

Proof of the Riemann hypothesis

Toshiro Takami
mmm82889@yahoo.co.jp
May 1, 2019

Abstract

I could give a complete proof by the number theory method to Riemann hypothesis.

I found the following number law. This proved that Riemann hypothesis is correct.

The formula is (1).

$$\sum_{n=1}^{\infty} \frac{1}{n^s} \tag{1}$$

$$s = a + bi \tag{2}$$

$$\sum_{n=1}^{\infty} \left[\frac{\sin(x \ln(2n-1))}{(2n-1)^c} - \frac{\sin(x \ln(2n))}{(2n)^c} \right] \tag{3}$$

$$\sum_{n=1}^{\infty} \left[\frac{\cos(x \ln(2n-1))}{(2n-1)^c} - \frac{\cos(x \ln(2n))}{(2n)^c} \right] \tag{4}$$

$$b = x, a = c = 0.5, \text{ If } x \text{ is nontrivial zero values, } (3) = (4) = 0 \tag{5}$$

Although x is treated as a real number, x is a nontrivial zero values.

That is, it takes eternal number of nontrivial zeros of the positive and negative regions on the axis 0.5.

introduction

Looking at the formula of Euler's formula(1), I sought out if this could be handled as a cross series.

$$\sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{n^{1-k}} = \sum_{n=1}^{\infty} \left[\frac{1}{(2n-1)^{1-k}} - \frac{1}{(2n)^{1-k}} \right] \dots (6)$$

insert $\cos\theta + i \sin\theta = e^{i\theta}$.

$$\sum_{n=1}^{\infty} \left[\frac{\cos(x \ln(2n-1)) + i \sin(x \ln(2n-1))}{(2n-1)^{\frac{1}{2}-d}} - \frac{\cos(x \ln(2n)) + i \sin(x \ln(2n))}{(2n)^{\frac{1}{2}-d}} \right] \dots (7)$$

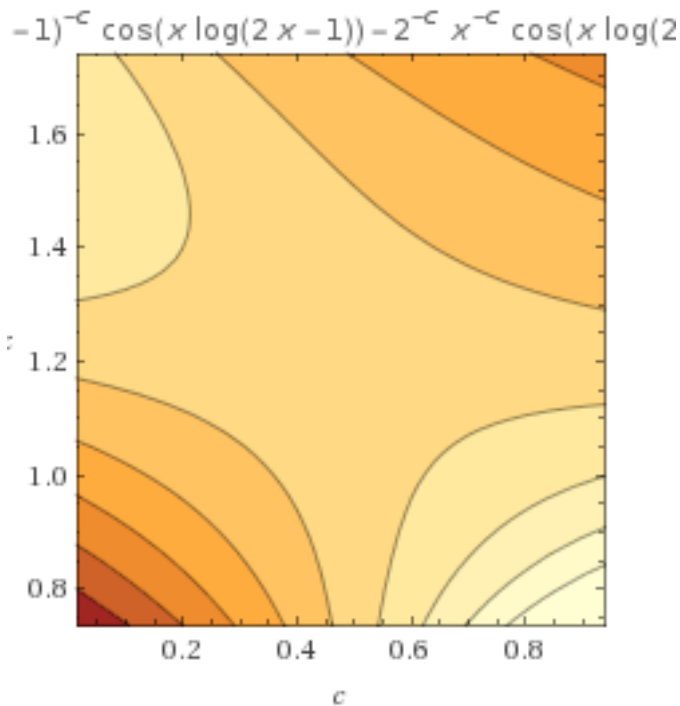
x is nontrivial zero values, and (6)=(7).

Equations (3) and (4) are derived from Equation (7).

The figure below is a figure of the following formula.

This placed with n = x.

$$\left[\frac{\cos(x \ln(2x-1))}{(2x-1)^c} - \frac{\cos(x \ln(2x))}{(2x)^c} \right]$$



From this figure, I thought that the proof was possible.

discussion

$$\left(\frac{\sin(x \ln(2n-1))}{(2n-1)^c} \right) + \left(\frac{\cos(x \ln(2n-1))}{(2n-1)^c} \right)$$

.....(8) [x are nontrivial zero values.]

When n is a large enough number, $(8) \doteq 0$ and $(8)^2 \doteq 0$.

$$(8)^2 = [2^{(-2c)}] * [n^{(-2c)}] * [\sin(x * \log(2n-1)) + \cos(x * \log(2n-1))]^2$$

$$[\sin^2(x * \ln(2n-1)) + \cos^2(x * \ln(2n-1))] = 1$$

$$= [2^{(-2c)}] * [n^{(-2c)}] * [\sin(2x * \log(2n-1)) + 1]$$

$$\begin{aligned} &= [2^{(1-2c)}] [n^{(-2c)}] [\sin^2(x \log(2n-1) + \pi/4)] \\ &= 2^{(-2c)} n^{(-2c)} = n^{(1-2c)} / ([4^c]^{(1-2c)}) \end{aligned}$$

$$\lim_{c \rightarrow 0.5^+} \frac{n^{1-2c}}{4^c(1-2c)} = \infty$$

$$\lim_{c \rightarrow 0.5^-} \frac{n^{1-2c}}{4^c(1-2c)} = -\infty$$

$= (8)^2$

That is, at this time ($c=0.5$), x can take an infinite number of nontrivial zeros.

when $c \neq 0.5$

$2^{(-2c)} * n^{(-2c)} = n^{(1-2c)} / (4^c * (1-2c)) \neq 0$,
 x of (8) can not be taken nontrivial zeros.

The proof is completed.

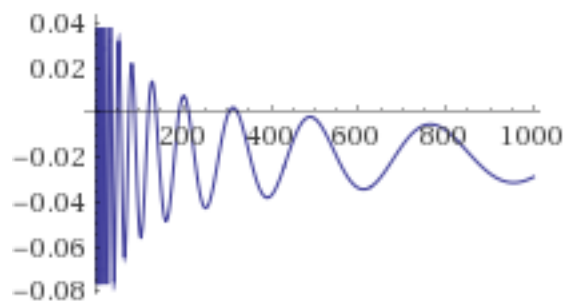
Examples

The lower part of the calculation was initially Libere-office for mac, but I moved to swift for mac from the middle.

The lower part of the calculation was swift on mac.

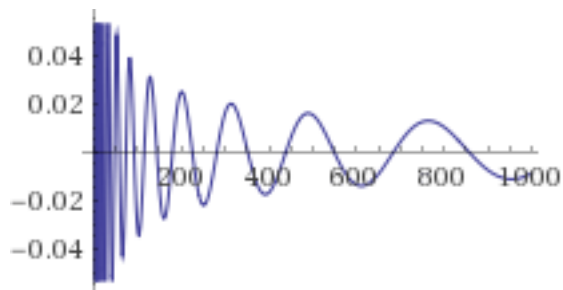
(chapter 1)

$$\sum_{n=1}^{1000} \{ \cos[14.1347 \cdot \ln(2n-1)] / (2n-1)^{0.49} - \cos[14.1347 \cdot \ln(2n)] / (2n)^{0.49} \}$$
$$\approx -0.0287246146425618261$$



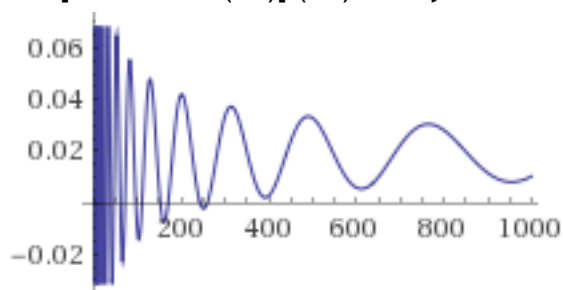
$$\begin{aligned} [10000] &= -0.0182412463962976847953 \\ [100000] &= -0.0177277053736920320315 \\ [1000000] &= -0.0186860009565473737803 \\ [10000000] &= -0.0190042870176894175549 \\ [100000000] &= -0.0189917517130979707218 \dots \text{not converge} \end{aligned}$$

$$\sum_{n=1}^{1000} \{ \cos[14.1347 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[14.1347 \cdot \ln(2n)] / (2n)^{0.5} \}$$
$$\approx -0.00906301367133582151$$



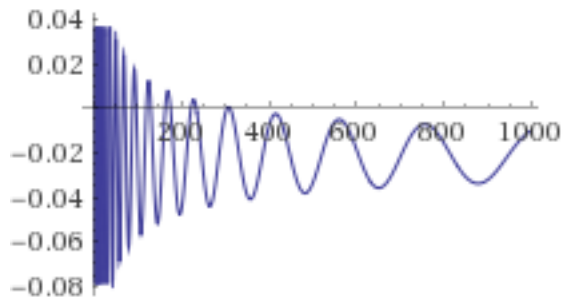
$[10000]=0.0006381011115495365026$
 $[100000]=0.0010780432416684295090$
 $[1000000]=0.0002245632899122298001$
 $[10000000]=-0.0000496479275200912434$
 $[100000000]=-0.0000382288508812898928\dots\text{converge}$

$\text{sum}_{\{n=1\}}^{\{1000\}}\{\cos[14.1347\ln(2n-1)]/(2n-1)^{0.51} - \cos[14.1347\ln(2n)]/(2n)^{0.51}\} \approx 0.01024008264902787325$



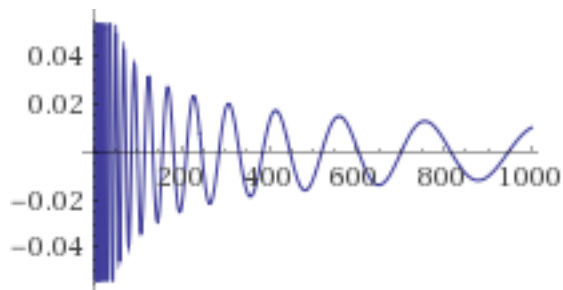
$[10000]=0.0192176082247373404555$
 $[100000]=0.0195937840748259088641$
 $[1000000]=0.0188337913412248876555$
 $[10000000]=0.0185975339572469408611$
 $[100000000]=0.0186078662584906844024\dots\text{not converge}$

$\text{sum}_{\{n=1\}}^{\{1000\}}\{\cos[21.022\ln(2n-1)]/(2n-1)^{0.49} - \cos[21.022\ln(2n)]/(2n)^{0.49}\} \approx -0.010077623957692851438$



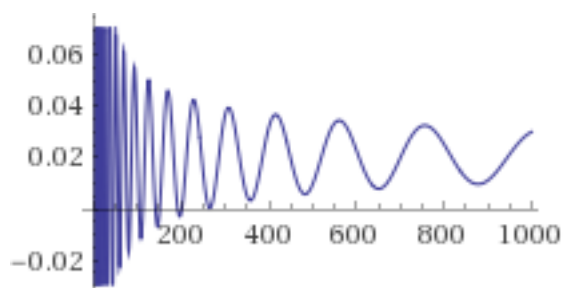
[10000]=-0.0236290071420571581862
 [100000]=-0.0217095847284566982605
 [1000000]=-0.0206482298290876220559
 [10000000]=-0.0210456267984390245351
 [100000000]=-0.0210832778695941719382.....not converge

$\text{sum}_{\{n=1\}}^{\{1000\}} \{ \cos[21.022 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[21.022 \cdot \ln(2n)] / (2n)^{0.5} \} \approx 0.010203050972979707$



[10000]=-0.0023018856406172511289
 [100000]=-0.0005496921657573621087
 [1000000]=0.0003817627764431225329
 [10000000]=0.0000380957809653702473
 [100000000]=0.0000070544092957442871converge

$\text{sum}_{\{n=1\}}^{\{1000\}} \{ \cos[21.022 \cdot \ln(2n-1)] / (2n-1)^{0.51} - \cos[21.022 \cdot \ln(2n)] / (2n)^{0.51} \} \approx 0.0301437250660519783$

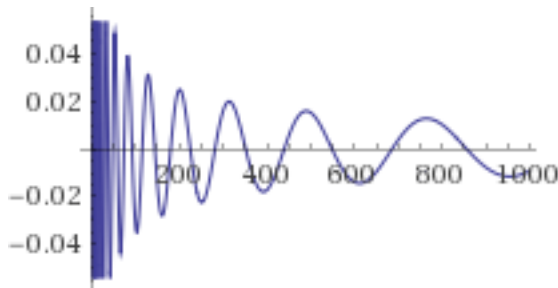


[10000]=0.0186034964827524601505
 [100000]=0.0202026487431074264212
 [1000000]=0.0210202028664549234183
 [10000000]=0.0207230001134234807780
 [100000000]=0.0206974093289953205155.....not converge

(chapter 2)

(14.1347- 0.001)

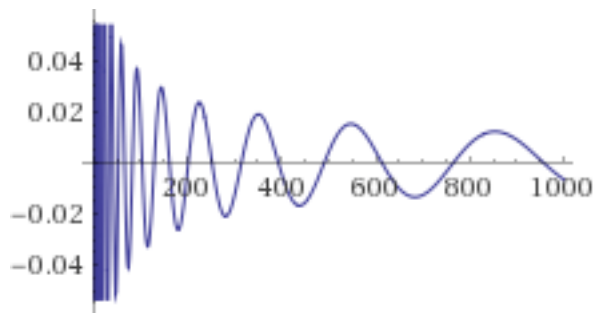
$$\sum_{n=1}^{1000} \{ \cos[14.1337 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[14.1337 \cdot \ln(2n)] / (2n)^{0.5} \} \approx -0.009225305555779525779463237679646088942314$$



[10000]=0.0004908595315669325720
 [100000]=0.0009616985990964528738
 [1000000]=0.0001156893510012422144
 [10000000]=-0.0001607114065385512091
 [100000000]=-0.0001509936635404196949.....not converge

(14.1347 is nontrivial zero value. as it is)

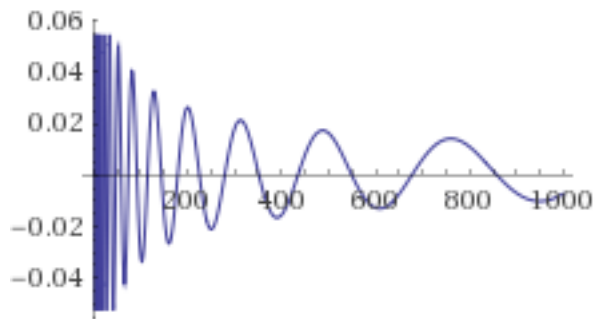
$$\sum_{n=1}^{1000} \{ \cos[14.1347 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[14.1347 \cdot \ln(2n)] / (2n)^{0.5} \} \approx -0.009063013671335821519956190406232181070163$$



[10000]=0.0006381011115495365026
 [100000]=0.0010780432416684295090
 [1000000]= 0.0002245632899122298001
 [10000000]= -0.0000496479275200912434
 [100000000]=-0.0000382288508812898928.....converge

(14.1347+ 0.01=14.1447)

$\sum_{n=1}^{1000} \{ \cos[14.1447 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[14.1447 \cdot \ln(2n)] / (2n)^{0.5} \}$
 $\approx -0.007243403455155722480043192935285864376912$



[10000]=0.0022748922502973858289
 [100000]=0.0024009439859531173274
 [1000000]=0.0014791973611828108937
 [10000000]=0.0012301792406834031936
 [100000000]=0.0012585154544851192247..... Undecidabl

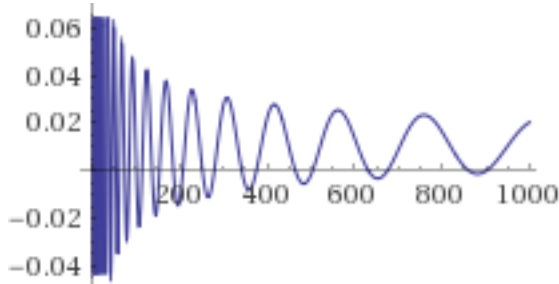
.....

