(5)}{z_0}\right) + \arg(z_0)}{2\pi} \right\rfloor + 0.5 \log(z_0) - 0.5 \sum_{k=1}^{\infty} \frac{(-1)^k (\log(5)-z_0)^k z_0^{-k}}{k}\right)^2}$$

$$\frac{2.5 \log(5)}{\log^2(\log(5))} = \frac{2.5 \left(\left\lfloor \frac{\arg(5-z_0)}{2\pi} \right\rfloor \log\left(\frac{1}{z_0}\right) + \log(z_0) + \left\lfloor \frac{\arg(5-z_0)}{2\pi} \right\rfloor \log(z_0) - \sum_{k=1}^{\infty} \frac{(-1)^k (5-z_0)^k z_0^{-k}}{k}\right)}{\left(\left\lfloor \frac{\arg(\log(5)-z_0)}{2\pi} \right\rfloor \log\left(\frac{1}{z_0}\right) + \log(z_0) + \left\lfloor \frac{\arg(\log(5)-z_0)}{2\pi} \right\rfloor \log(z_0) - \sum_{k=1}^{\infty} \frac{(-1)^k (\log(5)-z_0)^k z_0^{-k}}{k}\right)^2}$$

Integral representations:

$$\frac{2.5 \log(5)}{\log^2(\log(5))} = \frac{2.5 \int_1^5 \frac{1}{t} \, dt}{\left(\int_1^{\log(5)} \frac{1}{t} \, dt\right)^2}$$

$$\frac{2.5 \log(5)}{\log^2(\log(5))} = \frac{5 i \pi \int_{-i \infty+\gamma}^{i \infty+\gamma} \frac{4^{-s} \Gamma(-s)^2 \Gamma(1+s)}{\Gamma(1-s)} \, ds}{\left(\int_{-i \infty+\gamma}^{i \infty+\gamma} \frac{\Gamma(-s)^2 \Gamma(1+s) (-1+\log(5))^{-s}}{\Gamma(1-s)} \, ds\right)^2} \quad \text{for } -1 < \gamma < 0$$

Now, from the sum of the above expressions, we obtain:

2.5/(ln ln(5)) + ((((1/3)^2 sum((-1)^k/(k+2) (1/3)^k, k = 0..infinity)))) + (((1/2+(1/(ln ln (5)))))) + ((((2.5*ln(5)) / (ln ln(5))^2)))

Input interpretation:

$$\frac{2.5}{\log(\log(5))}+\left(\frac{1}{3}\right)^2\sum_{k=0}^{\infty}\frac{(-1)^k}{k+2}\left(\frac{1}{3}\right)^k+\left(\frac{1}{2}+\frac{1}{\log(\log(5))}\right)+\frac{2.5\log(5)}{\log^2(\log(5))}$$

log(x) is the natural logarithm

Result:

25.6672

25.6672

From which:

1+1/((((2.5/(ln ln(5)) + ((((1/3)^2 sum((-1)^k/(k+2) (1/3)^k, k = 0..infinity)))) + (((1/2+(1/(ln ln (5)))))) + ((((2.5*ln(5)) / (ln ln(5))^2)))))))^1/7

Input interpretation:

$$1+\frac{1}{\sqrt[7]{\frac{2.5}{\log(\log(5))}+\left(\frac{1}{3}\right)^2\sum_{k=0}^{\infty}\frac{(-1)^k}{k+2}\left(\frac{1}{3}\right)^k+\left(\frac{1}{2}+\frac{1}{\log(\log(5))}\right)+\frac{2.5\log(5)}{\log^2(\log(5))}}}$$

log(x) is the natural logarithm

Result:

1.62901

1.62901

and also:

2.5/(ln ln(5)) * ((((1/3)^2 sum((-1)^k/(k+2) (1/3)^k, k = 0..infinity)))) * (((1/2+(1/(ln ln (5)))))) * ((((2.5*ln(5)) / (ln ln(5))^2)))

Input interpretation:

$$\frac{2.5}{\log(\log(5))}\left(\left(\frac{1}{3}\right)^2\sum_{k=0}^{\infty}\frac{(-1)^k}{k+2}\left(\frac{1}{3}\right)^k\right)\left(\frac{1}{2}+\frac{1}{\log(\log(5))}\right)\times\frac{2.5\log(5)}{\log^2(\log(5))}$$

log(x) is the natural logarithm

Result:

11.0841

11.0841 ≈ 11 (Lucas number)

Multiplying by 18, that is a Lucas number, we obtain:

18*1/(((((2.5/(ln ln(5)) * ((((1/3)^2 sum((-1)^k/(k+2) (1/3)^k, k = 0..infinity)))) * (((1/2+(1/(ln ln (5)))))) * ((((2.5*ln(5)) / (ln ln(5))^2)))))))

Input interpretation:

$$18\times\frac{1}{\frac{2.5}{\log(\log(5))}\left(\left(\frac{1}{3}\right)^2\sum_{k=0}^{\infty}\frac{(-1)^k}{k+2}\left(\frac{1}{3}\right)^k\right)\left(\frac{1}{2}+\frac{1}{\log(\log(5))}\right)\times\frac{2.5\log(5)}{\log^2(\log(5))}}$$

$\log(x)$ is the natural logarithm

Result:

1.62395

1.62395

Performing the 5[th] root, we have:

(((2.5/(ln ln(5)) * ((((1/3)^2 sum((-1)^k/(k+2) (1/3)^k, k = 0..infinity)))) * (((1/2+(1/(ln ln (5)))))) * ((((2.5*ln(5)) / (ln ln(5))^2))))))^1/5

Input interpretation:

$$\sqrt[5]{\frac{2.5}{\log(\log(5))}\left(\left(\frac{1}{3}\right)^2\sum_{k=0}^{\infty}\frac{(-1)^k}{k+2}\left(\frac{1}{3}\right)^k\right)\left(\frac{1}{2}+\frac{1}{\log(\log(5))}\right)\times\frac{2.5\log(5)}{\log^2(\log(5))}}$$

$\log(x)$ is the natural logarithm

Result:

1.61786

1.61786 result that is a very good approximation to the value of the golden ratio 1.618033988749...

From the algebraic sum, we obtain:

(((((2.5/(ln ln(5)) - ((((1/3)^2 sum((-1)^k/(k+2) (1/3)^k, k = 0..infinity)))) - (((1/2+(1/(ln ln (5)))))) - ((((2.5*ln(5)) / (ln ln(5))^2))))))))

Input interpretation:

$$\frac{2.5}{\log(\log(5))} - \left(\frac{1}{3}\right)^2 \sum_{k=0}^{\infty} \frac{(-1)^k}{k+2} \left(\frac{1}{3}\right)^k - \left(\frac{1}{2} + \frac{1}{\log(\log(5))}\right) - \frac{2.5 \log(5)}{\log^2(\log(5))}$$

log(x) is the natural logarithm

Result:

-15.1605

-15.1605

From which:

1+1/[-(((((2.5/(ln ln(5)) - ((((1/3)^2 sum((-1)^k/(k+2) (1/3)^k, k = 0..infinity)))) - (((1/2+(1/(ln ln (5)))))) - ((((2.5*ln(5)) / (ln ln(5))^2)))))))))]^1/6

Input interpretation:

$$1 + \frac{1}{\sqrt[6]{-\left(\frac{2.5}{\log(\log(5))} - \left(\frac{1}{3}\right)^2 \sum_{k=0}^{\infty} \frac{(-1)^k}{k+2} \left(\frac{1}{3}\right)^k - \left(\frac{1}{2} + \frac{1}{\log(\log(5))}\right) - \frac{2.5 \log(5)}{\log^2(\log(5))}\right)}}$$

log(x) is the natural logarithm

Result:

1.63564

$1.63564 \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 \ldots$

Now, we have that:

C. Let

$$\gamma \in (\gamma' - 1, \gamma'' + 1), \quad t \in J(t_0)$$

and

$$(8.7) \quad \begin{aligned} V &= \sum_{\gamma \in (\gamma'-1,\gamma''+1)} \left\{ \frac{t-t_0}{t_0-\gamma} - \ln\left|\frac{t-\gamma}{t_0-\gamma}\right| \right\} = \\ &= \sum_{\gamma \in (\gamma'-1,\gamma''+1)} \frac{t-t_0}{t_0-\gamma} + \sum_{\gamma \in (\gamma'-1,\gamma''+1)} \ln\left|\frac{t_0-\gamma}{t-\gamma}\right| = V_1 + V_2. \end{aligned}$$

Since

$$\left|\frac{t-t_0}{t_0-\gamma}\right| \leq \frac{Q(t_0)}{m(t_0)}, \quad t \in J(t_0), \ \gamma \in (\gamma'-1, \gamma''+1),$$

then (see (1.2), (6.3), (8.7))

$$(8.8) \qquad |V_1| \leq \sum_{\gamma \in (\gamma'-1,\gamma''+1)} \left|\frac{t-t_0}{t_0-\gamma}\right| < A \ln t_0 \cdot t_0 \ln^3 t_0 = A t_0 \ln^4 t_0.$$

Next, by (1.2), (6.2) we have

$$(8.9) \quad \begin{aligned} \left|\frac{t_0-\gamma}{t-\gamma}\right| &= \left|1 + \frac{t_0-t}{t-\gamma}\right| \leq 1 + \frac{|t-t_0|}{|t-\gamma|} < 1 + \frac{Q(t_0)}{\omega(t_0)m(t_0)} < \\ &< \frac{2}{\omega(t_0)}\frac{Q(t_0)}{m(t_0)} < \frac{2}{\omega(t_0)} t_0 \ln^3 t_0. \end{aligned}$$

For: $\gamma' = 3$; $t_0 = 5$; $\gamma'' = 8$; $\omega(t_0) = 10^{-58}, \ldots$

$\gamma = 2$; $t = 6$; $A = 2.5$

From (8.7), we obtain:

$$\begin{aligned} V &= \sum_{\gamma \in (\gamma'-1,\gamma''+1)} \left\{ \frac{t-t_0}{t_0-\gamma} - \ln\left|\frac{t-\gamma}{t_0-\gamma}\right| \right\} = \\ &= \sum_{\gamma \in (\gamma'-1,\gamma''+1)} \frac{t-t_0}{t_0-\gamma} + \sum_{\gamma \in (\gamma'-1,\gamma''+1)} \ln\left|\frac{t_0-\gamma}{t-\gamma}\right| = V_1 + V_2. \end{aligned}$$

ln((5-2)/(6-2))

Input:

$$\log\left(\frac{5-2}{6-2}\right)$$

$\log(x)$ is the natural logarithm

Exact result:

$$-\log\left(\frac{4}{3}\right)$$

Decimal approximation:

−0.28768207245178092743921900599382743150350971089776105650...