.....

(21.022- 0.01=21.012)

$$\sum_{n=1}^{1000} \{ \cos[21.0120 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[21.0120 \cdot \ln(2n)] / (2n)^{0.5} \}$$

$$\approx 0.02028489255404090882758013459921094294008$$



$$[10000]= 0.0079126943260740684183$$

$$[100000]= 0.0100352227300254896042$$

$$[1000000]= 0.0108565621646344659390$$

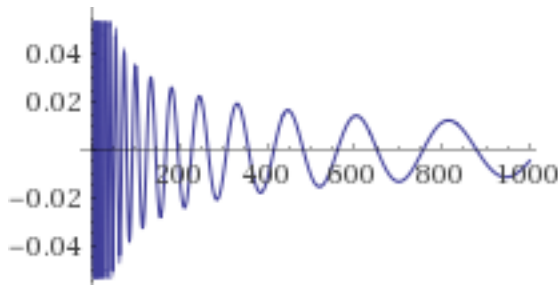
$$[10000000]= 0.0104843503975115531074$$

$$[100000000]= 0.0104746550659218524287 \dots \dots \dots \text{not converge}$$

(21.0220 is nontrivial zero value. as it is.)

$$\sum_{n=1}^{1000} \{ \cos[21.0220 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[21.0220 \cdot \ln(2n)] / (2n)^{0.5} \}$$

$$\approx 0.01020305097297970756165091906533606755457$$



$$[10000]=-0.0023018856406172511289$$

$$[100000]=-0.0005496921657573621087$$

$$[1000000]=0.0003817627764431225329$$

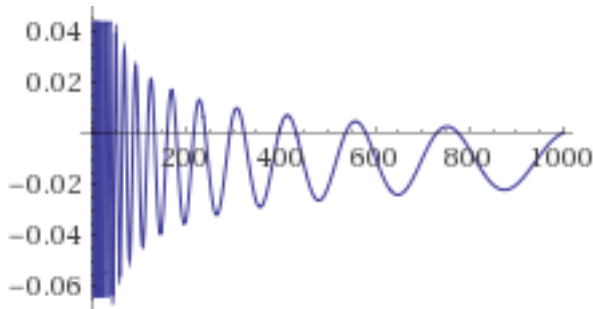
$$[10000000]=0.0000380957809653702473$$

[100000000]=0.0000070544092957442871.....converge

(21.0220+0.01=22.0320)

$$\sum_{n=1}^{1000} \{ \cos[21.0320 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[21.0320 \cdot \ln(2n)] / (2n)^{0.5} \}$$

$$\approx 0.009213501661674673769220937361896999026864$$



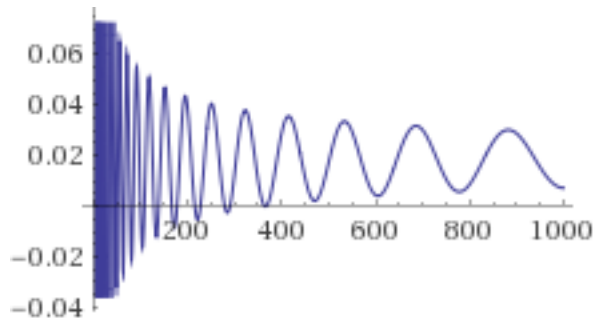
[10000]=-0.0120947862362253185514
 [100000]=-0.0107270996987019039820
 [1000000]=-0.0097014813569226230477
 [10000000]=-0.0100093633835118597103
 [100000000]=-0.0100605988203420360777.....not converge

.....

(25.0109-0.01=25.0009)

$$\sum_{n=1}^{1000} \{ \sin[25.0009 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \sin[25.0009 \cdot \ln(2n)] / (2n)^{0.5} \}$$

$$\approx 0.007208956867091058558975679870786427234417$$

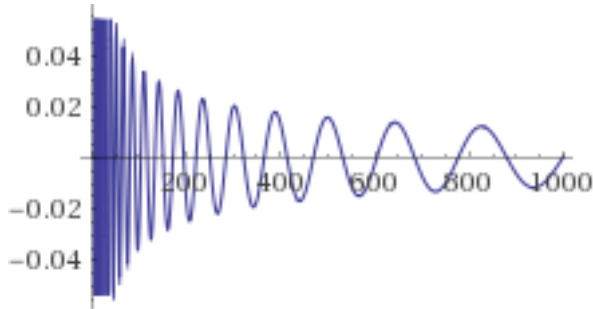


[10000]=-0.0109792843912182164212
 [100000]=-0.0129018421697284571548
 [1000000]=-0.0138749666260562180137
 [10000000]=-0.0140059815308212903817

[100000000]=-0.0139521725046484450922.....not converge

(25.0109 is nontrivial zero value. as it is.)

$$\begin{aligned} & \text{sum}_{\{n=1\}}^{\{1000\}} \{ \cos[25.0109 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \\ & \cos[25.0109 \cdot \ln(2n)] / (2n)^{0.5} \} \\ & \approx 0.0005664168769543854175153984498270195080704 \end{aligned}$$



$$[10000]=0.0031794539716973957769$$

$$[100000]=0.0010129648076460495264$$

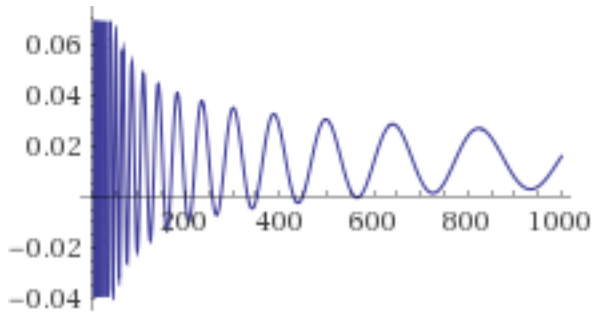
$$[1000000]=0.0000527725990851316977$$

$$[10000000]=-0.0000375544556307302004$$

[100000000]=0.0000296005134758246658.....converge

(25.0109+0.01=25.0209)

$$\begin{aligned} & \text{sum}_{\{n=1\}}^{\{1000\}} \{ \cos[25.0209 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \\ & \cos[25.0209 \cdot \ln(2n)] / (2n)^{0.5} \} \\ & \approx 0.01575432463889700806807754640291655225933 \end{aligned}$$

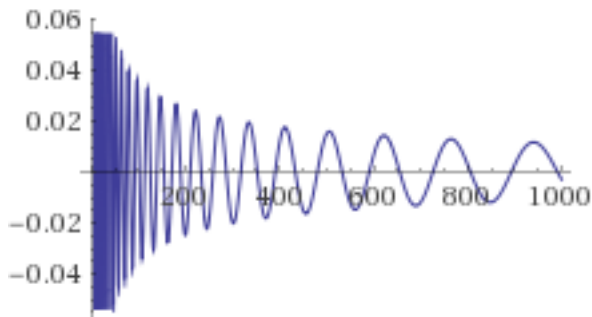


[10000]=0.0176700155045441953394
 [100000]=0.0152759853426839738166
 [1000000]=0.0143430581229324321385
 [10000000]=0.0142960181287969719660
 [100000000]=0.0143748762762403066440.....not converge

.....
.....

(30.4249 - 0.01=30.4149)

$\sum_{n=1}^{1000} \{ \cos[30.4149 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[30.4149 \cdot \ln(2n)] / (2n)^{0.5} \}$
 $\approx -0.002856409018257240951732534456529171014494$

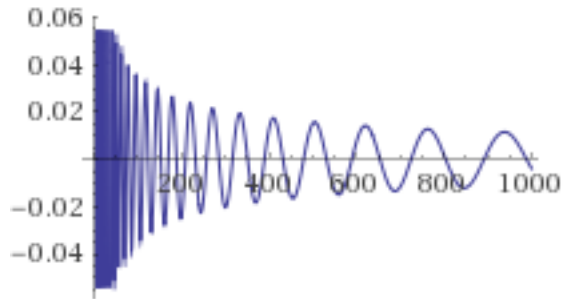


[10000]= -0.0030388948279709746512
 [100000]= -0.0007134501610826229565
 [1000000]= 0.0002059339855287456835
 [10000000]= 0.0003267595999544659156
 [100000000]=0.0002812429594458024443.....not converge

(30.4249 is nontrivial zero value. as it is.)

$\sum_{n=1}^{1000} \{ \cos[30.4249 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[30.4249 \cdot \ln(2n)] / (2n)^{0.5} \}$

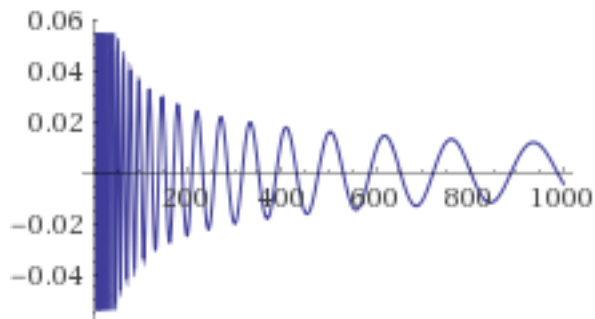
$\approx -0.003909090235135760293540930550124771914827$



[10000]=-0.0033980444366637999748
 [100000]=-0.0008825379930712329637
 [1000000]=0.0000110835698303654228
 [10000000]=0.000092555270059981509
 [100000000]=0.0000335427373431973819.....converge

(30.4249+0.01=30.4349)

$\text{sum}_{\{n=1\}}^{\{1000\}}\{\cos[30.4349 \cdot \ln(2n-1)]/(2n-1)^{0.5} - \cos[30.4349 \cdot \ln(2n)]/(2n)^{0.5}\}$
 $\approx -0.004252440526184255650794899059877558320760$



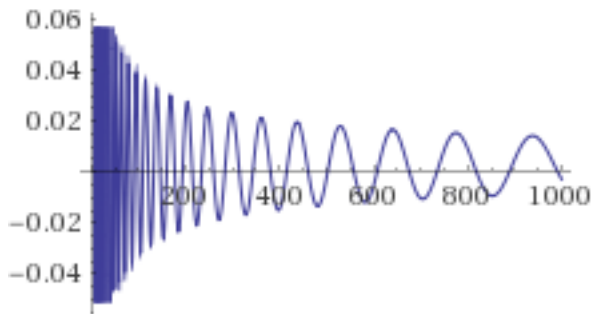
[10000]=-0.0030371364011003336783
 [100000]=-0.0003517351831407830760
 [1000000]=0.0005027598472046472316
 [10000000]=0.0005425030774031609814
 [100000000]=0.0004713839500665595187.....not converge

.....

(32.9351-0.01=32.9251)

$\text{sum}_{\{n=1\}}^{\{1000\}}\{\cos[32.9251 \cdot \ln(2n-1)]/(2n-1)^{0.5} - \cos[32.9251 \cdot \ln(2n)]/(2n)^{0.5}\}$

$\approx -0.002702007880758332603409000961383728787830$



[10000]=-0.0000354846146526247106

[100000]=0.0016892426191820577100

[1000000]=0.0024278271134448151970

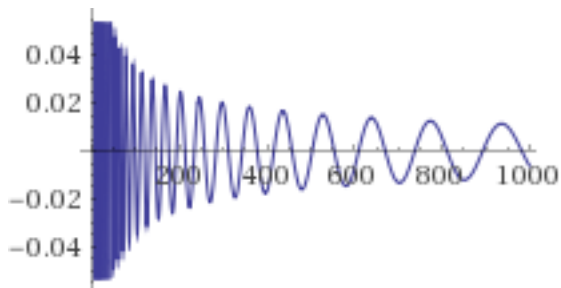
[10000000]=0.0026830551451150455762

[100000000]=0.0027569421199088403086.....not converge

(32.9351 is nontrivial zero value. as it is.)