-0.28768207245…..

Property:

$-\log\left(\frac{4}{3}\right)$ is a transcendental number

Alternate form:

$$\log(3) - 2\log(2)$$

Alternative representations:

$$\log\left(\frac{5-2}{6-2}\right) = \log_e\left(\frac{3}{4}\right)$$

$$\log\left(\frac{5-2}{6-2}\right) = \log(a)\log_a\left(\frac{3}{4}\right)$$

$$\log\left(\frac{5-2}{6-2}\right) = -\text{Li}_1\left(1-\frac{3}{4}\right)$$

Series representations:

$$\log\left(\frac{5-2}{6-2}\right) = \sum_{k=1}^{\infty} \frac{\left(-\frac{1}{3}\right)^k}{k}$$

$$\log\left(\frac{5-2}{6-2}\right) = -2 i \pi \left\lfloor \frac{\arg\left(\frac{4}{3}-x\right)}{2\pi} \right\rfloor - \log(x) + \sum_{k=1}^{\infty} \frac{(-1)^k \left(\frac{4}{3}-x\right)^k x^{-k}}{k} \quad \text{for } x < 0$$

$$\log\left(\frac{5-2}{6-2}\right) =$$
$$-\left\lfloor \frac{\arg\left(\frac{4}{3} - z_0\right)}{2\pi} \right\rfloor \log\left(\frac{1}{z_0}\right) - \log(z_0) - \left\lfloor \frac{\arg\left(\frac{4}{3} - z_0\right)}{2\pi} \right\rfloor \log(z_0) + \sum_{k=1}^{\infty} \frac{(-1)^k \left(\frac{4}{3} - z_0\right)^k z_0^{-k}}{k}$$

Integral representations:

$$\log\left(\frac{5-2}{6-2}\right) = -\int_1^{\frac{4}{3}} \frac{1}{t}\, dt$$

$$\log\left(\frac{5-2}{6-2}\right) = \frac{i}{2\pi} \int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{3^s\, \Gamma(-s)^2\, \Gamma(1+s)}{\Gamma(1-s)}\, ds \quad \text{for } -1 < \gamma < 0$$

From (8.8), we obtain:

$$|V_1| \leq \sum_{\gamma \in (\gamma'-1, \gamma''+1)} \left| \frac{t - t_0}{t_0 - \gamma} \right| < A \ln t_0 \cdot t_0 \ln^3 t_0 = A t_0 \ln^4 t_0.$$

2.5*5 ln^4(5)

Input:

$2.5 \times 5 \log^4(5)$

$\log(x)$ is the natural logarithm

Result:

83.8701…

83.8701…

Alternative representations:

$2.5 \times 5 \log^4(5) = 12.5 \log_e^4(5)$

$2.5 \times 5 \log^4(5) = 12.5 (\log(a) \log_a(5))^4$

$2.5 \times 5 \log^4(5) = 12.5 (-\text{Li}_1(-4))^4$

Series representations:

$$2.5\times 5\log^4(5) = 12.5\left(\log(4) - \sum_{k=1}^{\infty}\frac{\left(-\frac{1}{4}\right)^k}{k}\right)^4$$

$$2.5\times 5\log^4(5) = 12.5\left(2 i \pi\left\lfloor\frac{\arg(5-x)}{2\pi}\right\rfloor + \log(x) - \sum_{k=1}^{\infty}\frac{(-1)^k (5-x)^k x^{-k}}{k}\right)^4 \quad \text{for } x < 0$$

$$2.5\times 5\log^4(5) = 12.5\left(\log(z_0) + \left\lfloor\frac{\arg(5-z_0)}{2\pi}\right\rfloor\left(\log\left(\frac{1}{z_0}\right) + \log(z_0)\right) - \sum_{k=1}^{\infty}\frac{(-1)^k (5-z_0)^k z_0^{-k}}{k}\right)^4$$

Integral representations:

$$2.5\times 5\log^4(5) = 12.5\left(\int_1^5 \frac{1}{t}\,dt\right)^4$$

$$2.5\times 5\log^4(5) = \frac{0.78125\left(\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{4^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\right)^4}{i^4\,\pi^4} \quad \text{for } -1 < \gamma < 0$$

From (8.9), we obtain:

$$\left|\frac{t_0-\gamma}{t-\gamma}\right| = \left|1 + \frac{t_0-t}{t-\gamma}\right| \le 1 + \frac{|t-t_0|}{|t-\gamma|} < 1 + \frac{Q(t_0)}{\omega(t_0)m(t_0)} <$$
$$< \frac{2}{\omega(t_0)}\frac{Q(t_0)}{m(t_0)} < \frac{2}{\omega(t_0)} t_0 \ln^3 t_0.$$

(2/10^(-58)) * 5 ln^3(5)

Input:

$$\frac{2}{\frac{1}{10^{58}}}\times 5\log^3(5)$$

log(x) is the natural logarithm

Exact result:

100 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 $\log^3(5)$

Decimal approximation:

4.1689115642856527297917773543386666315782376035159757... × 10^{59}

4.168911564...*10^{59}

Property:

$100\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000$
$\log^3(5)$ is a transcendental number

Alternative representations:

$$\frac{(5\log^3(5))\,2}{\frac{1}{10^{58}}} = \frac{10\log_e^3(5)}{\frac{1}{10^{58}}}$$

$$\frac{(5\log^3(5))\,2}{\frac{1}{10^{58}}} = \frac{10\,(\log(a)\log_a(5))^3}{\frac{1}{10^{58}}}$$

$$\frac{(5\log^3(5))\,2}{\frac{1}{10^{58}}} = \frac{10\,(-\text{Li}_1(-4))^3}{\frac{1}{10^{58}}}$$

Series representations:

$$\frac{(5\log^3(5))\,2}{\frac{1}{10^{58}}} = 100\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\left(\log(4) - \sum_{k=1}^{\infty}\frac{\left(-\frac{1}{4}\right)^k}{k}\right)^3$$

$$\frac{(5\log^3(5))\,2}{\frac{1}{10^{58}}} = 100\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\left(2\,i\,\pi\left\lfloor\frac{\arg(5-x)}{2\,\pi}\right\rfloor + \log(x) - \sum_{k=1}^{\infty}\frac{(-1)^k\,(5-x)^k\,x^{-k}}{k}\right)^3 \quad \text{for } x < 0$$

$$\frac{(5\log^3(5))\,2}{\frac{1}{10^{58}}} = 100\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\left(\log(z_0) + \left\lfloor\frac{\arg(5-z_0)}{2\,\pi}\right\rfloor\left(\log\left(\frac{1}{z_0}\right) + \log(z_0)\right) - \sum_{k=1}^{\infty}\frac{(-1)^k\,(5-z_0)^k\,z_0^{-k}}{k}\right)^3$$

From the three previous results, performing the 288th root, we obtain:

(-0.2876820724517809+83.8701+4.168911564*10^59)^1/288

Input interpretation:

$$\sqrt[288]{-0.2876820724517809 + 83.8701 + 4.168911564 \times 10^{59}}$$

Result:

1.61069743711...

1.61069743711…. result that is a good approximation to the value of the golden ratio 1.618033988749...

Now, we have that:

Consequently,

$$-\ln\frac{2}{m(t_0)} < \ln\left|\frac{t_0-\gamma}{t-\gamma}\right| < \ln\left\{\frac{2}{\omega(t_0)}t_0\ln^3 t_0\right\},$$

(of course, $m(t_0) \in (0,1)$, $t_0 \to \infty$), and (see (1.4))

(8.11) $$\left|\ln\left|\frac{t_0-\gamma}{t-\gamma}\right|\right| < \ln w(t_0), \quad t \in J(t_0),\ \gamma \in (\gamma'-1, \gamma''+1).$$

Next, (see (6.3), (8.7), (8.11))

(8.12) $$|V_2| \le \sum_{\gamma\in(\gamma'-1,\gamma''+1)} \left|\ln\left|\frac{t_0-\gamma}{t-\gamma}\right|\right| < A\ln t_0 \ln w(t_0).$$

Next, (see (8.7), (8.8), (8.12))

(8.13) $$|V_1+V_2| \le |V_1| + |V_2| < At_0\ln^4 t_0 + A\ln t_0 \ln w(t_0),$$

and, of course,

(8.14) $$V_1+V_2 > -At_0\ln^4 t_0 - A\ln t_0\ln w(t_0).$$

Finally, the estimate (1.5) follows from (2.3) by (8.1), (8.5), (8.6), (8.13) and (8.14).