$\sum_{n=1}^{1000} \{ \cos[32.9351 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[32.9351 \cdot \ln(2n)] / (2n)^{0.5} \}$

$\approx -0.006211350232338428548135531520246292646547$



[10000]=-0.0030187974933814079245

[100000]=-0.0011198358022496601640

[1000000]=-0.0003446395140902848734

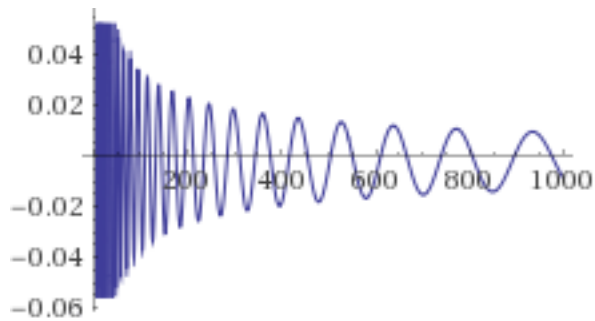
[10000000]=-0.0000903248133043883523

[100000000]=-0.0000221594074273025880.....converge

(32.9351+0.01= 32.9451)

$\sum_{n=1}^{1000} \{ \cos[32.9451 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[32.9451 \cdot \ln(2n)] / (2n)^{0.5} \}$

$\approx -0.008931280247269008024066371515947139282383$

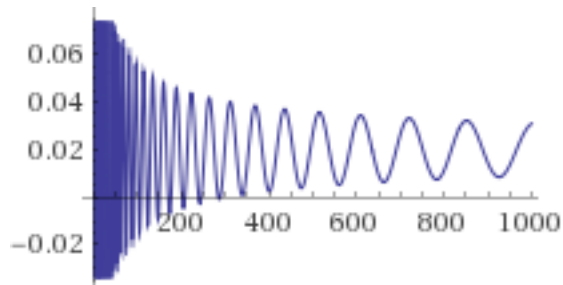


[10000]=-0.0052190215982851530935
 [100000]=-0.0031587929966095914039
 [1000000]=-0.0023564632518479375171
 [10000000]=-0.0021078236331256560571
 [100000000]=-0.0020471956046321931888.....not converge

.....
.....

(37.5862- 0.01= 37.5762)

$$\begin{aligned}
 & \text{sum}_{\{n=1\}}^{\{1000\}} \{ \cos[37.5762 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \\
 & \cos[37.5762 \cdot \ln(2n)] / (2n)^{0.5} \} \\
 & \approx 0.03083401506214361782561915309792393073922
 \end{aligned}$$

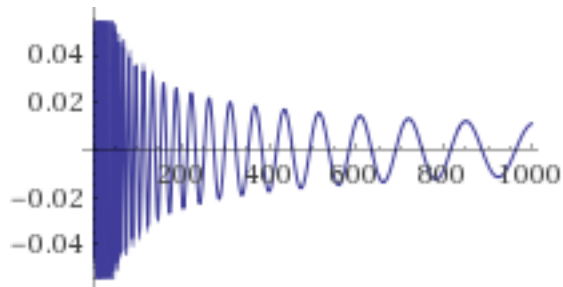


[10000]=0.0195359368608285441371
 [100000]=0.0189196414524257991441
 [1000000]=0.0199973689427138945351
 [10000000]=0.0201460868782911001196
 [100000000]=0.0200503760585013374174.....not converge

(37.5862 is nontrivial zero value. as it is.)

$$\sum_{n=1}^{1000} \{ \cos[37.5862 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[37.5862 \cdot \ln(2n)] / (2n)^{0.5} \}$$

$$\approx 0.01094179539026480827799190174599114281438$$

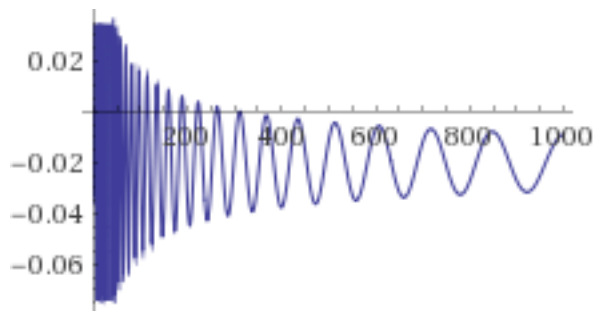


[10000]=-0.0001969237257829878525
 [100000]=-0.0011553773481789157869
 [1000000]=-0.0001343416061451328184
 [10000000]=0.0000587167172489908842
 [100000000]=-0.0000249459169129748873.....converge

$$(37.5862 + 0.01 = 37.5962)$$

$$\sum_{n=1}^{1000} \{ \cos[37.5962 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[37.5962 \cdot \ln(2n)] / (2n)^{0.5} \}$$

$$\approx -0.008946020896821952473793952327356223438291$$



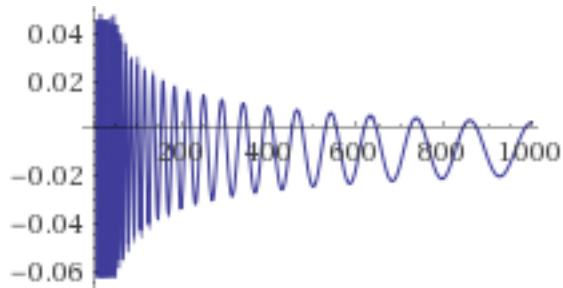
[10000]=-0.0198604388135492707090
 [100000]=-0.0211460105720736035728
 [1000000]=-0.0201963046130781143095
 [10000000]=-0.0199636989117923310810
 [100000000]=-0.0200331095329610020528.....not converge

.....

$$(40.9187 - 0.01 = 40.9087)$$

$$\sum_{n=1}^{1000} \left\{ \cos[40.9087 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[40.9087 \cdot \ln(2n)] / (2n)^{0.5} \right\}$$

$$\approx 0.002480935611445674636260370820510050638889$$

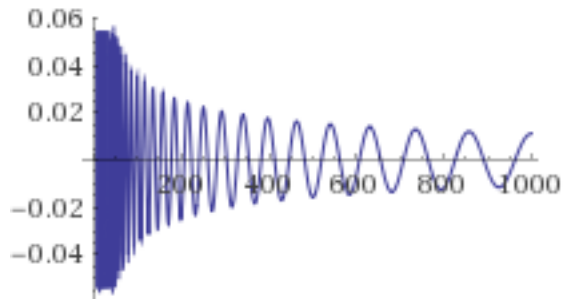


[10000]=-0.0051677833489781012030
 [100000]=-0.0075751568755802805785
 [1000000]=-0.0083312236007446627967
 [10000000]=-0.0085680467375924898588
 [100000000]=-0.0086420189500060091981.....not converge

(40.9187 is nontrivial zero value. as it is.)

$$\sum_{n=1}^{1000} \left\{ \cos[40.9187 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[40.9187 \cdot \ln(2n)] / (2n)^{0.5} \right\}$$

$$\approx 0.01116144304066434732383887175973104014394$$

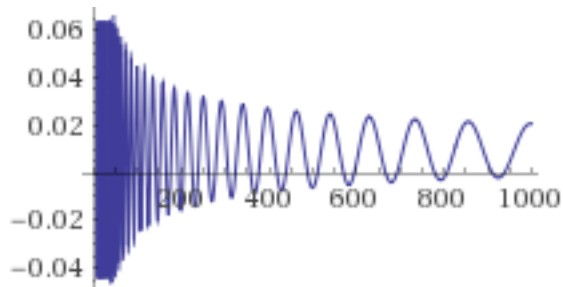


[10000]=0.0035169104243255207287
 [100000]=0.0010989171823213882747
 [1000000]=0.0003349281342070774877
 [10000000]=0.0000937391247718045875
 [100000000]=0.0000176604734510305102.....converge

(40.9187+ 0.01= 40.9287)

$$\sum_{n=1}^{1000} \{ \cos[40.9287 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[40.9287 \cdot \ln(2n)] / (2n)^{0.5} \}$$

$$\approx 0.02068783121384710154093688466862424692220$$



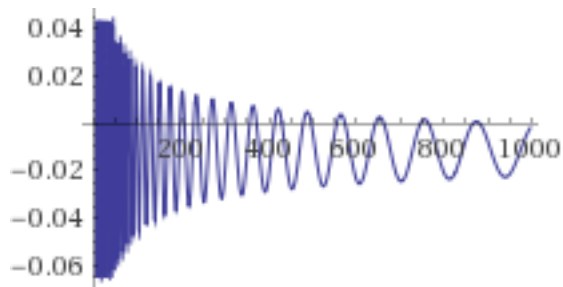
[10000]=0.0130774066708262623471
 [100000]=0.0106668189248659613794
 [1000000]=0.0099041156067228991455
 [10000000]=0.0096628311670022160734
 [100000000]=0.0095865032449445348323.....not converge

.....

(43.3271- 0.01= 43.3171)

$$\sum_{n=1}^{1000} \{ \cos[43.3171 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[43.3171 \cdot \ln(2n)] / (2n)^{0.5} \}$$

$$\approx -0.002627184464281924470612387264789499947854$$

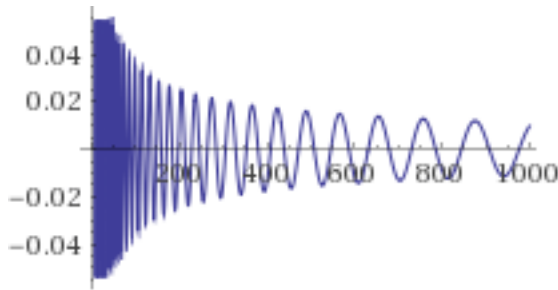


[10000]=-0.0112300972457555110762
 [100000]=-0.0124630776424045092848
 [1000000]=-0.0121568283539716555375
 [10000000]=-0.0118974800268731202568
 [100000000]=-0.0118126252156423548756.....not converge

(43.3271 is nontrivial zero value. as it is.)

$$\sum_{n=1}^{1000} \{ \cos[43.3271 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[43.3271 \cdot \ln(2n)] / (2n)^{0.5} \}$$

$$\approx 0.009670906260156884143514330311804340408437$$

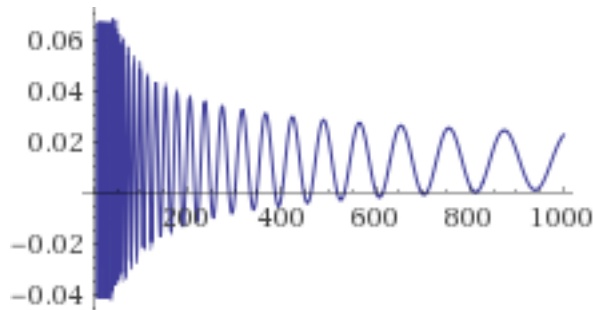


[10000]= 0.0009520515105505345573
 [100000]= -0.0005078252057554809556
 [1000000]= -0.0003051887688908388216
 [10000000]= -0.0000672058546933808392.....converge

(43.3271+ 0.01= 43.3371)

$$\sum_{n=1}^{1000} \{ \cos[43.3371 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[43.3371 \cdot \ln(2n)] / (2n)^{0.5} \}$$

$$\approx 0.009670906260156884143514330311804340408437$$



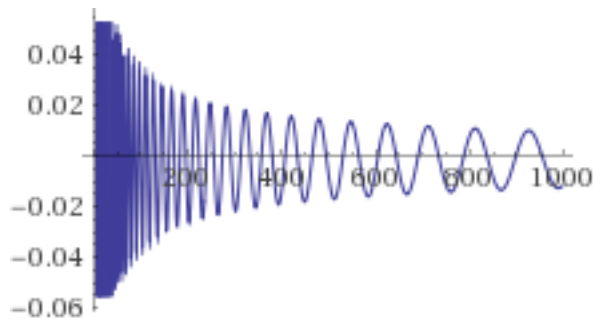
[10000]= 0.0138611334436689482424
 [100000]= 0.0121914127967915099371
 [1000000]= 0.0122894928302838823964
 [10000000]=0.0125018265102611169509.....not converge

.....

(48.0052- 0.01=47.9952)

$$\sum_{n=1}^{1000} \{ \cos[47.9952 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[47.9952 \cdot \ln(2n)] / (2n)^{0.5} \}$$

$$\approx -0.01237776368572021892164330354677826997352$$

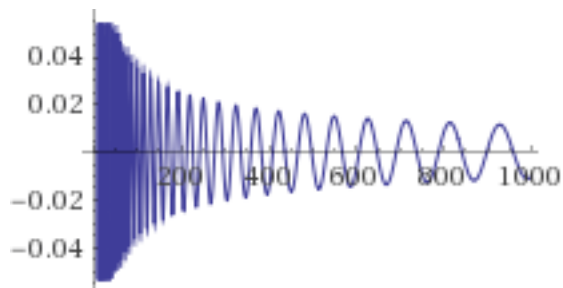


[10000]= 0.0000285799991242556995
 [100000]= -0.0021376413863578289966
 [1000000]= -0.0022192255925806937331
 [10000000]= -0.0019585239647509334292.....not converge

(48.0052 is nontrivial zero value. as it is.)

$$\sum_{n=1}^{1000} \{ \cos[48.0052 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[48.0052 \cdot \ln(2n)] / (2n)^{0.5} \}$$

$$\approx -0.009954710963835234494265321374978419642965$$

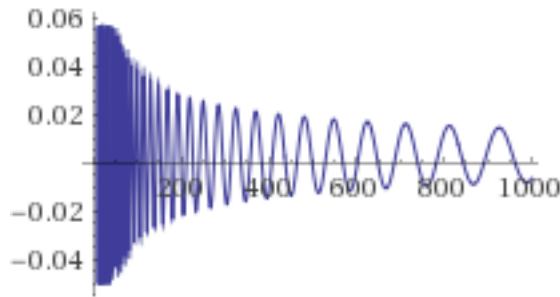


[10000]= 0.0018032285340410843938
 [100000]= 0.0000660014107200388242
 [1000000]= -0.0001954933851270815727
 [10000000]= 0.0001168501874528188322
 [100000000]= -0.0000222158682941726699.....converge

(48.0052+ 0.01=48.0152)

$$\sum_{n=1}^{1000} \{ \cos[48.0152 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[48.0152 \cdot \ln(2n)] / (2n)^{0.5} \}$$

$$\approx -0.006597815652933799152944355894709218323312$$



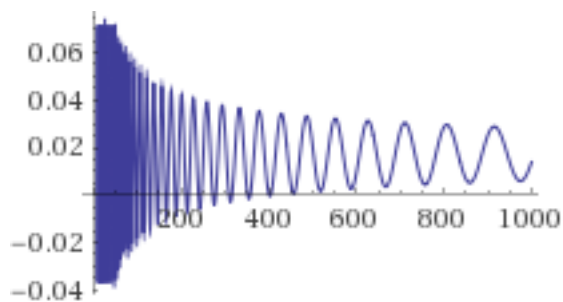
[10000]= 0.0044366094516016078841
 [100000]=0.0031451285025022525550
 [1000000]=0.0027088886322526439104
 [10000000]=0.0030655599344365370811
 [100000000]=0.0029234203769221956369.....not converge

.....