Page 13 of 14

From (8.11), we obtain:

ln(10^-58)

Input:

$\log\left(\frac{1}{10^{58}}\right)$

$\log(x)$ is the natural logarithm

Exact result:

$-\log(10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000)$

Decimal approximation:

$-133.549935393654649673043504371693124040863886340468832609\ldots$

-133.54993539…

Property:

$-\log(10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000)$ is a transcendental number

Alternate forms:

$-58 \log(10)$

$-58 (\log(2) + \log(5))$

$-58 \log(2) - 58 \log(5)$

Alternative representations:

$\log\left(\frac{1}{10^{58}}\right) = \log_e\left(\frac{1}{10^{58}}\right)$

$\log\left(\frac{1}{10^{58}}\right) = \log(a) \log_a\left(\frac{1}{10^{58}}\right)$

$\log\left(\frac{1}{10^{58}}\right) = -\text{Li}_1\left(1 - \frac{1}{10^{58}}\right)$

Series representations:

$$\log\left(\frac{1}{10^{58}}\right) = -\log(9\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999) + \sum_{k=1}^{\infty} \frac{\left(-\frac{1}{9\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999}\right)^k}{k}$$

$$\log\left(\frac{1}{10^{58}}\right) = -2\,i\,\pi \left\lfloor \frac{1}{2\,\pi} \arg(10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000 - x) \right\rfloor - \log(x) + \sum_{k=1}^{\infty} \frac{1}{k} (-1)^k (10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000 - x)^k\, x^{-k} \quad \text{for } x < 0$$

$$\log\left(\frac{1}{10^{58}}\right) = -2\,i\,\pi \left\lfloor \frac{\pi - \arg\left(\frac{1}{z_0}\right) - \arg(z_0)}{2\,\pi} \right\rfloor - \log(z_0) + \sum_{k=1}^{\infty} \frac{1}{k} (-1)^k (10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000 - z_0)^k\, z_0^{-k}$$

Integral representations:

$$\log\left(\frac{1}{10^{58}}\right) = -\int_1^{10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000} \frac{1}{t}\, dt$$

$$\log\left(\frac{1}{10^{58}}\right) = \frac{i}{2\,\pi} \int_{-i\,\infty+\gamma}^{i\,\infty+\gamma} \frac{1}{\Gamma(1-s)}\, 9\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999^{-s}\, \Gamma(-s)^2\, \Gamma(1+s)\, ds \quad \text{for } -1 < \gamma < 0$$

From which:

-ln(10^-58)+sqrt2

Input:

$$-\log\left(\frac{1}{10^{58}}\right) + \sqrt{2}$$

$\log(x)$ is the natural logarithm

Exact result:

$\sqrt{2} + \log(10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000)$

Decimal approximation:

134.96414895602774472184519309590282211943355821584578068 31...

134.9641489… result practically equal to the rest mass of Pion meson 134.9766 MeV

Property:

$\sqrt{2} + \log(10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000)$ is a transcendental number

Alternate forms:

$\sqrt{2} + 58 \log(10)$

$\sqrt{2} + 58 \log(2) + 58 \log(5)$

Alternative representations:

$$-\log\left(\frac{1}{10^{58}}\right) + \sqrt{2} = -\log_e\left(\frac{1}{10^{58}}\right) + \sqrt{2}$$

$$-\log\left(\frac{1}{10^{58}}\right) + \sqrt{2} = -\log(a) \log_a\left(\frac{1}{10^{58}}\right) + \sqrt{2}$$

$$-\log\left(\frac{1}{10^{58}}\right) + \sqrt{2} = \text{Li}_1\left(1 - \frac{1}{10^{58}}\right) + \sqrt{2}$$

Series representations:

$$-\log\left(\frac{1}{10^{58}}\right) + \sqrt{2} = \sqrt{2} + \log(9\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999) - \sum_{k=1}^{\infty} \frac{\left(-\frac{1}{9\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999}\right)^k}{k}$$

$$-\log\left(\frac{1}{10^{58}}\right)+\sqrt{2} = \sqrt{2} + 2 i \pi \left\lfloor \frac{1}{2\pi} \arg(10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000 - x) \right\rfloor + \log(x) - \sum_{k=1}^{\infty} \frac{1}{k} (-1)^k (10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000 - x)^k x^{-k} \quad \text{for } x < 0$$

$$-\log\left(\frac{1}{10^{58}}\right)+\sqrt{2} = \sqrt{2} + 2 i \pi \left\lfloor \frac{\pi - \arg\left(\frac{1}{z_0}\right) - \arg(z_0)}{2\pi} \right\rfloor + \log(z_0) - \sum_{k=1}^{\infty} \frac{1}{k} (-1)^k (10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000 - z_0)^k z_0^{-k}$$

Integral representations:

$$-\log\left(\frac{1}{10^{58}}\right)+\sqrt{2} = \sqrt{2} + \int_1^{10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000} \frac{1}{t}\, dt$$

$$-\log\left(\frac{1}{10^{58}}\right)+\sqrt{2} = \sqrt{2} - \frac{i}{2\pi} \int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{1}{\Gamma(1-s)} 9\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999^{-s}\, \Gamma(-s)^2\, \Gamma(1+s)\, ds \quad \text{for } -1 < \gamma < 0$$

-ln(10^-58)+sqrt2 -11+golden ratio

where 11 is a Lucas number

Input:

$$-\log\left(\frac{1}{10^{58}}\right)+\sqrt{2} - 11 + \phi$$

log(x) is the natural logarithm

ϕ is the golden ratio

Exact result:

$$\phi - 11 + \sqrt{2} + \log(10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000)$$

Decimal approximation:

125.58218294477763957004977993026846023715386739565154354 52...

125.5821829… result very near to the Higgs boson mass 125.18 GeV

Property:

$-11+\sqrt{2}+\phi+\log(10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000)$ is a transcendental number

Alternate forms:

$\phi-11+\sqrt{2}+58\log(10)$

$-\frac{21}{2}+\sqrt{2}+\frac{\sqrt{5}}{2}+\log(10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000)$

$-11+\sqrt{2}+\frac{1}{2}\left(1+\sqrt{5}\right)+\log(10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000)$

Alternative representations:

$$-\log\left(\frac{1}{10^{58}}\right)+\sqrt{2}-11+\phi=-11+\phi-\log_e\left(\frac{1}{10^{58}}\right)+\sqrt{2}$$

$$-\log\left(\frac{1}{10^{58}}\right)+\sqrt{2}-11+\phi=-11+\phi-\log(a)\log_a\left(\frac{1}{10^{58}}\right)+\sqrt{2}$$

$$-\log\left(\frac{1}{10^{58}}\right)+\sqrt{2}-11+\phi=-11+\phi+\text{Li}_1\left(1-\frac{1}{10^{58}}\right)+\sqrt{2}$$

Series representations:

$$-\log\left(\frac{1}{10^{58}}\right)+\sqrt{2}-11+\phi=-\frac{21}{2}+\sqrt{2}+\frac{\sqrt{5}}{2}+\log(9\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999)-\sum_{k=1}^{\infty}\frac{\left(-\frac{1}{9\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999}\right)^k}{k}$$

$$-\log\left(\frac{1}{10^{58}}\right)+\sqrt{2}-11+\phi=-\frac{21}{2}+\sqrt{2}+\frac{\sqrt{5}}{2}+2\,i\,\pi\left\lfloor\frac{1}{2\,\pi}\arg(\right.$$
$$10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000 \ddots$$
$$\left.000\,000\,000-x)\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{1}{k}(-1)^k$$
$$(10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000 \ddots$$
$$000\,000-x)^k\,x^{-k} \quad \text{for } x<0$$

$$-\log\left(\frac{1}{10^{58}}\right)+\sqrt{2}-11+\phi=$$
$$-\frac{21}{2}+\sqrt{2}+\frac{\sqrt{5}}{2}+2\,i\,\pi\left\lfloor\frac{\pi-\arg\left(\frac{1}{z_0}\right)-\arg(z_0)}{2\,\pi}\right\rfloor+\log(z_0)-\sum_{k=1}^{\infty}\frac{1}{k}(-1)^k$$
$$(10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000 \ddots$$
$$000\,000-z_0)^k\,z_0^{-k}$$

Integral representations:

$$-\log\left(\frac{1}{10^{58}}\right)+\sqrt{2}-11+\phi=$$
$$-11+\sqrt{2}+\phi+\int_1^{10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000}\frac{1}{t}\,dt$$

$$-\log\left(\frac{1}{10^{58}}\right)+\sqrt{2}-11+\phi=-\frac{21}{2}+\sqrt{2}+\frac{\sqrt{5}}{2}-\frac{i}{2\,\pi}\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{1}{\Gamma(1-s)}$$
$$9\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999 \ddots$$
$$999\,999^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)\,ds \quad \text{for } -1<\gamma<0$$

27*1/2[-ln(10^-58)+sqrt2-7]+golden ratio

Input:

$$27\times\frac{1}{2}\left(-\log\left(\frac{1}{10^{58}}\right)+\sqrt{2}-7\right)+\phi$$

$\log(x)$ is the natural logarithm

ϕ is the golden ratio

Exact result:

$$\phi+\frac{27}{2}\left(-7+\sqrt{2}+\log(\right.$$
$$\left.10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000)\right)$$

Decimal approximation:

1729.1340448951244485931146936290537367300733450937238020 84...

1729.13404489…

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

With regard 27 (From Wikipedia):

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

Property:

$$\phi + \frac{27}{2}\left(-7+\sqrt{2}+\log(10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000)\right) \text{ is a transcendental number}$$

Alternate forms:

$$\phi - \frac{189}{2} + \frac{27}{\sqrt{2}} + 783\log(10)$$

$$\phi + \frac{27}{2}\left(-7+\sqrt{2}+58\log(10)\right)$$

$$\frac{1}{2}\left(-188+27\sqrt{2}+\sqrt{5}+27\log(10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000)\right)$$

Alternative representations:

$$\frac{27}{2}\left(-\log\left(\frac{1}{10^{58}}\right)+\sqrt{2}-7\right)+\phi=\phi+\frac{27}{2}\left(-7-\log_e\left(\frac{1}{10^{58}}\right)+\sqrt{2}\right)$$

$$\frac{27}{2}\left(-\log\left(\frac{1}{10^{58}}\right)+\sqrt{2}-7\right)+\phi=\phi+\frac{27}{2}\left(-7-\log(a)\log_a\left(\frac{1}{10^{58}}\right)+\sqrt{2}\right)$$

$$\frac{27}{2}\left(-\log\left(\frac{1}{10^{58}}\right)+\sqrt{2}-7\right)+\phi=\phi+\frac{27}{2}\left(-7+\text{Li}_1\left(1-\frac{1}{10^{58}}\right)+\sqrt{2}\right)$$

Series representations:

$$\frac{27}{2}\left(-\log\left(\frac{1}{10^{58}}\right)+\sqrt{2}-7\right)+\phi=-94+\frac{27}{\sqrt{2}}+\frac{\sqrt{5}}{2}+\frac{1}{2}27\log(9\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999)-\frac{27}{2}\sum_{k=1}^{\infty}\frac{\left(-\frac{1}{9\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999}\right)^k}{k}$$

$$\frac{27}{2}\left(-\log\left(\frac{1}{10^{58}}\right)+\sqrt{2}-7\right)+\phi=-94+\frac{27}{\sqrt{2}}+\frac{\sqrt{5}}{2}+27\,i\,\pi\left\lfloor\frac{1}{2\,\pi}\arg(10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000-x)\right\rfloor+\frac{27\log(x)}{2}-\frac{27}{2}\sum_{k=1}^{\infty}\frac{1}{k}(-1)^k(10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000-x)^k x^{-k}\quad\text{for } x<0$$

$$\frac{27}{2}\left(-\log\left(\frac{1}{10^{58}}\right)+\sqrt{2}-7\right)+\phi=-94+\frac{27}{\sqrt{2}}+\frac{\sqrt{5}}{2}+27\,i\,\pi\left\lfloor-\frac{-\pi+\arg\left(\frac{1}{z_0}\right)+\arg(z_0)}{2\,\pi}\right\rfloor+\frac{27\log(z_0)}{2}-\frac{27}{2}\sum_{k=1}^{\infty}\frac{1}{k}(-1)^k(10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000-z_0)^k z_0^{-k}$$

Integral representations:

$$\frac{27}{2}\left(-\log\left(\frac{1}{10^{58}}\right)+\sqrt{2}-7\right)+\phi=-94+\frac{27}{\sqrt{2}}+\frac{\sqrt{5}}{2}+\frac{27}{2}\int_1^{10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000}\frac{1}{t}\,dt$$

$$\frac{27}{2}\left(-\log\left(\frac{1}{10^{58}}\right)+\sqrt{2}-7\right)+\phi = -94+\frac{27}{\sqrt{2}}+\frac{\sqrt{5}}{2}-\frac{27 i}{4\pi}\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{1}{\Gamma(1-s)}$$

$$9\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999 \ldots$$
$$999\,999^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)\,ds \quad \text{for } -1<\gamma<0$$

From (8.12), we obtain:

$$|V_2| \leq \sum_{\gamma\in(\gamma'-1,\gamma''+1)} \left|\ln\left|\frac{t_0-\gamma}{t-\gamma}\right|\right| < A\ln t_0 \ln w(t_0).$$

2.5 * ln(5) * ln(10^-58)

Input:

$$2.5\log(5)\log\left(\frac{1}{10^{58}}\right)$$

log(x) is the natural logarithm

Result:

-537.351…

-537.351…

Alternative representations:

$$2.5\log(5)\log\left(\frac{1}{10^{58}}\right) = 2.5\log_e(5)\log_e\left(\frac{1}{10^{58}}\right)$$

$$2.5\log(5)\log\left(\frac{1}{10^{58}}\right) = 2.5\log^2(a)\log_a(5)\log_a\left(\frac{1}{10^{58}}\right)$$

$$2.5\log(5)\log\left(\frac{1}{10^{58}}\right) = 2.5\,\text{Li}_1(-4)\,\text{Li}_1\left(1-\frac{1}{10^{58}}\right)$$

Series representations:

$$2.5 \log(5) \log\left(\frac{1}{10^{58}}\right) = 2.5 \left(\log(z_0) + \left\lfloor \frac{\arg\left(\frac{1}{10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000} - z_0\right)}{2\pi} \right\rfloor \left(\log\left(\frac{1}{z_0}\right) + \log(z_0)\right) - \sum_{k=1}^{\infty} \frac{1}{k} (-1)^k \left(1/10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000 - z_0\right)^k z_0^{-k}\right) \left(\log(z_0) + \left\lfloor \frac{\arg(5 - z_0)}{2\pi} \right\rfloor \left(\log\left(\frac{1}{z_0}\right) + \log(z_0)\right) - \sum_{k=1}^{\infty} \frac{(-1)^k (5 - z_0)^k z_0^{-k}}{k}\right)$$

$$
\begin{aligned}
&2.5\log(5)\log\left(\frac{1}{10^{58}}\right) = \\
&10\left(i^2\pi^2\left\lfloor\frac{\arg\left(\frac{1}{10^{58}}-x\right)}{2\pi}\right\rfloor\left\lfloor\frac{\arg(5-x)}{2\pi}\right\rfloor + 0.5\,i\,\pi\left\lfloor\frac{\arg\left(\frac{1}{10^{58}}-x\right)}{2\pi}\right\rfloor\log(x) + 0.5\,i\,\pi\left\lfloor\frac{\arg(5-x)}{2\pi}\right\rfloor\log(x) + \right. \\
&0.25\log^2(x) - 0.5\,i\,\pi\left\lfloor\frac{\arg(5-x)}{2\pi}\right\rfloor\sum_{k=1}^{\infty}\frac{1}{k}(-1)^k\left(1/10^{58}-x\right)^k x^{-k} - 0.25\log(x)\sum_{k=1}^{\infty}\frac{1}{k}(-1)^k\left(1/10^{58}-x\right)^k x^{-k} - 0.5\,i\,\pi \\
&\left\lfloor\frac{\arg\left(\frac{1}{10^{58}}-x\right)}{2\pi}\right\rfloor\sum_{k=1}^{\infty}\frac{(-1)^k(5-x)^k x^{-k}}{k} - \\
&\left. 0.25\log(x)\sum_{k=1}^{\infty}\frac{(-1)^k(5-x)^k x^{-k}}{k} + 0.25\sum_{k_1=1}^{\infty}\sum_{k_2=1}^{\infty}\frac{1}{k_1 k_2}(-1)^{k_1+k_2}\left(1/10^{58}-x\right)^{k_1}(5-x)^{k_2}x^{-k_1-k_2}\right) \quad \text{for } x<0
\end{aligned}
$$

$$
\begin{aligned}
2.5 \log(5) \log\left(\frac{1}{10^{58}}\right) = 10 \Bigg(& i^2 \pi^2 \left\lfloor -\frac{1}{2\pi}\left(-\pi + \arg\left(1/\left(10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\, z_0\right)\right) + \arg(z_0)\right) \right\rfloor \left\lfloor -\frac{-\pi + \arg\left(\frac{5}{z_0}\right) + \arg(z_0)}{2\pi} \right\rfloor \\
& + 0.5\, i\, \pi \left\lfloor -\frac{1}{2\pi}\left(-\pi + \arg\left(1/\left(10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\, z_0\right)\right) + \arg(z_0)\right) \right\rfloor \log(z_0) + 0.5\, i\, \pi \left\lfloor -\frac{-\pi + \arg\left(\frac{5}{z_0}\right) + \arg(z_0)}{2\pi} \right\rfloor \log(z_0) + \\
& 0.25 \log^2(z_0) - 0.5\, i\, \pi \left\lfloor -\frac{-\pi + \arg\left(\frac{5}{z_0}\right) + \arg(z_0)}{2\pi} \right\rfloor \sum_{k=1}^{\infty} \frac{1}{k}(-1)^k \left(1/10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000 - z_0\right)^k z_0^{-k} \\
& - 0.25 \log(z_0) \sum_{k=1}^{\infty} \frac{1}{k}(-1)^k \left(1/10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000 - z_0\right)^k z_0^{-k} \\
& - 0.5\, i\, \pi \left\lfloor -\frac{1}{2\pi}\left(-\pi + \arg\left(1/\left(10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\, z_0\right)\right) + \arg(z_0)\right) \right\rfloor \sum_{k=1}^{\infty} \frac{(-1)^k (5 - z_0)^k z_0^{-k}}{k} - \\
& 0.25 \log(z_0) \sum_{k=1}^{\infty} \frac{(-1)^k (5 - z_0)^k z_0^{-k}}{k} + 0.25 \sum_{k_1=1}^{\infty} \sum_{k_2=1}^{\infty} \frac{1}{k_1 k_2}(-1)^{k_1+k_2} \left(1/10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000 - z_0\right)^{k_1} (5 - z_0)^{k_2} z_0^{-k_1-k_2} \Bigg)
\end{aligned}
$$

Integral representation:

$$2.5 \log(5) \log\left(\frac{1}{10^{58}}\right) = -10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000 \int_0^1 \int_0^1 (1/((-10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000 + 9\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999 t_1)(1 + 4 t_2))) \, dt_2 \, dt_1$$

From the previous expression:

$$2.5 \log(5) \log\left(\frac{1}{10^{58}}\right)$$

we obtain:

1-1/(((2.5 * ln(5) * ln(10^-58))))

Input:

$$1 - \frac{1}{2.5 \log(5) \log\left(\frac{1}{10^{58}}\right)}$$

log(x) is the natural logarithm

Result:

1.0018609816102962585525311541648991373638778430019529366 57...