(49.7738- 0.01=49.7638)

$$\sum_{n=1}^{1000} \{ \cos[49.7638 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[49.7638 \cdot \ln(2n)] / (2n)^{0.5} \}$$

$$\approx 0.01383818187704884282408936833978078967314$$

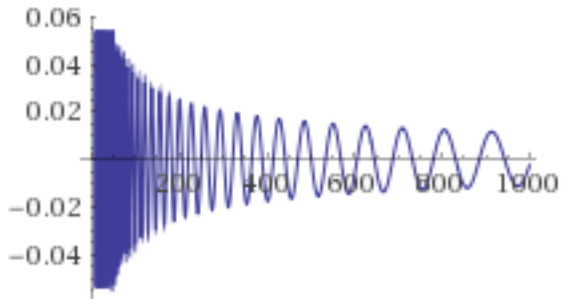


[10000]=0.0204037589236460217834
 [100000]=0.0176524483959972777747
 [1000000]=0.0168391658695661756984
 [10000000]=0.0170716013967882086766
 [100000000]=0.0171650920761718187024.....not converge

(49.7738 is nontrivial zero value. as it is.)

$$\sum_{n=1}^{1000} \{ \cos[49.7738 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[49.7738 \cdot \ln(2n)] / (2n)^{0.5} \}$$

$$\approx -0.002425522478434600029779024059868471000503$$

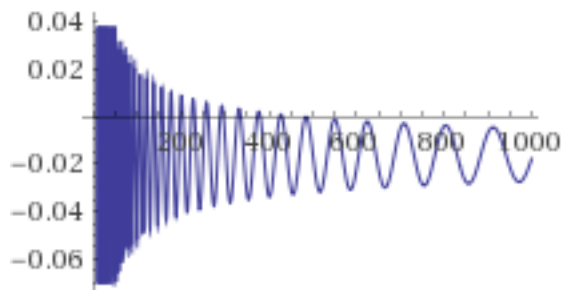


[10000]= 0.0034374613798155602418
 [100000]= 0.0004433508278073949134
 [1000000]= -0.0002692269558208497827
 [10000000]= 0.0000031448364606872906
 [100000000]=0.0000016971109376292873.....converge

(49.7738+ 0.01=49.7838)

$$\sum_{n=1}^{1000} \{ \cos[49.7838 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[49.7838 \cdot \ln(2n)] / (2n)^{0.5} \}$$

$$\approx -0.01792553042791727447634460232379546458718$$



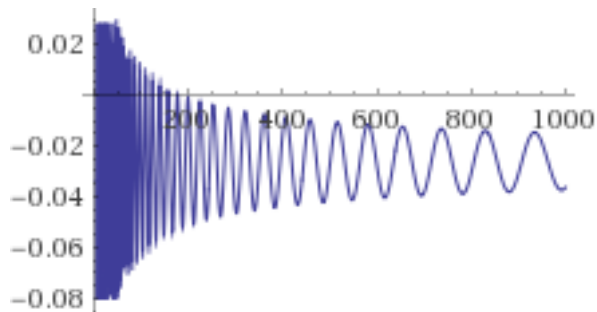
[10000]= -0.0128126155902118996077
 [100000]= -0.0160221607044494576688
 [1000000]= -0.0166214463360710926199
 [10000000]= -0.0163144944504915699601
 [100000000]=-0.0162474302505595455393.....not converge

.....

(52.9703- 0.01=52.9603)

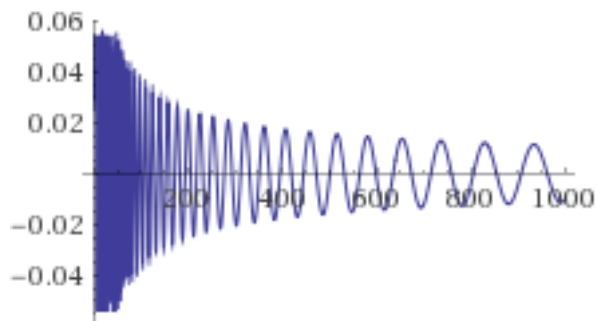
$$\sum_{n=1}^{1000} \{ \cos[52.9603 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[52.9603 \cdot \ln(2n)] / (2n)^{0.5} \}$$

$$\approx -0.03635518141833695778724613296604269322725$$



[10000]=-0.0227243930148252754053
 [100000]=-0.0270512158174514988351
 [1000000]=-0.0261265188041285185971
 [10000000]=-0.0261841661259985397647
 [100000000]=-0.0262460615983426404085.....not converge
 (52.9703 is nontrivial zero value. as it is.)

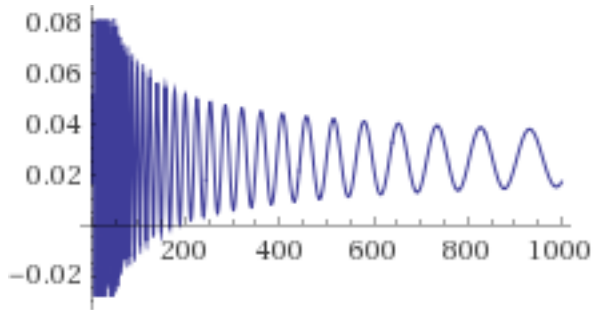
$$\begin{aligned}
 & \text{sum}_{\{n=1\}}^{\{1000\}} \{ \cos[52.9703 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \\
 & \cos[52.9703 \cdot \ln(2n)] / (2n)^{0.5} \} \\
 & \approx -0.009805569328727788768320627130100407623786
 \end{aligned}$$



[10000]=0.0034739734404261226469
 [100000]=-0.0009736503195389328066
 [1000000]=0.0000840864838235658814
 [10000000]=-0.0000402288186734236711
 [100000000]=-0.0000791109926464973008.....converge

(52.9703+ 0.01=52.9803)

$$\begin{aligned}
 & \text{sum}_{\{n=1\}}^{\{1000\}} \{ \cos[52.9803 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \\
 & \cos[52.9803 \cdot \ln(2n)] / (2n)^{0.5} \} \\
 & \approx 0.01696351638531999947395264707358456028123
 \end{aligned}$$

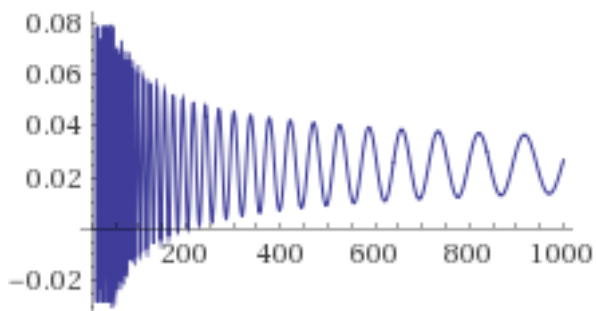


[10000]=0.0298009149632027132981
 [100000]=0.0252807368145561497941
 [1000000]=0.0264549124817869858728
 [10000000]=0.0262664254861674946462
 [100000000]=0.0262518399485283625283

.....

(56.4462- 0.01=56.4362)

$$\begin{aligned} & \text{sum}_{n=1}^{1000} \{ \cos[56.4362 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \\ & \cos[56.4362 \cdot \ln(2n)] / (2n)^{0.5} \} \\ & \approx 0.02661362850362773718971974636737236364152 \end{aligned}$$

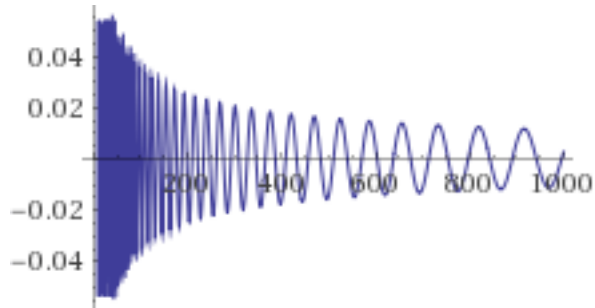


[10000]=0.0215213375849595336953
 [100000]=0.0256454199486976612554
 [1000000]=0.0250592910221035559959
 [10000000]=0.0248005396480182084551
 [100000000]=0.0249269290298672584194.....not converge

(56.4462 is nontrivial zero value. as it is.)

$$\sum_{n=1}^{1000} \{ \cos[56.4462 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[56.4462 \cdot \ln(2n)] / (2n)^{0.5} \}$$

$$\approx 0.002651841310208654740010549296886542678129$$

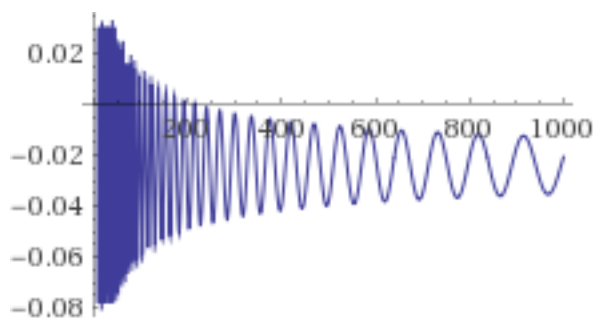


[10000]=-0.0033569416558486631433
 [100000]=0.0007412009666034661236
 [1000000]=0.0003082564029241538104
 [10000000]=0.0000061648527900334994
 [100000000]=0.0001245625213175247570.....converge

$$(56.4462 + 0.01 = 56.4562)$$

$$\sum_{n=1}^{1000} \{ \cos[56.4562 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[56.4562 \cdot \ln(2n)] / (2n)^{0.5} \}$$

$$\approx -0.02051850791786285306441430897020475710196$$



[10000]=-0.0273951025018738907046
 [100000]=-0.0233662356193842200847
 [1000000]=-0.0236407303330016561882
 [10000000]=-0.0239790227111441045516
 [100000000]=-0.0238720224947596565412.....not converge

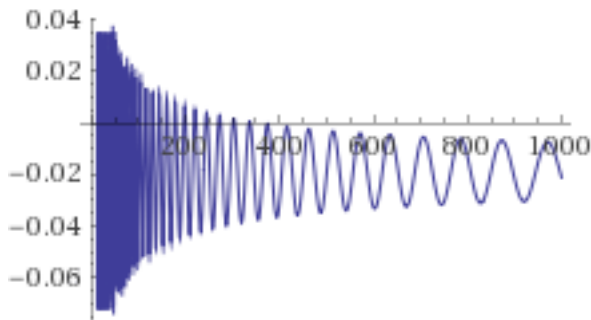
.....

.....

(59.3470- 0.01=59.3370)

$$\sum_{n=1}^{1000} \{ \cos[59.3370 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[59.3370 \cdot \ln(2n)] / (2n)^{0.5} \}$$

$$\approx -0.02117544407868147009046644659813383875831$$

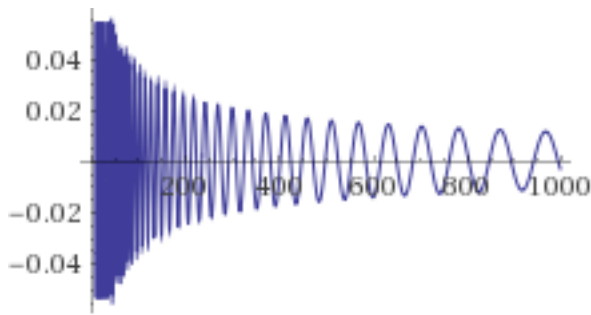


- [10000]=-0.0153470935301642623372
- [100000]=-0.0186832345035133039202
- [1000000]=-0.0191851092465768376105
- [10000000]=-0.0188416207259528324658
- [100000000]=-0.0187981369915568748141.....not converge

(59.3470 is nontrivial zero value. as it is.)

$$\sum_{n=1}^{1000} \{ \cos[59.3470 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[59.3470 \cdot \ln(2n)] / (2n)^{0.5} \}$$

$$\approx -0.003249397427817426257297031928877826615990$$

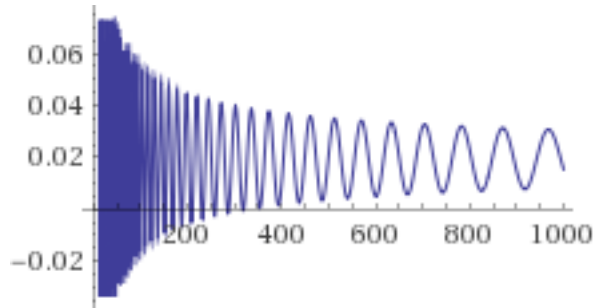


- [10000]=0.0033272037996214297653
- [100000]=0.0001999944676262767817
- [1000000]=-0.0004266637864907864286
- [10000000]=-0.0001107110726185287755
- [100000000]=-0.0000496121879175364362.....converge

(59.3470+ 0.01=59.3570)

$$\sum_{n=1}^{1000} \{ \cos[59.3570 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[59.3570 \cdot \ln(2n)] / (2n)^{0.5} \}$$

$$\approx 0.01536746372715759014536413888094266154090$$



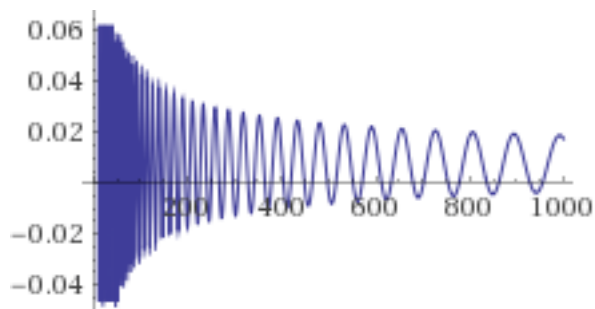
[10000]=0.0226406059802710668549
 [100000]=0.0197515319113135204288
 [1000000]=0.0190115164934722205570
 [10000000]=0.0192934859950445840304
 [100000000]=0.0193701943315789659739.....not converge

.....