1.0018609816.... result practically equal to the following Rogers-Ramanujan continued fraction:

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

= 1.0018674362

Alternative representations:

$$1-\frac{1}{2.5\log(5)\log\left(\frac{1}{10^{58}}\right)}=1-\frac{1}{2.5\log_e(5)\log_e\left(\frac{1}{10^{58}}\right)}$$

$$1-\frac{1}{2.5\log(5)\log\left(\frac{1}{10^{58}}\right)}=1-\frac{1}{2.5\log^2(a)\log_a(5)\log_a\left(\frac{1}{10^{58}}\right)}$$

$$1-\frac{1}{2.5\log(5)\log\left(\frac{1}{10^{58}}\right)}=1-\frac{1}{2.5\,\text{Li}_1(-4)\,\text{Li}_1\left(1-\frac{1}{10^{58}}\right)}$$

Series representations:

$$1-\frac{1}{2.5\log(5)\log\left(\frac{1}{10^{58}}\right)}=1-0.4\Big/\left(\left(2\,i\,\pi\left\lfloor\frac{1}{2\,\pi}\arg(1/10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000-x)\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{1}{k}(-1)^k\,(1/10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000-x)^k\,x^{-k}\right)\left(2\,i\,\pi\left\lfloor\frac{\arg(5-x)}{2\,\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k\,(5-x)^k\,x^{-k}}{k}\right)\right)\quad\text{for } x<0$$

$$1-\frac{1}{2.5\log(5)\log\left(\frac{1}{10^{58}}\right)}=1-0.4\Big/\left(\left(\log(z_0)+\left\lfloor\frac{1}{2\,\pi}\arg(1/10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000-z_0)\right\rfloor\left(\log\left(\frac{1}{z_0}\right)+\log(z_0)\right)-\sum_{k=1}^{\infty}\frac{1}{k}(-1)^k\,(1/10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000-z_0)^k\,z_0^{-k}\right)\left(\log(z_0)+\left\lfloor\frac{\arg(5-z_0)}{2\,\pi}\right\rfloor\left(\log\left(\frac{1}{z_0}\right)+\log(z_0)\right)-\sum_{k=1}^{\infty}\frac{(-1)^k\,(5-z_0)^k\,z_0^{-k}}{k}\right)\right)$$

$$1-\frac{1}{2.5\log(5)\log\left(\frac{1}{10^{58}}\right)} = 1-0.4\Bigg/\Bigg(\Bigg(2\,i\,\pi\left\lfloor-\frac{1}{2\,\pi}(-\pi+\arg(1/\right.$$

$$(10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\ddots$$
$$000\,000\,000\,000\,000\,000\,000$$
$$\left.z_0))+\arg(z_0))\right\rfloor+\log(z_0)-\sum_{k=1}^{\infty}\frac{1}{k}(-1)^k\,(1/$$
$$10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\ddots$$
$$000\,000\,000\,000\,000\,000\,000\,000-$$
$$z_0)^k\,z_0^{-k}\Bigg)$$

$$\left(2\,i\,\pi\left\lfloor-\frac{-\pi+\arg\left(\frac{5}{z_0}\right)+\arg(z_0)}{2\,\pi}\right\rfloor+\log(z_0)-\sum_{k=1}^{\infty}\frac{(-1)^k\,(5-z_0)^k\,z_0^{-k}}{k}\right)\Bigg)\Bigg)$$

Integral representation:

$$1-\frac{1}{2.5\log(5)\log\left(\frac{1}{10^{58}}\right)} = \Big(-0.4-$$
$$10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\ddots$$
$$000\,000\int_0^1\int_0^1(1/$$
$$((-10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\ddots$$
$$000\,000\,000\,000\,000+$$
$$9\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\ddots$$
$$999\,999\,999\,999\,999\,999\,999$$
$$t_1)\,(1+4\,t_2)))\,dt_2\,dt_1\Big)\Big/$$
$$\left(\left(\int_1^{\frac{1}{10000\,000000\,000000\,000000\,000000\,000000\,000000\,000000\,000000\,000000\,000000}}\frac{1}{t}\,dt\right)\int_1^5\frac{1}{t}\,dt\right)$$

From (8.13), we obtain:

$$|V_1+V_2|\le|V_1|+|V_2|<At_0\ln^4 t_0+A\ln t_0\ln w(t_0),$$

((2.5*5* ln^4(5)+2.5* ln(5) ln(10^-58)))

Input:

$$2.5\times5\log^4(5)+2.5\log(5)\log\left(\frac{1}{10^{58}}\right)$$

log(x) is the natural logarithm

Result:

-453.481...

-453.481…

Alternative representations:

$$2.5\times 5\log^4(5)+2.5\log(5)\log\left(\frac{1}{10^{58}}\right)=2.5\log_e(5)\log_e\left(\frac{1}{10^{58}}\right)+12.5\log_e^4(5)$$

$$2.5\times 5\log^4(5)+2.5\log(5)\log\left(\frac{1}{10^{58}}\right)=$$
$$2.5\log^2(a)\log_a(5)\log_a\left(\frac{1}{10^{58}}\right)+12.5\left(\log(a)\log_a(5)\right)^4$$

$$2.5\times 5\log^4(5)+2.5\log(5)\log\left(\frac{1}{10^{58}}\right)=2.5\,\text{Li}_1(-4)\,\text{Li}_1\left(1-\frac{1}{10^{58}}\right)+12.5\left(-\text{Li}_1(-4)\right)^4$$

Series representations:

$$2.5\times 5\log^4(5)+2.5\log(5)\log\left(\frac{1}{10^{58}}\right)=2.5\left(2 i\pi\left\lfloor\frac{1}{2\pi}\arg(1/\right.\right.$$
$$10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,\cdot.$$
$$\left.\left.000\,000\,000\,000\,000-x)\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{1}{k}(-1)^k\,(1/\right.$$
$$10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,\cdot.$$
$$\left.000\,000\,000\,000\,000\,000-x)^k\,x^{-k}\right)\left(2 i\pi\left\lfloor\frac{\arg(5-x)}{2\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k\,(5-x)^k\,x^{-k}}{k}\right)+$$
$$12.5\left(2 i\pi\left\lfloor\frac{\arg(5-x)}{2\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k\,(5-x)^k\,x^{-k}}{k}\right)^4\quad\text{for } x<0$$

$$2.5\times 5\log^4(5)+2.5\log(5)\log\left(\frac{1}{10^{58}}\right)=2.5\left(\log(z_0)+\left\lfloor\frac{\arg\left(\frac{1}{10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000}-z_0\right)}{2\pi}\right\rfloor\left(\log\left(\frac{1}{z_0}\right)+\log(z_0)\right)-\sum_{k=1}^{\infty}\frac{1}{k}(-1)^k\,(1/10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,\ddots\,000\,000\,000\,000\,000\,000-z_0)^k\,z_0^{-k}\right)\left(\log(z_0)+\left\lfloor\frac{\arg(5-z_0)}{2\pi}\right\rfloor\left(\log\left(\frac{1}{z_0}\right)+\log(z_0)\right)-\sum_{k=1}^{\infty}\frac{(-1)^k\,(5-z_0)^k\,z_0^{-k}}{k}\right)+12.5\left(\log(z_0)+\left\lfloor\frac{\arg(5-z_0)}{2\pi}\right\rfloor\left(\log\left(\frac{1}{z_0}\right)+\log(z_0)\right)-\sum_{k=1}^{\infty}\frac{(-1)^k\,(5-z_0)^k\,z_0^{-k}}{k}\right)^4$$

$$2.5\times 5\log^4(5)+2.5\log(5)\log\left(\frac{1}{10^{58}}\right)=2.5\left(2\,i\,\pi\left\lfloor-\frac{1}{2\pi}(-\pi+\arg(1/(10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,\ddots\,000\,000\,000\,000\,000\,000\,z_0))+\arg(z_0))\right\rfloor+\log(z_0)-\sum_{k=1}^{\infty}\frac{1}{k}(-1)^k\,(1/10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,\ddots\,000\,000\,000\,000\,000\,000-z_0)^k\,z_0^{-k}\right)\left(2\,i\,\pi\left\lfloor-\frac{-\pi+\arg\left(\frac{5}{z_0}\right)+\arg(z_0)}{2\pi}\right\rfloor+\log(z_0)-\sum_{k=1}^{\infty}\frac{(-1)^k\,(5-z_0)^k\,z_0^{-k}}{k}\right)+12.5\left(2\,i\,\pi\left\lfloor-\frac{-\pi+\arg\left(\frac{5}{z_0}\right)+\arg(z_0)}{2\pi}\right\rfloor+\log(z_0)-\sum_{k=1}^{\infty}\frac{(-1)^k\,(5-z_0)^k\,z_0^{-k}}{k}\right)^4$$

Integral representation:

$$2.5\times 5\log^4(5)+2.5\log(5)\log\left(\frac{1}{10^{58}}\right)=2.5\left(5\left(\int_1^5\frac{1}{t}\,dt\right)^4-10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,\ddots\,000\,000\int_0^1\int_0^1(1/((-10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,\ddots\,000\,000\,000\,000\,000+9\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,\ddots\,999\,999\,999\,999\,999\,999\,999\,t_1)(1+4\,t_2)))\,dt_2\,dt_1\right)$$

From which:

((2.5*5* ln^4(5)+2.5* ln(5) ln(10^-58)))-47+3

Input:

$$\left(2.5\times 5\log^4(5)+2.5\log(5)\log\left(\frac{1}{10^{58}}\right)\right)-47+3$$

log(x) is the natural logarithm

Result:

-497.481...