(60.8318- 0.01=60.8218)

$$\sum_{n=1}^{1000} \{ \cos[60.8218 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[60.8218 \cdot \ln(2n)] / (2n)^{0.5} \}$$

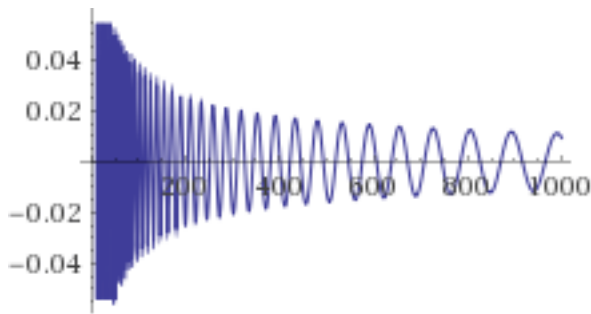
$$\approx 0.01753556053596957888173793527771193026300$$



[10000]=0.0053634168996513102365
 [100000]=0.0071097290555579180371
 [1000000]=0.0080656137459530069522
 [10000000]=0.0077438534214533767328
 [100000000]=0.0076979062723852836186.....not converge

(60.8318 is nontrivial zero value. as it is.)

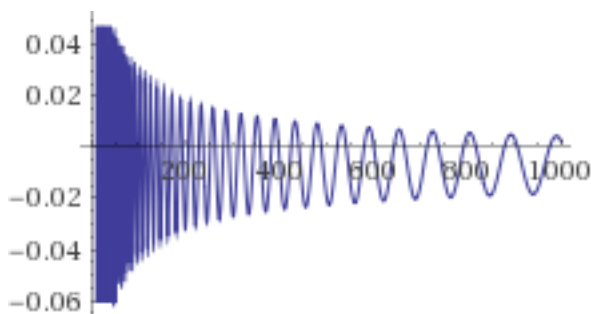
$$\sum_{n=1}^{1000} \{ \cos[60.8318 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[60.8318 \cdot \ln(2n)] / (2n)^{0.5} \} \approx 0.009350453395631120028330356599623205250689$$



- [10000]=-0.0026329489910695037802
- [100000]=-0.0005211427047658763467
- [1000000]=0.0003308650681597519964
- [10000000]=-0.0000234504367579117287
- [100000000]=-0.0000489979146843307173.....converge

(60.8318+ 0.01=60.8418)

$$\sum_{n=1}^{1000} \{ \cos[60.8418 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[60.8418 \cdot \ln(2n)] / (2n)^{0.5} \} \approx 0.002034032487286737015973242331706318052856$$



- [10000]=-0.0096808902961095563006
- [100000]=-0.0072217173963795193783
- [1000000]=-0.0064883898884115342315
- [10000000]=-0.0068677592993540365410
- [100000000]=-0.0068719124842466644543.....not converge

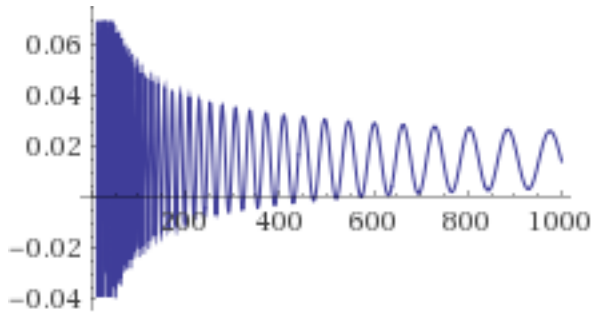
.....

.....

(65.1125- 0.01=65.1025)

$$\sum_{n=1}^{1000} \{ \cos[65.1025 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[65.1025 \cdot \ln(2n)] / (2n)^{0.5} \}$$

$$\approx 0.01455354766716725850019791519965069408143$$

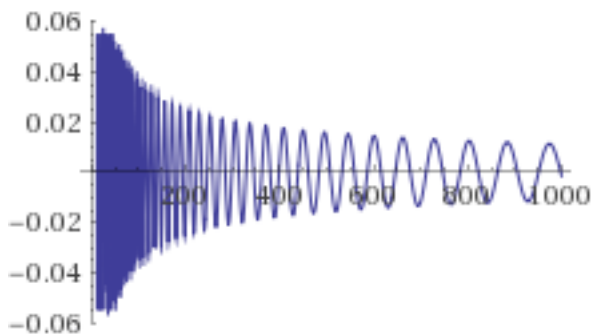


- [10000]=0.0178130662139432995039
- [100000]=0.0162484992948911007027
- [1000000]=0.0153178316294963045435
- [10000000]=0.0151053012272931840715
- [100000000]=0.0151140151910756879994.....not converge

(65.1125 is nontrivial zero value. as it is.)

$$\sum_{n=1}^{1000} \{ \cos[65.1125 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[65.1125 \cdot \ln(2n)] / (2n)^{0.5} \}$$

$$\approx -0.001376025783705826525998747282547781505619$$

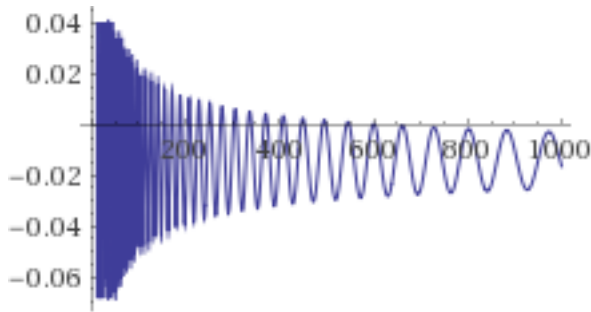


- [10000]=0.0024868485483015901651
- [100000]=0.0011808038497076905112
- [1000000]=0.0002774053647495089620
- [10000000]=0.0000397292122541242009
- [100000000]=0.0000330684738521100997.....converge

(65.1125+ 0.01=65.1225)

$$\sum_{n=1}^{1000} \{ \cos[65.1225 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[65.1225 \cdot \ln(2n)] / (2n)^{0.5} \}$$

$$\approx -0.01639371889042223977588544036025566860737$$



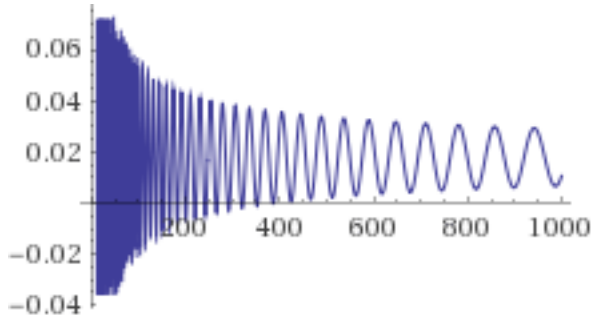
- [10000]=-0.0119595467599865334929
- [100000]=-0.0129999415740921740736
- [1000000]=-0.0138639340077547287833
- [10000000]=-0.0141215839941903811144
- [100000000]=-0.0141431734096021752972.....not converge

.....

(67.0798- 0.01=67.0698)

$$\sum_{n=1}^{1000} \{ \cos[67.0698 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[67.0698 \cdot \ln(2n)] / (2n)^{0.5} \}$$

$$\approx 0.01054340101298597874827370995356065380138$$

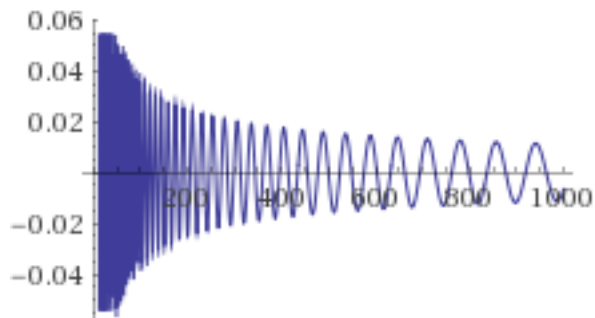


- [10000]=0.0185272576419921730650
- [100000]=0.0180575446703839549711
- [1000000]=0.0175087936290795401217
- [10000000]=0.0178615209629044355277
- [100000000]=0.0177201662173655516419.....not converge

(67.0798 is nontrivial zero value. as it is.)

$$\sum_{n=1}^{1000} \{ \cos[67.0798 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[67.0798 \cdot \ln(2n)] / (2n)^{0.5} \}$$

$$\approx -0.006523754229361230117729034342592599387830$$

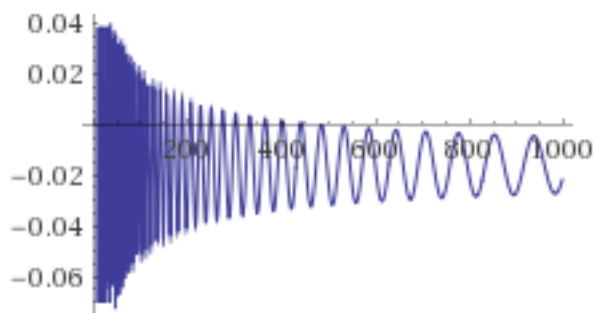


[10000]=0.0004455620242284032877
 [100000]=0.0004495504034751115607
 [1000000]=-0.0002621111366443582480
 [10000000]=0.0001288477260946204589
 [100000000]=-0.0000147163868139592400.....converge

(67.0798 + 0.01=67.0898)

$$\sum_{n=1}^{1000} \{ \cos[67.0898 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[67.0898 \cdot \ln(2n)] / (2n)^{0.5} \}$$

$$\approx -0.02243564561896982282262256211086763908767$$

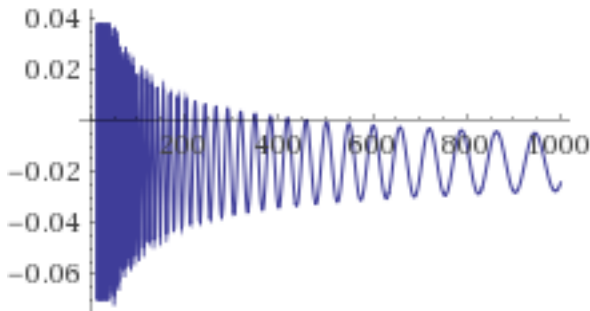


[10000]=-0.0165228379532093849758
 [100000]=-0.0160473792921948035795
 [1000000]=-0.0169096431198623928238
 [10000000]=-0.0164894634928593915302
 [100000000]=-0.0166309192179651989252.....not converge

.....
.....

(69.5464 - 0.01 = 69.5364)

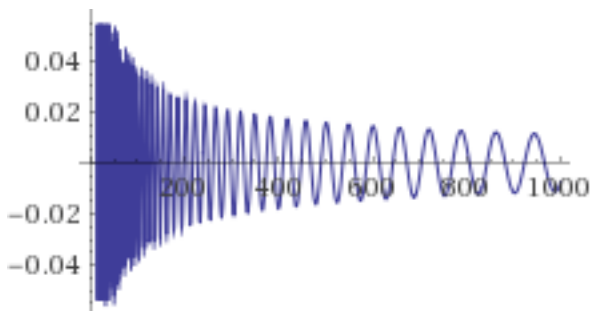
$$\begin{aligned} & \text{sum}_{\{n=1\}}^{\{1000\}} \{ \cos[69.5364 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \\ & \cos[69.5364 \cdot \ln(2n)] / (2n)^{0.5} \} \\ & \approx -0.02432975779620540595661843317573032593524 \end{aligned}$$



[10000]=-0.0134734792416161801992
[100000]=-0.0172578985580090112084
[1000000]=-0.0159753770631393052226
[10000000]=-0.0164030485920629576224
[100000000]=-0.0162623947872419447047.....not converge

(69.5464 is nontrivial zero value. as it is.)

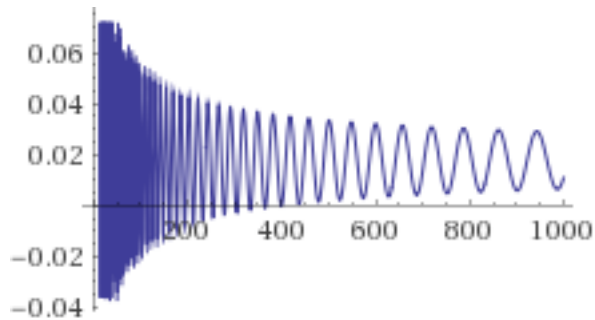
$$\begin{aligned} & \text{sum}_{\{n=1\}}^{\{1000\}} \{ \cos[69.5464 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[69.5464 \\ & \cdot \ln(2n)] / (2n)^{0.5} \} \\ & \approx -0.007421949818682513341087904880751539716491 \end{aligned}$$



[10000]=0.0025963455525007681293
[100000]=-0.0008871211367050240836
[1000000]=0.0002940474711544655657
[10000000]=-0.0001016062203650079822
[100000000]=0.0000296025170157569742.....converge

(69.5464 + 0.01=69.5564)

$$\sum_{n=1}^{1000} \{ \cos[69.5564 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[69.5564 \cdot \ln(2n)] / (2n)^{0.5} \} \\ \approx 0.01086780482916160320385310488213722257879$$



[10000]=0.0199797996968321539546

[100000]=0.0168359155842571633910

[1000000]=0.0178963339534679265197

[10000000]=0.0175417209470739889066

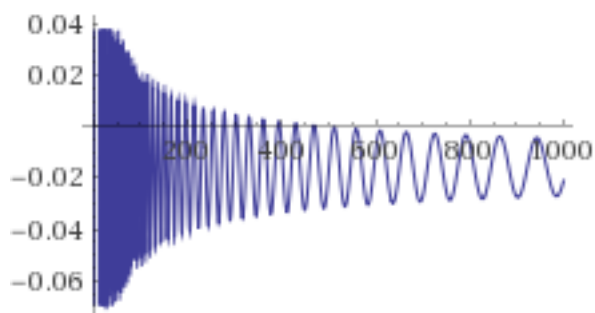
[100000000]=0.0176595177076413131778.....not converge

.....

.....