-497.481… result practically equal to the rest mass of Kaon meson 497.614 with minus sign

Alternative representations:

$$\left(2.5\times 5\log^4(5)+2.5\log(5)\log\left(\frac{1}{10^{58}}\right)\right)-47+3 = -44+2.5\log_e(5)\log_e\left(\frac{1}{10^{58}}\right)+12.5\log_e^4(5)$$

$$\left(2.5\times 5\log^4(5)+2.5\log(5)\log\left(\frac{1}{10^{58}}\right)\right)-47+3 = -44+2.5\log^2(a)\log_a(5)\log_a\left(\frac{1}{10^{58}}\right)+12.5\,(\log(a)\log_a(5))^4$$

$$\left(2.5\times 5\log^4(5)+2.5\log(5)\log\left(\frac{1}{10^{58}}\right)\right)-47+3 = -44+2.5\,\mathrm{Li}_1(-4)\,\mathrm{Li}_1\left(1-\frac{1}{10^{58}}\right)+12.5\,(-\mathrm{Li}_1(-4))^4$$

Series representations:

$$\left(2.5\times 5\log^4(5)+2.5\log(5)\log\left(\frac{1}{10^{58}}\right)\right)-47+3=-44+2.5\left(2\,i\,\pi\left\lfloor\frac{1}{2\pi}\arg(1/\right.\right.$$
$$10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000 \ddots$$
$$\left.000\,000\,000\,000\,000-x)\right\rfloor+$$
$$\log(x)-\sum_{k=1}^{\infty}\frac{1}{k}(-1)^k\,(1/$$
$$10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000 \ddots$$
$$000\,000\,000\,000\,000-x)^k$$
$$\left.x^{-k}\right)\left(2\,i\,\pi\left\lfloor\frac{\arg(5-x)}{2\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k\,(5-x)^k\,x^{-k}}{k}\right)+$$
$$12.5\left(2\,i\,\pi\left\lfloor\frac{\arg(5-x)}{2\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k\,(5-x)^k\,x^{-k}}{k}\right)^4\quad\text{for } x<0$$

$$\left(2.5\times 5\log^4(5)+2.5\log(5)\log\left(\frac{1}{10^{58}}\right)\right)-47+3=-44+2.5\left(\log(z_0)+\right.$$
$$\left\lfloor\frac{\arg\left(\frac{1}{10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000}-z_0\right)}{2\pi}\right\rfloor$$
$$\left(\log\left(\frac{1}{z_0}\right)+\log(z_0)\right)-\sum_{k=1}^{\infty}\frac{1}{k}(-1)^k\,(1/$$
$$10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000 \ddots$$
$$000\,000\,000\,000\,000-z_0)^k$$
$$\left.z_0^{-k}\right)\left(\log(z_0)+\left\lfloor\frac{\arg(5-z_0)}{2\pi}\right\rfloor\left(\log\left(\frac{1}{z_0}\right)+\log(z_0)\right)-\sum_{k=1}^{\infty}\frac{(-1)^k\,(5-z_0)^k\,z_0^{-k}}{k}\right)+$$
$$12.5\left(\log(z_0)+\left\lfloor\frac{\arg(5-z_0)}{2\pi}\right\rfloor\left(\log\left(\frac{1}{z_0}\right)+\log(z_0)\right)-\sum_{k=1}^{\infty}\frac{(-1)^k\,(5-z_0)^k\,z_0^{-k}}{k}\right)^4$$

$$\left(2.5\times 5\log^4(5)+2.5\log(5)\log\left(\frac{1}{10^{58}}\right)\right)-47+3=-44+2.5\left(2\,i\,\pi\left\lfloor-\frac{1}{2\pi}(-\pi+\arg(1/\right.\right.$$
$$(10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000 \ddots$$
$$000\,000\,000\,000\,000\,z_0))+$$
$$\left.\arg(z_0))\right\rfloor+\log(z_0)-\sum_{k=1}^{\infty}\frac{1}{k}(-1)^k\,(1/$$
$$10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000 \ddots$$
$$000\,000\,000\,000\,000-z_0)^k$$
$$\left.z_0^{-k}\right)\left(2\,i\,\pi\left\lfloor-\frac{-\pi+\arg\left(\frac{5}{z_0}\right)+\arg(z_0)}{2\pi}\right\rfloor+\log(z_0)-\sum_{k=1}^{\infty}\frac{(-1)^k\,(5-z_0)^k\,z_0^{-k}}{k}\right)+$$
$$12.5\left(2\,i\,\pi\left\lfloor-\frac{-\pi+\arg\left(\frac{5}{z_0}\right)+\arg(z_0)}{2\pi}\right\rfloor+\log(z_0)-\sum_{k=1}^{\infty}\frac{(-1)^k\,(5-z_0)^k\,z_0^{-k}}{k}\right)^4$$

Integral representation:

$$\left(2.5\times 5\log^4(5)+2.5\log(5)\log\left(\frac{1}{10^{58}}\right)\right)-47+3=2.5\left(-17.6+5\left(\int_1^5 \frac{1}{t}\,dt\right)^4-10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\int_0^1\int_0^1 (1/((-10\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000+9\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,999\,t_1)(1+4t_2)))\,dt_2\,dt_1\right)$$

From (8.14), we obtain:

$$V_1+V_2>-At_0\ln^4 t_0-A\ln t_0\ln w(t_0).$$

-2.5*5*ln^4(5)-2.5*ln(5) ln(10^-58)

$$-2.5\times 5\log^4(5)-(2.5\log(5))\log\left(\frac{1}{10^{58}}\right)$$

log(x) is the natural logarithm

Result:

453.481...

453.481…. result equal to the previous expression in absolute value.

From the various results, we obtain the following expression:

-8(-133.54993539-537.351-453.481+453.481)

Input interpretation:

$-8(-133.54993539-537.351-453.481+453.481)$

Result:

5367.20748312

5367.20748312 result very near to the rest mass of strange B meson 5366.3

From:

ON SOME PROPERTIES OF RIEMANN ZETA FUNCTION ON CRITICAL LINE - *JAN MOSER* - arXiv:0710.0943v1 [math.CA] 4 Oct 2007

For: $\gamma' = 3$; $t_0 = 5$; $\gamma'' = 8$; $\omega(t_0) = 10^{-58}, \ldots$

$\gamma = 2$; $t = 6$; $A = 2.5$; $Z(t) = 2$

from:

$$(17) \qquad \frac{\kappa c^2}{3}\rho(t) = \frac{c^2}{Z^2(t)} + \left\{\frac{Z'(t)}{Z(t)}\right\}^2$$

we obtain:

((1.866e-26*(9e+16)*8.5e-27))/3 = (9e+16)/4+(x/2)^2

Input interpretation:

$$\frac{1}{3}\left(1.866\times 10^{-26}\times 9\times 10^{16}\times 8.5\times 10^{-27}\right) = \frac{9\times 10^{16}}{4}+\left(\frac{x}{2}\right)^2$$

Result:

$$4.7583\times 10^{-36} = \frac{x^2}{4} + 22500000000000000$$

Alternate forms:

$$4.7583\times 10^{-36} = \frac{1}{4}\left(x^2 + 90000000000000000\right)$$

$$-\frac{x^2}{4} - 2.25\times 10^{16} = 0$$

Complex solutions:

$x = -300000000\,i$

$x = 300000000\,i$

300.000.000 $i \approx$ c = speed of light (with imaginary unit)

Thence:

((1.866e-26*(9e+16)*8.5e-27))/3

Input interpretation:

$$\frac{1}{3}\left(1.866\times 10^{-26}\times 9\times 10^{16}\times 8.5\times 10^{-27}\right)$$

Result:

4.7583×10^{-36}

$4.7583*10^{-36}$

From the right-hand side of (17), we obtain:

(9e+16)/4+((300000000i)/2)^2

Input interpretation:

$$\frac{9\times 10^{16}}{4}+\left(\frac{300\,000\,000\,i}{2}\right)^2$$

i is the imaginary unit

Result:

0

0

From:

$$(18) \qquad \frac{\kappa}{2}p(t)=\sum_{\gamma}\frac{1}{(t-\gamma)^2}-\frac{3}{2}\left\{\frac{Z'(t)}{Z(t)}\right\}^2-\frac{c^2}{2}\frac{1}{Z^2(t)}+\mathcal{O}\left(\frac{1}{t}\right).$$

we obtain:

1/(6-2)^2-3/2((300000000i)/2)^2-((9e+16)/(2*4))+1/6

Input interpretation:

$$\frac{1}{(6-2)^2} - \frac{3}{2}\left(\frac{300\,000\,000\,i}{2}\right)^2 - \frac{9\times 10^{16}}{2\times 4} + \frac{1}{6}$$

i is the imaginary unit

Exact result:

$$\frac{1\,080\,000\,000\,000\,000\,011}{48}$$

Decimal approximation:

$2.250000000000000229166666666666666666666666666666... \times 10^{16}$

$2.25...*10^{16}$

From:

$$(20) \qquad |Z(\tilde{t}_0)| > A_2 \exp(\ln^\beta \tilde{t}_0), \quad \beta < \frac{1}{2}.$$

we obtain:

2.5*exp(ln^(1/3) (5))

Input:

$$2.5 \exp\left(\sqrt[3]{\log(5)}\right)$$

$\log(x)$ is the natural logarithm

Result:

8.07032...

8.07032...

Alternative representations:

$$2.5 \exp\left(\sqrt[3]{\log(5)}\right) = 2.5 \exp\left(\sqrt[3]{\log_e(5)}\right)$$

$$2.5\exp\left(\sqrt[3]{\log(5)}\right) = 2.5\exp\left(\sqrt[3]{\log(a)\log_a(5)}\right)$$

Series representations:

$$2.5\exp\left(\sqrt[3]{\log(5)}\right) = 2.5\exp\left(\sqrt[3]{\log(4) - \sum_{k=1}^{\infty}\frac{\left(-\frac{1}{4}\right)^k}{k}}\right)$$

$$2.5\exp\left(\sqrt[3]{\log(5)}\right) = 2.5\exp\left(\sqrt[3]{2 i \pi \left\lfloor \frac{\arg(5-x)}{2\pi} \right\rfloor + \log(x) - \sum_{k=1}^{\infty}\frac{(-1)^k (5-x)^k x^{-k}}{k}}\right)$$

for $x < 0$

$$2.5\exp\left(\sqrt[3]{\log(5)}\right) = 2.5\exp\left(\sqrt[3]{\log(z_0) + \left\lfloor \frac{\arg(5-z_0)}{2\pi} \right\rfloor \left(\log\left(\frac{1}{z_0}\right) + \log(z_0)\right) - \sum_{k=1}^{\infty}\frac{(-1)^k (5-z_0)^k z_0^{-k}}{k}}\right)$$

Integral representations:

$$2.5\exp\left(\sqrt[3]{\log(5)}\right) = 2.5\exp\left(\sqrt[3]{\int_1^5 \frac{1}{t}\,dt}\right)$$

$$2.5\exp\left(\sqrt[3]{\log(5)}\right) = 2.5\exp\left(\frac{\sqrt[3]{\frac{1}{i\pi}\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{4^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds}}{\sqrt[3]{2}}\right) \quad \text{for } -1 < \gamma < 0$$

Now, from the ln of:

$$\frac{1}{(6-2)^2} - \frac{3}{2}\left(\frac{300\,000\,000\,i}{2}\right)^2 - \frac{9\times10^{16}}{2\times4} + \frac{1}{6}$$

and

$2.5 \exp\left(\sqrt[3]{\log(5)}\right)$

and performing the 6[th] root of ratio, we obtain:

Input interpretation:

$$\sqrt[6]{\frac{\log\left(\frac{1}{(6-2)^2} - \frac{3}{2}\left(\frac{300\,000\,000\, i}{2}\right)^2 - \frac{9\times 10^{16}}{2\times 4} + \frac{1}{6}\right)}{\log\left(2.5 \exp\left(\sqrt[3]{\log(5)}\right)\right)}}$$

log(x) is the natural logarithm

i is the imaginary unit

Result:

1.6193353446276029267966506498959906885086155024047091395 82...

1.619335344…. result that is a good approximation to the value of the golden ratio 1.618033988749...

From

(19) $$\sum_{\gamma} \frac{1}{(t-\gamma)^2} > \frac{1}{(\gamma'' - \gamma')^2} > A_1 (\ln\ln\ln t_0)^2.$$

we obtain:

2.5(((ln ln ln (5))))^2

Input:

$2.5 \log^2(\log(\log(5)))$

log(x) is the natural logarithm

Result:

1.3785591523536023951717885716154839016424973796284228114 16...

1.37855915…

Alternative representations:

$$2.5 \log^2(\log(\log(5))) = 2.5 \log_e^2(\log(\log(5)))$$

$$2.5 \log^2(\log(\log(5))) = 2.5 (\log(a) \log_a(\log(\log(5))))^2$$

$$2.5 \log^2(\log(\log(5))) = 2.5 (-\text{Li}_1(1 - \log(\log(5))))^2$$

Series representations:

$$2.5 \log^2(\log(\log(5))) = 2.5 \left(\sum_{k=1}^{\infty} \frac{(-1)^k (-1 + \log(\log(5)))^k}{k}\right)^2$$

$$2.5 \log^2(\log(\log(5))) = 2.5 \left(2 i \pi \left\lfloor \frac{\arg(-x + \log(\log(5)))}{2 \pi} \right\rfloor + \log(x) - \sum_{k=1}^{\infty} \frac{(-1)^k x^{-k} (-x + \log(\log(5)))^k}{k}\right)^2 \quad \text{for } x < 0$$

$$2.5 \log^2(\log(\log(5))) = 2.5 \left(\log(z_0) + \left\lfloor \frac{\arg(\log(\log(5)) - z_0)}{2 \pi} \right\rfloor \left(\log\left(\frac{1}{z_0}\right) + \log(z_0)\right) - \sum_{k=1}^{\infty} \frac{(-1)^k (\log(\log(5)) - z_0)^k z_0^{-k}}{k}\right)^2$$

Integral representation:

$$2.5 \log^2(\log(\log(5))) = 2.5 \left(\int_1^{\log(\log(5))} \frac{1}{t} \, dt\right)^2$$

From the ratio of two previous expressions, performing the 4th root and adding 1, we obtain:

1+[(((2.5(((ln ln ln (5))))^2)))/(((2.5*exp(ln^(1/3) (5)))))]^1/4

Input:

$$1 + \sqrt[4]{\frac{2.5 \log^2(\log(\log(5)))}{2.5 \exp\left(\sqrt[3]{\log(5)}\right)}}$$

log(x) is the natural logarithm

Result:

1.642886...

$1.642886.... \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 ...$

Alternative representations:

$$1 + \sqrt[4]{\frac{2.5 \log^2(\log(\log(5)))}{2.5 \exp\left(\sqrt[3]{\log(5)}\right)}} = 1 + \sqrt[4]{\frac{2.5 \log_e^2(\log(\log(5)))}{2.5 \exp\left(\sqrt[3]{\log_e(5)}\right)}}$$

$$1 + \sqrt[4]{\frac{2.5 \log^2(\log(\log(5)))}{2.5 \exp\left(\sqrt[3]{\log(5)}\right)}} = 1 + \sqrt[4]{\frac{2.5 (\log(a) \log_a(\log(\log(5))))^2}{2.5 \exp\left(\sqrt[3]{\log(a) \log_a(5)}\right)}}$$

Series representations:

$$1 + \sqrt[4]{\frac{2.5 \log^2(\log(\log(5)))}{2.5 \exp\left(\sqrt[3]{\log(5)}\right)}} =$$

$$1 + \sqrt[4]{\frac{\left(2 i \pi \left\lfloor \frac{\arg(-x+\log(\log(5)))}{2 \pi} \right\rfloor + \log(x) - \sum_{k=1}^{\infty} \frac{(-1)^k x^{-k} (-x+\log(\log(5)))^k}{k}\right)^2}{\exp\left(\sqrt[3]{2 i \pi \left\lfloor \frac{\arg(5-x)}{2 \pi} \right\rfloor + \log(x) - \sum_{k=1}^{\infty} \frac{(-1)^k (5-x)^k x^{-k}}{k}}\right)}} \quad \text{for } x < 0$$

$$1 + \sqrt[4]{\frac{2.5 \log^2(\log(\log(5)))}{2.5 \exp\left(\sqrt[3]{\log(5)}\right)}} =$$

$$1 + \sqrt[4]{\frac{\left(2 i \pi \left\lfloor -\frac{-\pi+\arg\left(\frac{\log(\log(5))}{z_0}\right)+\arg(z_0)}{2 \pi} \right\rfloor + \log(z_0) - \sum_{k=1}^{\infty} \frac{(-1)^k (\log(\log(5))-z_0)^k z_0^{-k}}{k}\right)^2}{\exp\left(\sqrt[3]{2 i \pi \left\lfloor -\frac{-\pi+\arg\left(\frac{5}{z_0}\right)+\arg(z_0)}{2 \pi} \right\rfloor + \log(z_0) - \sum_{k=1}^{\infty} \frac{(-1)^k (5-z_0)^k z_0^{-k}}{k}}\right)}}$$

$$1+\sqrt[4]{\frac{2.5\log^2(\log(\log(5)))}{2.5\exp\left(\sqrt[3]{\log(5)}\right)}} =$$