(72.0672 - 0.01=72.0572)

$$\sum_{n=1}^{1000} \{ \cos[72.0572 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[72.0572 \cdot \ln(2n)] / (2n)^{0.5} \} \\ \approx -0.02107430335516470143649414015227967905131$$



[10000]=-0.0126713775327911490343

[100000]=-0.0169220760051842292193

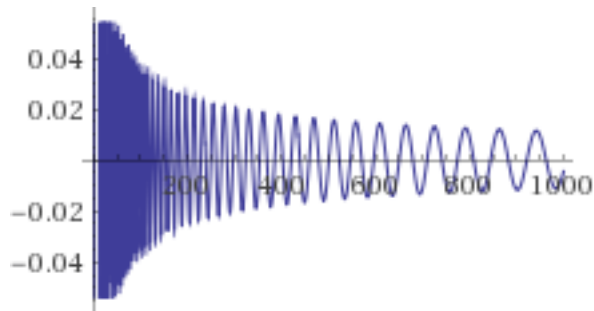
[1000000]=-0.0155397673872098192327

[10000000]=-0.0158425049243976420743

[100000000]=-0.0158212729604979597531.....not converge

(72.0672 is nontrivial zero value. as it is.)

$$\sum_{n=1}^{1000} \{ \cos[72.0672 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[72.0672 \cdot \ln(2n)] / (2n)^{0.5} \} \approx -0.004433077941905571139525695057394011228066$$



$$[10000]=0.0030294285324277098019$$

$$[100000]=-0.0010518535189544097729$$

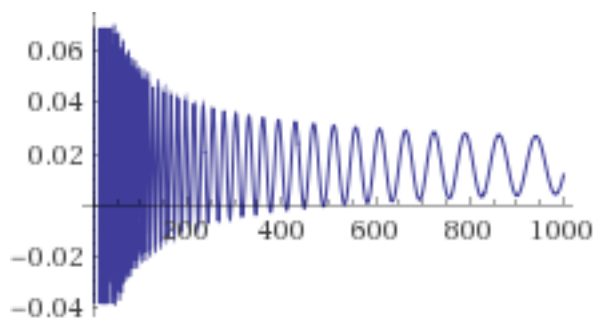
$$[1000000]=0.0003671456814411551135$$

$$[10000000]=0.0000169455603833922448$$

[100000000]=0.0000622802048020602324.....converge

(72.0672 + 0.01=72.0772)

$$\sum_{n=1}^{1000} \{ \cos[72.0772 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[72.0772 \cdot \ln(2n)] / (2n)^{0.5} \} \approx 0.01170363676792169905229332806333232274698$$



$$[10000]=0.0181707007646028824432$$

$$[100000]=0.0143045111219020221194$$

$$[1000000]=0.0157372394547144987820$$

$$[10000000]=0.0153472886281138462539$$

[100000000]=0.0154154791762151199136.....not converge

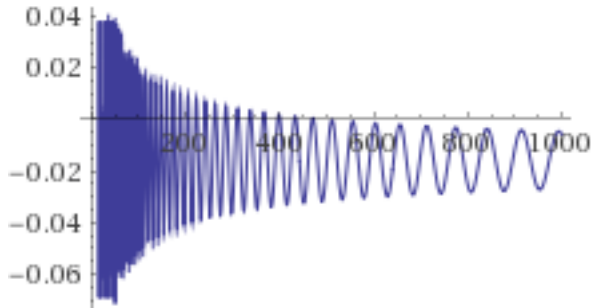
.....

.....

(75.7047 - 0.01=75.6947)

$$\sum_{n=1}^{1000} \{ \cos[75.6947 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[75.6947 \cdot \ln(2n)] / (2n)^{0.5} \}$$

$$\approx -0.005767602040275194888056795583206626735159$$



[10000]=-0.0145183117659648756176

[100000]=-0.0168743137361940659380

[1000000]=-0.0158932270594019514620

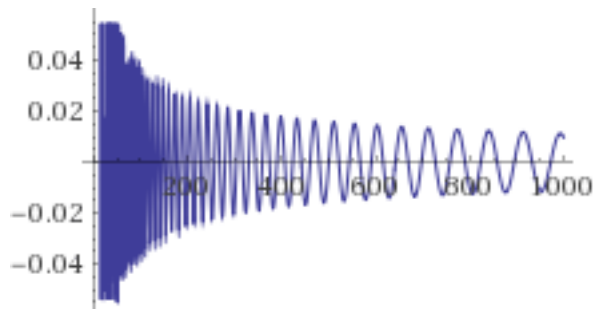
[10000000]=-0.0156984831255221751745

[100000000]=-0.0158045871196352515076.....not converge

(75.7047 is nontrivial zero value. as it is.)

$$\sum_{n=1}^{1000} \{ \cos[75.7047 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[75.7047 \cdot \ln(2n)] / (2n)^{0.5} \}$$

$$\approx 0.009653628012110042231224261630636385090761$$



[10000]=0.0016245600108993024473

[100000]=-0.0010015153125604158314

[1000000]=-0.0001182290513657512342

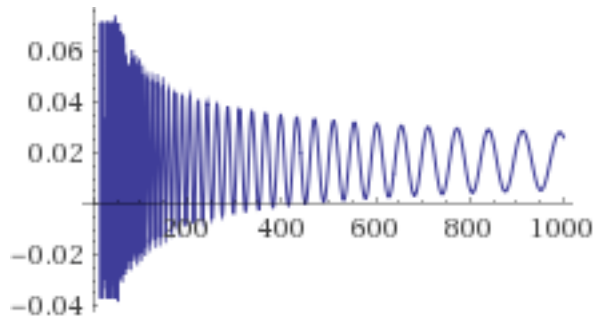
[10000000]=0.0001204084346666212352

[100000000]=0.0000257517189773427849.....converge

(75.7047 + 0.01=75.7147)

$$\sum_{n=1}^{1000} \{ \cos[75.7147 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[75.7147 \cdot \ln(2n)] / (2n)^{0.5} \}$$

$$\approx 0.02603757915450419183152249404869049358387$$



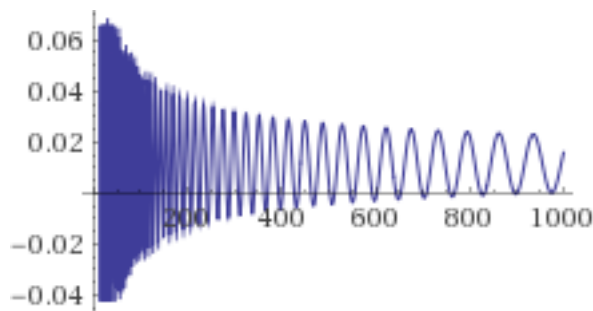
[10000]=0.0187700429043501960946
 [100000]=0.0159047949088703503839
 [1000000]=0.0166779554338473551267
 [10000000]=0.0169547162854766578222
 [100000000]=0.0168740888732249530446.....not converge

.....

$$(77.1448 - 0.01=77.1348)$$

$$\sum_{n=1}^{1000} \{ \cos[77.1348 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[77.1348 \cdot \ln(2n)] / (2n)^{0.5} \}$$

$$\approx 0.01583745539074428146647286370734127500673$$

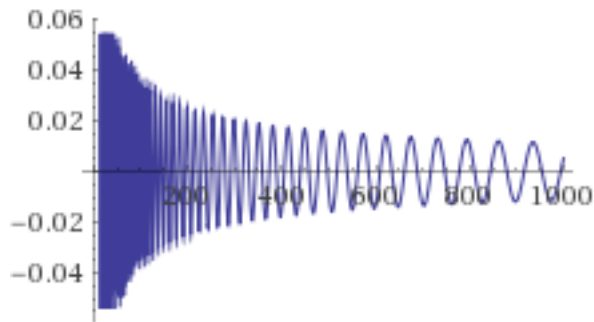


[10000]=0.0145234041256118440177
 [100000]=0.0107811168707620391727
 [1000000]=0.0111512206798152439108
 [10000000]=0.0115001989383124846728
 [100000000]=0.0114390960849727763710.....not converge

(77.1448 is nontrivial zero value. as it is.)

$$\sum_{n=1}^{1000} \{ \cos[77.1448 \ln(2n-1)] / (2n-1)^{0.5} - \cos[77.1448 \ln(2n)] / (2n)^{0.5} \}$$

$$\approx 0.005230027651272115755657184376504416718487$$

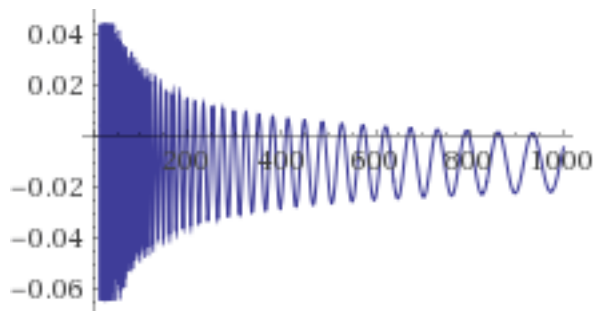


[10000]=0.0029664779953020377519
 [100000]=-0.0007006166354271297931
 [1000000]=-0.0001870419726466966779
 [10000000]=0.0001371403920681105127
 [100000000]=0.0000587154729794121019.....converge

(77.1448 + 0.01=77.1548)

$$\sum_{n=1}^{1000} \{ \cos[77.1548 \ln(2n-1)] / (2n-1)^{0.5} - \cos[77.1548 \ln(2n)] / (2n)^{0.5} \}$$

$$\approx -0.004360860981271211249390787454252573107463$$



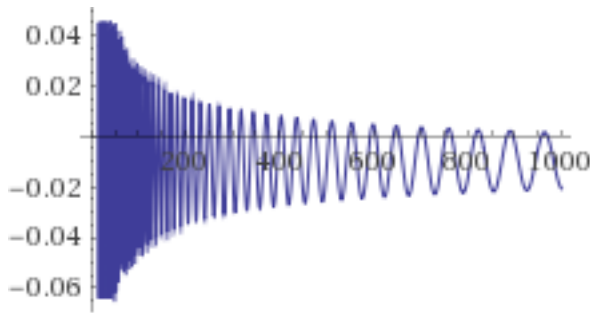
[10000]=-0.0075726021271640304999
 [100000]=-0.0111247864798120002505
 [1000000]=-0.0104739693260100571320
 [10000000]=-0.0101820675996653637468.....not converge

.....

(79.3374 + 0.01=79.3474)

$$\sum_{n=1}^{1000} \{ \cos[79.3274 \ln(2n-1)] / (2n-1)^{0.5} - \cos[79.3274 \ln(2n)] / (2n)^{0.5} \}$$

$\approx -0.02076513152075744354907712109053746217288$



[10000]=0.0081757550311770624957

[100000]=0.0107178805140204780333

[1000000]=0.0113446414910911078100

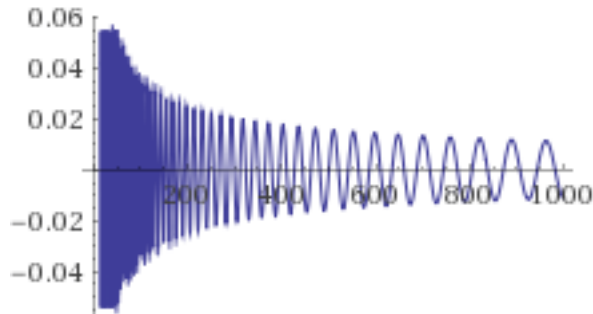
[10000000]=0.0114396706861565559260

[100000000]=0.0114299609176478494943.....not converge

(79.3374 is nontrivial zero value. as it is.)

$\sum_{n=1}^{1000} \{ \cos[79.3374 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[79.3374 \cdot \ln(2n)] / (2n)^{0.5} \}$

$\approx -0.01106011860300484314739118389904421197136$



[10000]=-0.0033286483613430535924

[100000]=-0.0007622145135349513156

[1000000]=-0.0000828611800183551403

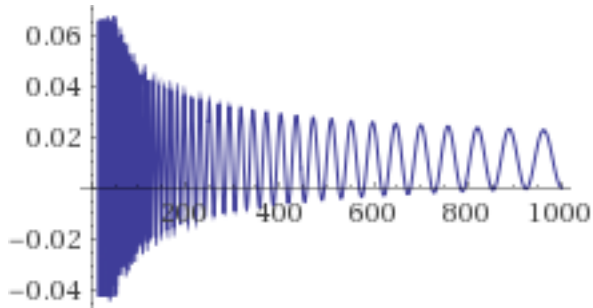
[10000000]=0.0000436829234382010275

[100000000]=0.0000471368163292867377.....converge

(79.3374 + 0.01=79.3474)

$\sum_{n=1}^{1000} \{ \cos[79.3474 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[79.3474 \cdot \ln(2n)] / (2n)^{0.5} \}$

$\approx 0.0002394727927926906226549451014682763864611$



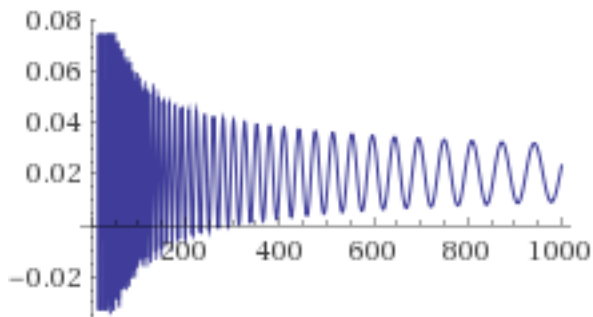
[10000]=0.0081757550311770624957
 [100000]=0.0107178805140204780333
 [1000000]=0.0113446414910911078100
 [10000000]=0.0114396706861565559260
 [100000000]=0.0114299609176478494943.....not converge

.....

(82.9104 - 0.01=82.9004)

$$\sum_{n=1}^{1000} \{ \cos[82.9004 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[82.9004 \cdot \ln(2n)] / (2n)^{0.5} \}$$

$$\approx 0.02328207386196233755938745975507027042064$$

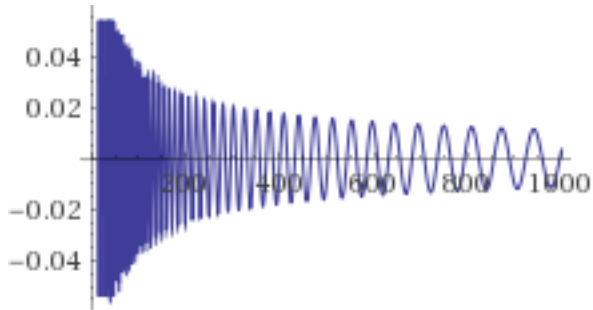


[10000]=0.0222846263592452326074
 [100000]=0.0194543229123889487020
 [1000000]=0.0208411982389801672677
 [10000000]=0.0204842003462149778448
 [100000000]=0.0205104126644407684654.....not converge

(82.9104 is nontrivial zero value. as it is.)

$$\sum_{n=1}^{1000} \{ \cos[82.9104 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[82.9104 \cdot \ln(2n)] / (2n)^{0.5} \}$$

$$\approx 0.003534455886989732993089041177903516486028$$

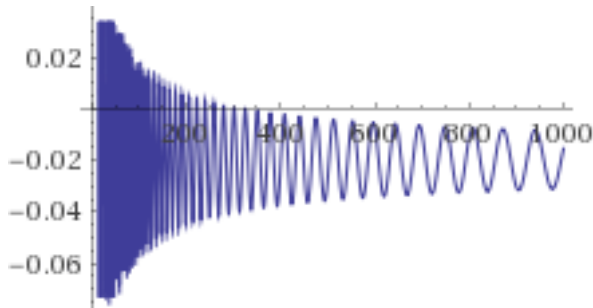


[10000]=0.0014103623601796036642
 [100000]=-0.0010605598122671972775
 [1000000]=0.0002978867961682382442
 [10000000]=-0.0000952393762674968021
 [100000000]=-0.0000456358162302138902.....converge

(82.9104 + 0.01=82.9204)

$$\sum_{n=1}^{1000} \{ \cos[82.9204 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[82.9204 \cdot \ln(2n)] / (2n)^{0.5} \}$$

$$\approx -0.01548996349106622583890468134979564327476$$



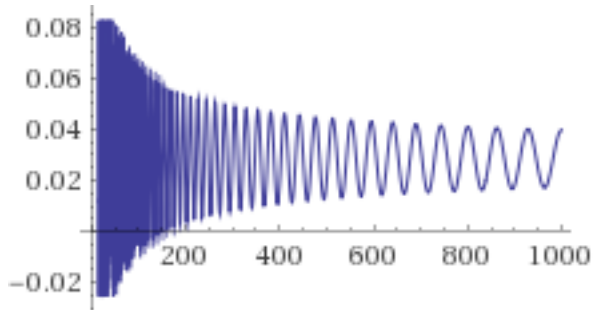
[10000]=-0.0187342688547805988342
 [100000]=-0.0208164032433105182507
 [1000000]=-0.0195086635481445599960
 [10000000]=-0.0199292508559919707978.....not converge

.....

(84.7355 - 0.01=84.7255)

$$\sum_{n=1}^{1000} \{ \cos[84.7255 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[84.7255 \cdot \ln(2n)] / (2n)^{0.5} \}$$

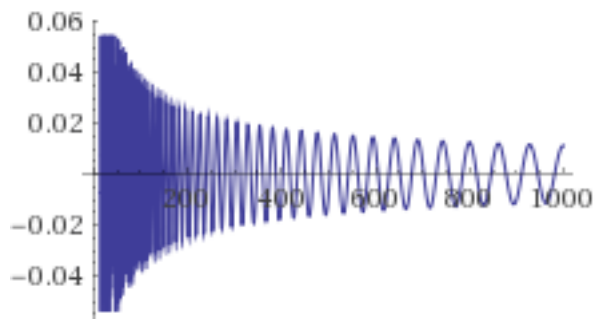
$$\approx 0.03966457339110282569555467746675705048241$$



$[10000]=0.0318872204225595853866$
 $[100000]=0.0294184557494009089884$
 $[1000000]=0.0287067629290724581070$
 $[10000000]=0.0285249567043578157455$
 $[100000000]=0.0284865943793785082738\dots\dots$ not converge

(84.7355 is nontrivial zero value. as it is.)

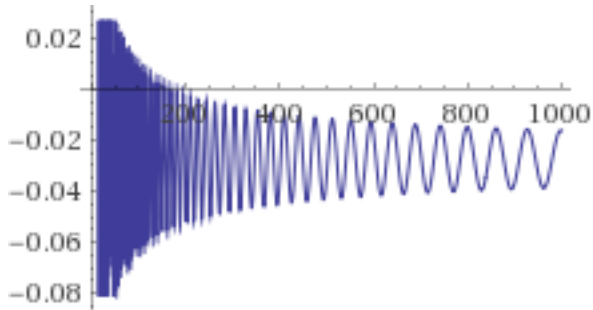
$\sum_{n=1}^{1000} \{ \cos[84.7355 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[84.7355 \cdot \ln(2n)] / (2n)^{0.5} \}$
 $\approx 0.01114105160265642993787875398772657576116$



$[10000]=0.0032716683727916544625$
 $[100000]=0.0008326779381843932206$
 $[1000000]=0.0001606701190157385807$
 $[10000000]=0.0000029354452761063156$
 $[100000000]=-0.0000241664658097951197\dots\dots$ converge

(84.7355 + 0.01=84.7455)

$\sum_{n=1}^{1000} \{ \cos[84.7455 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[84.7455 \cdot \ln(2n)] / (2n)^{0.5} \}$
 $\approx -0.01634507197229332832488362753685614800743$

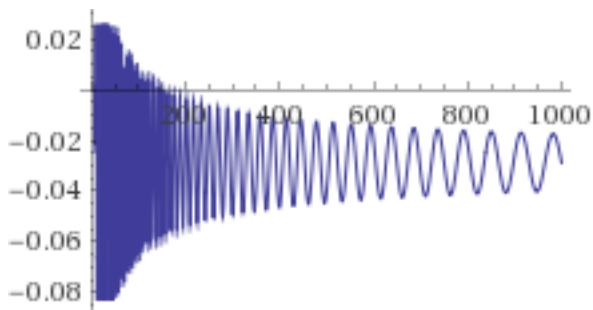


[10000]=-0.0242742873721646205964
 [100000]=-0.0266639316485210234320
 [1000000]=-0.0272873605024068974223
 [10000000]=-0.0274178711569532593262
 [100000000]=-0.0274329111587670940176.....not converge

.....

(87.4253 - 0.01=87.4153)

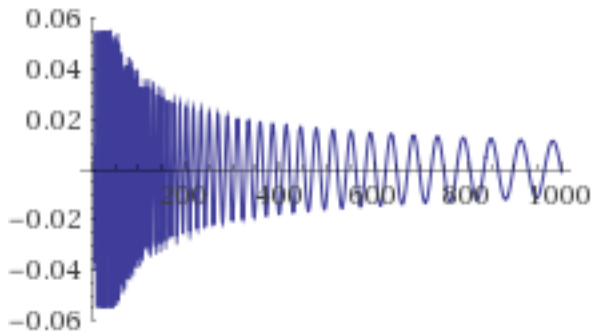
$$\sum_{n=1}^{1000} \{ \cos[87.4153 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[87.4153 \cdot \ln(2n)] / (2n)^{0.5} \} \\ \approx -0.02886823886770549647030999540383076778733$$



[10000]=-0.0294905492735248811464
 [100000]=-0.0292174614920240223459
 [1000000]=-0.0289672758022459127247
 [10000000]=-0.0288395349215854295000
 [100000000]=-0.0287856788587947144686.....not converge

(87.4253 is nontrivial zero value. as it is.)

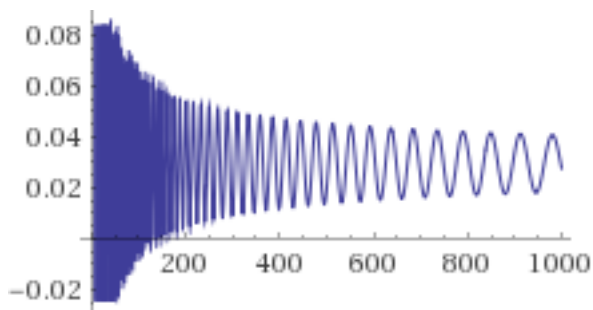
$$\sum_{n=1}^{1000} \{ \cos[87.4253 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[87.4253 \cdot \ln(2n)] / (2n)^{0.5} \} \\ \approx -0.0008885814873853968282314147822626937984652$$



$S(10000) = -0.0010004497393000491741$
 $S(100000) = -0.0005095242227744967893$
 $S(1000000) = -0.0001774559399960536792$
 $S(10000000) = -0.0000220674631672737237 \dots \text{converge}$

$(87.4253 + 0.01 = 87.4353)$

$$\begin{aligned}
 & \sum_{n=1}^{1000} \{ \cos[87.4353 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \\
 & \cos[87.4353 \cdot \ln(2n)] / (2n)^{0.5} \} \\
 & \approx 0.02770447484589880891303818419140328053395
 \end{aligned}$$

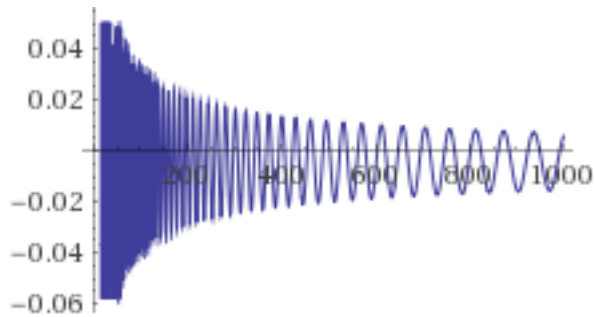


$[10000] = 0.0281080194080228738807$
 $[100000] = 0.0288149360292453242394$
 $[1000000] = 0.0292254876163264634692$
 $[10000000] = 0.0294059482673889455162$
 $[100000000] = 0.0294750496713673745819 \dots \text{not converge}$

.....

$(88.8091 - 0.01 = 88.7991)$

$$\begin{aligned}
 & \sum_{n=1}^{1000} \{ \cos[88.7991 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \\
 & \cos[88.7991 \cdot \ln(2n)] / (2n)^{0.5} \} \\
 & \approx 0.005852530275833069866886810620228436786771
 \end{aligned}$$

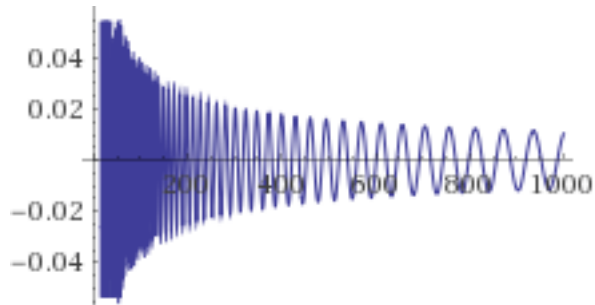


[10000]=-0.0075802629627276293250
 [100000]=-0.0030150819828270061622
 [1000000]=-0.0044697337538711374300
 [10000000]=-0.0040379390189374331568
 [100000000]=-0.0041561060838526033695.....not converge

(88.8091 is nontrivial zero value. as it is.)

$$\sum_{n=1}^{1000} \{ \cos[88.8091 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[88.8091 \cdot \ln(2n)] / (2n)^{0.5} \}$$

$$\approx 0.01033289707810826689801153077496286149537$$

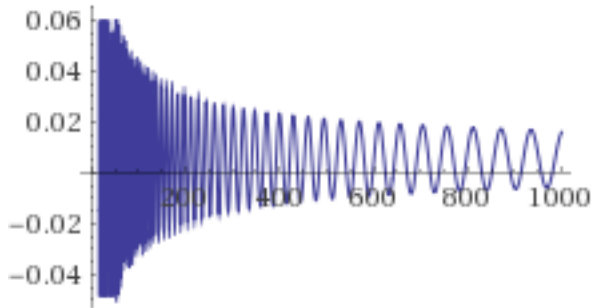


[10000]=-0.0035136809338557582760
 [100000]=0.0010982711272328137507
 [1000000]=-0.0003239705664555260706
 [10000000]=0.0000776637060144497345
 [100000000]=-0.0000237365082598473473.....converge

(88.8091 + 0.01=88.8191)

$$\sum_{n=1}^{1000} \{ \cos[88.8191 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[88.8191 \cdot \ln(2n)] / (2n)^{0.5} \}$$

$$\approx 0.01593493283752298348725610077429899196590$$

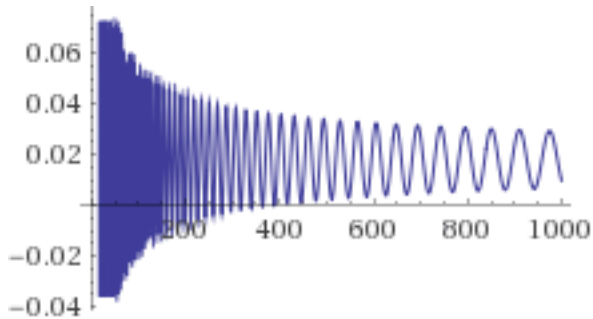


[10000]=0.0017686547806949515400
 [100000]=0.0063765745429264107311
 [1000000]=0.0050098608074647396973
 [10000000]=0.0053722992267073851544
 [100000000]=0.0052906766583897986422.....not converge

.....

(92.4919 - 0.01=92.4819)

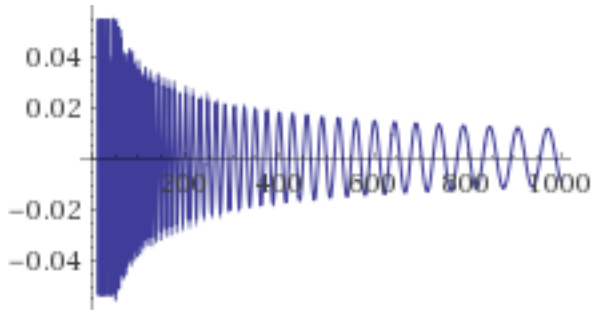
$$\begin{aligned}
 & \text{sum}_{\{n=1\}}^{\{1000\}} \{ \cos[92.4819 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \\
 & \cos[92.4819 \cdot \ln(2n)] / (2n)^{0.5} \} \\
 & \approx 0.009801967430046798170297271086259106047519
 \end{aligned}$$



[10000]=0.0175727899371627450942
 [100000]=0.0185962823074991082106
 [1000000]=0.0183356254448237623866
 [10000000]=0.0181058644958792085145
 [100000000]=0.0180190368161497645183

(92.4919 is nontrivial zero value. as it is.)