$$1+\left(\left(\left\lfloor\frac{\arg(\log(\log(5))-z_0)}{2\pi}\right\rfloor\log\left(\frac{1}{z_0}\right)+\log(z_0)+\left\lfloor\frac{\arg(\log(\log(5))-z_0)}{2\pi}\right\rfloor\log(z_0)-\sum_{k=1}^{\infty}\frac{(-1)^k(\log(\log(5))-z_0)^k z_0^{-k}}{k}\right)^2 \Big/ \exp\left(\sqrt[3]{\log(z_0)+\left\lfloor\frac{\arg(5-z_0)}{2\pi}\right\rfloor\left(\log\left(\frac{1}{z_0}\right)+\log(z_0)\right)-\sum_{k=1}^{\infty}\frac{(-1)^k(5-z_0)^k z_0^{-k}}{k}}\right)\right)^\wedge(1/4)$$

$$1+\sqrt[4]{\frac{2.5\log^2(\log(\log(5)))}{2.5\exp\left(\sqrt[3]{\log(5)}\right)}} =$$

$$1+\sqrt[4]{\frac{\left(2i\pi\left\lfloor\frac{\pi-\arg\left(\frac{\log(\log(5))}{z_0}\right)-\arg(z_0)}{2\pi}\right\rfloor+\log(z_0)-\sum_{k=1}^{\infty}\frac{(-1)^k(\log(\log(5))-z_0)^k z_0^{-k}}{k}\right)^2}{\exp\left(\sqrt[3]{2i\pi\left\lfloor\frac{\pi-\arg\left(\frac{5}{z_0}\right)-\arg(z_0)}{2\pi}\right\rfloor+\log(z_0)-\sum_{k=1}^{\infty}\frac{(-1)^k(5-z_0)^k z_0^{-k}}{k}}\right)}}$$

Integral representation:

$$1+\sqrt[4]{\frac{2.5\log^2(\log(\log(5)))}{2.5\exp\left(\sqrt[3]{\log(5)}\right)}} = 1+\sqrt[4]{\frac{\left(\int_1^{\log(\log(5))}\frac{1}{t}\,dt\right)^2}{\exp\left(\sqrt[3]{\int_1^5\frac{1}{t}\,dt}\right)}}$$

From which, we obtain also:

1+[(((2.5(((ln ln ln (5))))^2)))/(((2.5*exp(ln^(1/3) (5)))))]^1/4 - 24/10^3

Input:

$$1+\sqrt[4]{\frac{2.5\log^2(\log(\log(5)))}{2.5\exp\left(\sqrt[3]{\log(5)}\right)}} - \frac{24}{10^3}$$

$\log(x)$ is the natural logarithm

Result:

1.618885562847996063837818877502534188801742125658190687290...

1.6188855628…. result that is a very good approximation to the value of the golden ratio 1.618033988749...

Alternative representations:

$$1+\sqrt[4]{\frac{2.5\log^2(\log(\log(5)))}{2.5\exp\left(\sqrt[3]{\log(5)}\right)}}-\frac{24}{10^3}=1-\frac{24}{10^3}+\sqrt[4]{\frac{2.5\log_e^2(\log(\log(5)))}{2.5\exp\left(\sqrt[3]{\log_e(5)}\right)}}$$

$$1+\sqrt[4]{\frac{2.5\log^2(\log(\log(5)))}{2.5\exp\left(\sqrt[3]{\log(5)}\right)}}-\frac{24}{10^3}=1-\frac{24}{10^3}+\sqrt[4]{\frac{2.5\,(\log(a)\log_a(\log(\log(5))))^2}{2.5\exp\left(\sqrt[3]{\log(a)\log_a(5)}\right)}}$$

Series representations:

$$1+\sqrt[4]{\frac{2.5\log^2(\log(\log(5)))}{2.5\exp\left(\sqrt[3]{\log(5)}\right)}}-\frac{24}{10^3}=$$

$$0.976+\sqrt[4]{\frac{\left(2\,i\,\pi\left\lfloor\frac{\arg(-x+\log(\log(5)))}{2\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k x^{-k}(-x+\log(\log(5)))^k}{k}\right)^2}{\exp\left(\sqrt[3]{2\,i\,\pi\left\lfloor\frac{\arg(5-x)}{2\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k(5-x)^k x^{-k}}{k}}\right)}}\quad\text{for } x<0$$

$$1+\sqrt[4]{\frac{2.5\log^2(\log(\log(5)))}{2.5\exp\left(\sqrt[3]{\log(5)}\right)}}-\frac{24}{10^3}=$$

$$0.976+\sqrt[4]{\frac{\left(2\,i\,\pi\left\lfloor-\frac{-\pi+\arg\left(\frac{\log(\log(5))}{z_0}\right)+\arg(z_0)}{2\pi}\right\rfloor+\log(z_0)-\sum_{k=1}^{\infty}\frac{(-1)^k(\log(\log(5))-z_0)^k z_0^{-k}}{k}\right)^2}{\exp\left(\sqrt[3]{2\,i\,\pi\left\lfloor-\frac{-\pi+\arg\left(\frac{5}{z_0}\right)+\arg(z_0)}{2\pi}\right\rfloor+\log(z_0)-\sum_{k=1}^{\infty}\frac{(-1)^k(5-z_0)^k z_0^{-k}}{k}}\right)}}$$

$$1+\sqrt[4]{\frac{2.5\log^2(\log(\log(5)))}{2.5\exp\left(\sqrt[3]{\log(5)}\right)}}-\frac{24}{10^3}=$$

$$0.976+\left(\left(\left\lfloor\frac{\arg(\log(\log(5))-z_0)}{2\pi}\right\rfloor\log\left(\frac{1}{z_0}\right)+\log(z_0)+\left\lfloor\frac{\arg(\log(\log(5))-z_0)}{2\pi}\right\rfloor\log(z_0)-\sum_{k=1}^{\infty}\frac{(-1)^k(\log(\log(5))-z_0)^k z_0^{-k}}{k}\right)^2 \Big/ \exp\left(\sqrt[3]{\log(z_0)+\left\lfloor\frac{\arg(5-z_0)}{2\pi}\right\rfloor\left(\log\left(\frac{1}{z_0}\right)+\log(z_0)\right)-\sum_{k=1}^{\infty}\frac{(-1)^k(5-z_0)^k z_0^{-k}}{k}}\right)\right)\hat{}(1/4)$$

$$1+\sqrt[4]{\frac{2.5\log^2(\log(\log(5)))}{2.5\exp\left(\sqrt[3]{\log(5)}\right)}}-\frac{24}{10^3}=$$

$$0.976+\sqrt[4]{\frac{\left(2i\pi\left\lfloor\frac{\pi-\arg\left(\frac{\log(\log(5))}{z_0}\right)-\arg(z_0)}{2\pi}\right\rfloor+\log(z_0)-\sum_{k=1}^{\infty}\frac{(-1)^k(\log(\log(5))-z_0)^k z_0^{-k}}{k}\right)^2}{\exp\left(\sqrt[3]{2i\pi\left\lfloor\frac{\pi-\arg\left(\frac{5}{z_0}\right)-\arg(z_0)}{2\pi}\right\rfloor+\log(z_0)-\sum_{k=1}^{\infty}\frac{(-1)^k(5-z_0)^k z_0^{-k}}{k}}\right)}}$$

Integral representation:

$$1+\sqrt[4]{\frac{2.5\log^2(\log(\log(5)))}{2.5\exp\left(\sqrt[3]{\log(5)}\right)}}-\frac{24}{10^3}=0.976+\sqrt[4]{\frac{\left(\int_1^{\log(\log(5))}\frac{1}{t}\,dt\right)^2}{\exp\left(\sqrt[3]{\int_1^5\frac{1}{t}\,dt}\right)}}$$

From

$$\frac{1}{3}\left(1.866\times10^{-26}\times9\times10^{16}\times8.5\times10^{-27}\right)$$

$$\frac{1}{(6-2)^2}-\frac{3}{2}\left(\frac{300\,000\,000\,i}{2}\right)^2-\frac{9\times10^{16}}{2\times4}+\frac{1}{6}$$

$$2.5\log^2(\log(\log(5)))$$

performing the following calculations, we obtain:

(((((((((((((1.866e-26*(9e+16)*8.5e-27))/3)))*(((1/(6-2)^2-3/2((300000000i)/2)^2-((9e+16)/(2*4))+1/6)))))) + ((((sqrt(((2.5(((ln ln ln (5)))/2)^2)))))))*10^-19))))*1/10^8+(11+3)/10^30

Input interpretation:

$$\left(\left(\frac{1}{3}\left(1.866\times10^{-26}\times9\times10^{16}\times8.5\times10^{-27}\right)\right)\left(\frac{1}{(6-2)^2}-\frac{3}{2}\left(\frac{300\,000\,000\,i}{2}\right)^2-\frac{9\times10^{16}}{2\times4}+\frac{1}{6}\right)+\frac{\sqrt{2.5\left(\frac{1}{2}\log(\log(\log(5)))\right)^2}}{10^{19}}\right)\times\frac{1}{10^8}+\frac{11+3}{10^{30}}$$

log(x) is the natural logarithm

i is the imaginary unit

Result:

$1.67168... \times 10^{-27}$

$1.67168...*10^{-27}$ result practically equal to the value of the formula:

$$m_{p'} = 2\times\frac{\eta}{R}m_P = 1.6714213\times10^{-27}\ \text{kg}$$

that is the holographic proton mass (N. Haramein)

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 and 134.9766 (mass of the two Pions - mesons 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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