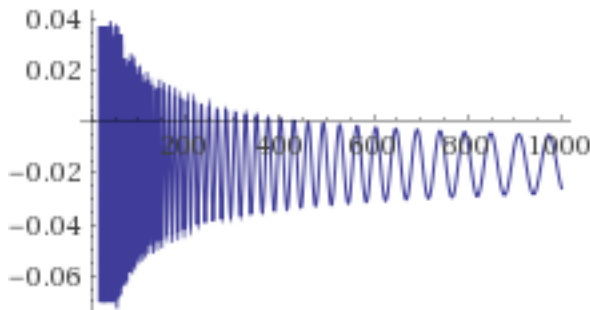
$$\begin{aligned}
 & \text{sum}_{\{n=1\}}^{\{1000\}} \{ \cos[92.4919 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \\
 & \cos[92.4919 \cdot \ln(2n)] / (2n)^{0.5} \}
 \end{aligned}$$



[10000]=-0.0007743076968254169329
 [100000]=0.0004744262043307513350
 [1000000]=0.0003134308227507082872
 [10000000]=0.0001086453122232273349
 [100000000]=0.0000222759238317110844

(92.4919 + 0.01=92.5019)

$$\text{sum}_{\{n=1\}^{1000}}\{\cos[92.5019*\ln(2n-1)]/(2n-1)^{0.5} - \cos[92.5019*\ln(2n)]/(2n)^{0.5}\} \\ \approx -0.02576992288281400789722210051155240859814$$

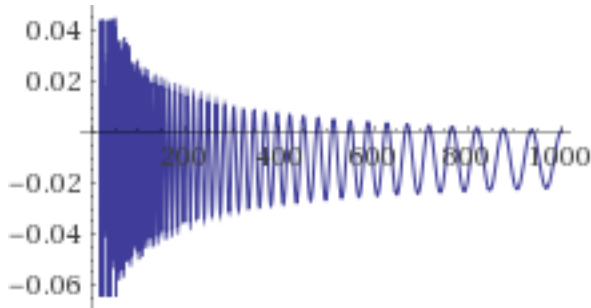


[10000]=-0.0176244246733206419431
 [100000]=-0.0161651034310129684823
 [1000000]=-0.0162259716204928086669
 [10000000]=-0.0164022678319018025417
 [100000000]=-0.0164859373527452453267.....not converge

.....

(94.6513 - 0.01=94.6413)

$$\text{sum}_{\{n=1\}^{1000}}\{\cos[94.6413*\ln(2n-1)]/(2n-1)^{0.5} - \cos[94.6413*\ln(2n)]/(2n)^{0.5}\} \\ \approx 0.0006608191687865404682189098591313967823763$$

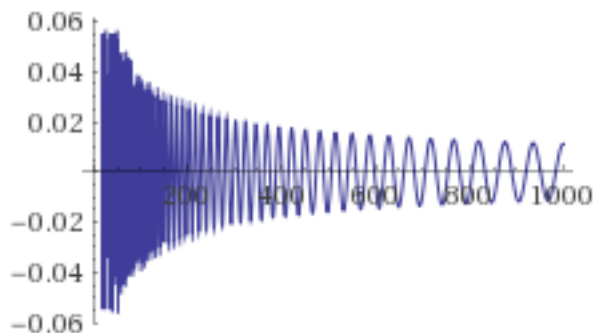


[10000]=-0.0121569785214179423849
 [100000]=-0.0112000894592297842861
 [1000000]=-0.0101682718652411838156
 [10000000]=-0.0105313846942306915677
 [100000000]=-0.0105406836417775116865.....not converge

(94.6513 is nontrivial zero value. as it is.)

$$\sum_{n=1}^{1000} \{ \cos[94.6513 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[94.6513 \cdot \ln(2n)] / (2n)^{0.5} \}$$

$$\approx 0.01112700547633024529033659656870917082860$$

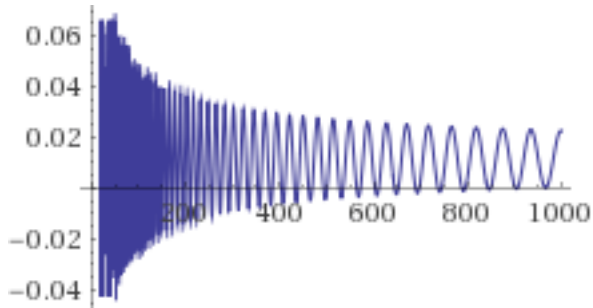


[10000]=-0.0013765254567662944633
 [100000]=-0.0008392212363509909913
 [1000000]=0.0002788508501267524431
 [10000000]=-0.0000497038044914837129
 [100000000]=-0.0000809521760194209424.....converge

(94.6513 + 0.01=94.6613)

$$\sum_{n=1}^{1000} \{ \cos[94.6613 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[94.6613 \cdot \ln(2n)] / (2n)^{0.5} \}$$

$$\approx 0.02261773506407896603369913579252955717727$$



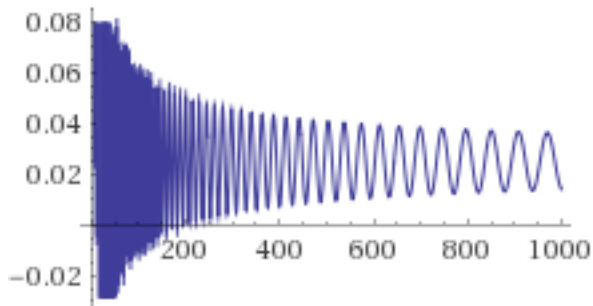
[10000]=0.0105060236444533584843
 [100000]=0.0106224946041767430438
 [1000000]=0.0118081762350637931719
 [10000000]=0.0115210923270080024122
 [100000000]=0.0114690425146854717980.....not converge

.....

(95.8706 - 0.01=95.8606)

$$\sum_{n=1}^{1000} \{ \cos[95.8606 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[95.8606 \cdot \ln(2n)] / (2n)^{0.5} \}$$

$$\approx 0.01417263147085697010420963328525761491269$$

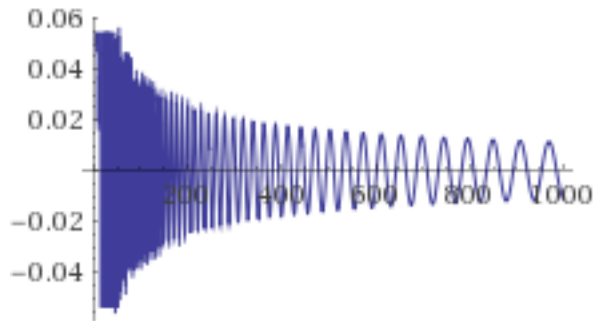


[10000]=0.0222087165335923750198
 [100000]=0.0249554363954456182029
 [1000000]=0.0253503637991626534776
 [10000000]=0.0252465303669947294107
 [100000000]=0.0251620072925927106000

(95.8706 is nontrivial zero value. as it is.)

$$\sum_{n=1}^{1000} \{ \cos[95.8706 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[95.8706 \cdot \ln(2n)] / (2n)^{0.5} \}$$

$$\approx -0.01101403382432185671727346462148413905776$$

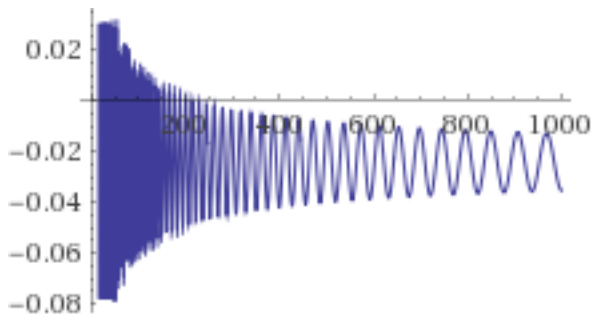


[10000]=-0.0026317155444329789170
 [100000]=0.0000402283252831486376
 [1000000]=0.0003377731160845019081
 [10000000]=0.0001959498109393056735
 [100000000]=0.0001062174084937451399.....converge

(95.8706+ 0.01=95.8806)

$$\sum_{n=1}^{1000} \{ \cos[95.8806 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[95.8806 \cdot \ln(2n)] / (2n)^{0.5} \}$$

$$\approx -0.03533498357896498035949291827253009409191$$



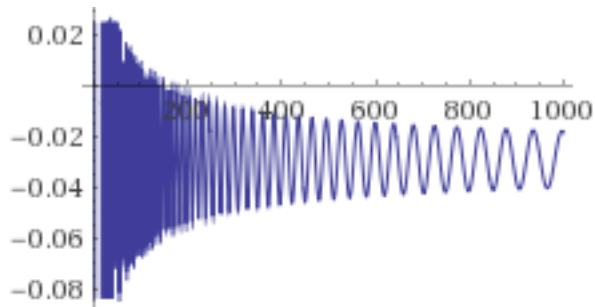
[10000]=-0.0266439074358246347218
 [100000]=-0.0240727000624901266157
 [1000000]=-0.0238785193788296559725
 [10000000]=-0.0240561535769304446486
 [100000000]=-0.0241487448061668240340.....not converge

.....

(98.8312 - 0.01=98.8212)

$$\sum_{n=1}^{1000} \{ \cos[98.8212 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[98.8212 \cdot \ln(2n)] / (2n)^{0.5} \}$$

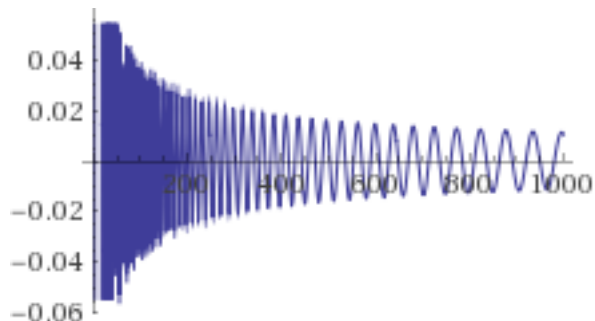
$$\approx -0.01836716410892171545340072825816205770072$$



[10000]=-0.0292518955508751753170
 [100000]=-0.0301065407422408601312
 [1000000]=-0.0291306835944684996975
 [10000000]=-0.0289089284578080280008
 [100000000]=-0.0289757311462570422977.....not converge

(98.8312 is nontrivial zero value. as it is.)

$$\begin{aligned}
 & \text{sum}_{n=1}^{1000} \{ \cos[98.8312 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \\
 & \cos[98.8312 \cdot \ln(2n)] / (2n)^{0.5} \} \\
 & \approx 0.01035763665582629861002788662670953735774
 \end{aligned}$$

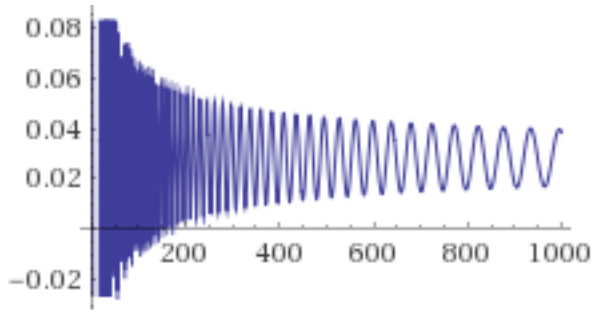


[10000]=-0.0005812758455654100289
 [100000]=-0.0011009283190770852157
 [1000000]=-0.0000636630925465695460

[10000000]=0.0001183386232722523221
 [100000000]=0.0000372821209876205499.....converge

(98.8312 + 0.01=98.8412)

$$\begin{aligned}
 & \text{sum}_{n=1}^{1000} \{ \cos[98.8412 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \\
 & \cos[98.8412 \cdot \ln(2n)] / (2n)^{0.5} \} \\
 & \approx 0.03833646323669522650396120887040783723348
 \end{aligned}$$



[10000]=0.0274089479801120014524
 [100000]=0.0272350581913820416480
 [1000000]=0.0283187887816494579529
 [10000000]=0.0284564818222056009622
 [100000000]=0.0283632866205242029078.....not converge

.....

(101.3179 - 0.01=101.3079)

$$\sum_{n=1}^{1000} \{ \cos[98.8412 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[98.8412 \cdot \ln(2n)] / (2n)^{0.5} \}$$

(101.3179 is nontrivial zero value. as it is.)

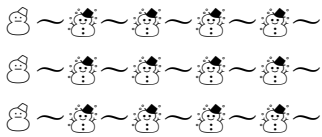
$$\sum_{n=1}^{1000} \{ \cos[101.3179 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[98.8312 \cdot \ln(2n)] / (2n)^{0.5} \}$$

(101.3179 + 0.01=101.3279)

$$\sum_{n=1}^{1000} \{ \cos[98.8412 \cdot \ln(2n-1)] / (2n-1)^{0.5} - \cos[98.8412 \cdot \ln(2n)] / (2n)^{0.5} \}$$

References

- [1] B. Riemann, *Über die Anzahl der Primzahlen unter einer gegebenen Grösse*, Mon. Not. Berlin Akad. 671-680 (1859)
- [2] John Derbyshire, *Prime Obsession: Bernhard Riemann and The Greatest Unsolved Problem in Mathematics*, Joseph Henry Press, (2003), ISBN 9780309085496.
- [3] A. Selberg, *On the zeros of the zeta-function of Riemann*, Der. Kong. Norske. Vidensk. Selsk. Forhand. 15, 59-62, 1945.
- [4] J.B. Conrey, *At Least Two Fifths of the Zeros of the Riemann Zeta Function Are on the Critical Line*, Bull. Amer. Math. Soc. 20, 79-81, 1989.
- [5] J.B. Conrey, *More than Two Fifths of the Zeros of the Riemann Zeta Function Are on the Critical Line*, J. reine angew. Math. 399, 1-26, 1989.
- [6] J.B. Conrey, *The Riemann Hypothesis*, Not. Amer. Math. Phys., 12, 343-358, 2003.
- [7] A. Connes, *Trace formula in noncommutative geometry and the zeros of the Riemann zeta function*, Selecta. Math. (NS) 5, pp.29-106 (1999).
- [8] C. Deninger, *Some analogies between number theory and dynamical systems on foliated spaces*, Proc. Int. Congress Math. Berlin Vol. I, pp.163-186 (1998).
- [9] S.S. Gelbert and S.D. Miller, *Riemann's Zeta Function and Beyond*, Bulletin (New series) of American Mathematical Society 4 no.1 pp.59-112 (2003).
- [10] Toshiro Takami, *Simulation of Nontrivial Zero Point of Riemann Zeta Function*. viXra: 1901.0432





I am a psychiatrist now and also a doctor of brain surgery before.
mmm82889@yahoo.co.jp

I would like to receive an email. I will not answer the phone.
Currently 57 years old. Born on November 26, 1961

(Home)

〒854-0067

Toshiro Takami

47-8 kuyamadai, Isahaya City, Nagasaki Prefecture, Japan

(postscript)

Prize money for my son and daughter.

I am poor of english.