

Sarkar Series: “For Generating “ π ” Up to Five Decimal Places”.

Najmuj Sahadat Sarkar.
 West Bengal, North Bengal University India.

Abstract: In this paper I figure out a formula which tends to be 3.14159 or π no matter what index we put into the main formula sequentially. Its very fundamental formula because pi itself is a fundamental number. It governs the natural world all around us. First of all I have series S_1 , that always gives me 2.80323 no matter what the indexes are, but one important thing we must have to put indexes in sequential manner, other wise if we put them randomly then we never get 2.80323. Second of all there is an another series I named it as S_2 . S_2 always gives me 0.33836 (by putting indexes sequential manner). And therefore the sum of $S_1 + S_2 = \pi$.

Keywords: Series, Pi, Indexes, Sum, Generates, Number, Digits.

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Formula:

$$\begin{aligned} \pi = & \sum_{N=2,5,8,11,\dots} (2N+5) \times \sum_{\lambda=1,2,3,4,\dots} \frac{1}{(2\lambda+1)} + \sum_{j=0,2,4,6,\dots} \frac{5^j}{1000} \\ & \times \sum_{i=2,4,6,8,\dots} \left(-\frac{1}{5}\right)^i \left\{ \frac{F_2 + F_5 + F_7 + F_{15} + F_{18} + F_{21}}{2^{\sum_{i=2,4,6,8,\dots} i - \sum_{j=0,2,4,6,\dots} j}} \right. \\ & - \left[\sum_{P=1}^7 P! \right. \\ & \left. + 38 \left(\sum_{\eta=10,11,12,13,\dots} \frac{\eta!}{2\eta(\eta-1)\dots 6} + \frac{14}{\sqrt{\pi}} \sum_{\lambda=1,2,3,4,\dots} \Gamma\left(\lambda + \frac{1}{2}\right) \times 2^{2\lambda-1} \times \frac{\lambda!}{(2\lambda)!} \right) \right] \Bigg\} \\ & + \left\{ \sum_{n=1,7,13,19,\dots} \tan\left(\frac{n\pi_\theta}{6}\right) - \left[p_{2659} \times \left(\frac{1}{4000}\right) \frac{\sum_{\lambda=1,2,3,4,\dots} 5^\lambda}{\sum_{k=3,4,5,6,\dots} 5^k} \right] \right\} \end{aligned}$$

I. Introduction:

Let's look at the upper formula that generates “pi” (π). Now I used to divide it in two section. The first section is S_1 and the second section is to be S_2 . In S_1 the $F_2, F_5, F_7, F_{15}, F_{18}, F_{21}$ are Fibonacci numbers. F_2 is 2nd Fibonacci number, F_5 is 5th Fibonacci number ... and so on. So $F_2 + F_5 + F_7 + F_{15} + F_{18} + F_{21} = 14159$. In S_1 ; $\sum_{P=1}^7 P! = 5913$. And in S_2 ; the term p_{2659} is a prime number, it's just the 2659th number of prime series. And the number is 23899. In S_2 , $\pi_\theta = 180^\circ$.

Verification: let's verify S_1 for first there indexes. Here S_1 is-

$$\begin{aligned}
 S_1 &= \sum_{N=2,5,8,11,\dots} (2N+5) \times \sum_{\lambda=1,2,3,4,\dots} \frac{1}{(2\lambda+1)} + \sum_{j=0,2,4,6,\dots} \frac{5^j}{1000} \\
 &\quad \times \sum_{i=2,4,6,8,\dots} \left(-\frac{1}{5}\right)^i \left\{ \frac{F_2 + F_5 + F_7 + F_{15} + F_{18} + F_{21}}{2^{\sum_{i=2,4,6,8,\dots} i - \sum_{j=0,2,4,6,\dots} j}} \right. \\
 &\quad \left. - \left[\sum_{P=1}^7 P! \right. \right. \\
 &\quad \left. \left. + 38 \left(\sum_{\eta=10,11,12,13,\dots} \frac{\eta!}{2\eta(\eta-1)\dots 6} + \frac{14}{\sqrt{\pi}} \sum_{\lambda=1,2,3,4,\dots} \Gamma\left(\lambda + \frac{1}{2}\right) \times 2^{2\lambda-1} \times \frac{\lambda!}{(2\lambda)!} \right) \right] \right\} \\
 S_1 &= 9 \times \frac{1}{3} + \frac{1}{1000} \times \frac{1}{25} \left\{ \frac{14159}{4} - \left[5913 + 38 \left(\frac{5 \times 4 \times 3 \times 2}{2} + 7 \right) \right] \right\} \\
 S_1 &= 3 + \frac{1}{1000} \times \frac{1}{25} \left\{ \frac{14159}{4} - [5913 + 38 \times 67] \right\} \\
 S_1 &= 3 + \frac{1}{1000} \times \frac{1}{25} \left\{ \frac{14159}{4} - 8459 \right\} \\
 S_1 &= 3 + \frac{1}{1000} \times \frac{1}{25} \left(-\frac{19677}{4} \right) \\
 S_1 &= 3 - \frac{19677}{100000} \\
 S_1 &= \frac{300000 - 19677}{100000} = 2.80323
 \end{aligned}$$

For values of $N = 2, \lambda = 1, j = 0, i = 2, \eta = 10$.

$$\begin{aligned}
 S_1 &= 15 \times \frac{1}{5} + \frac{5^2}{1000} \times \frac{1}{5^4} \left\{ \frac{14159}{4} - \left[5913 + 38 \left(\frac{5 \times 4 \times 3 \times 2}{2} + 7 \right) \right] \right\} \\
 S_1 &= 3 + \frac{1}{1000} \times \frac{1}{25} \left\{ \frac{14159}{4} - 8459 \right\} \\
 S_1 &= 3 + \frac{1}{1000} \times \frac{1}{25} \left(-\frac{19677}{4} \right) \\
 S_1 &= 3 - \frac{19677}{100000} = 2.80323
 \end{aligned}$$

For values of $N = 5, \lambda = 2, j = 2, i = 4, \eta = 11$.

$$\begin{aligned}
 S_1 &= 21 \times \frac{1}{7} + \frac{5^4}{1000} \times \frac{1}{5^6} \left\{ \frac{14159}{4} - \left[5913 + 38 \left(\frac{5 \times 4 \times 3 \times 2}{2} + 7 \right) \right] \right\} \\
 S_1 &= 3 + \frac{1}{1000} \times \frac{1}{25} \left\{ \frac{14159}{4} - 8459 \right\} \\
 S_1 &= 3 + \frac{1}{1000} \times \frac{1}{25} \left(-\frac{19677}{4} \right) \\
 S_1 &= 3 - \frac{19677}{100000} = 2.80323
 \end{aligned}$$

For the value of $N = 8, \lambda = 3, j = 4, i = 6, \eta = 12$.

Now let's verify S_2 ; According to the formula S_2 is-

$$S_2 = \left\{ \sum_{n=1,7,13,19,\dots} \tan\left(\frac{n\pi_\theta}{6}\right) - \left[p_{2659} \times \left(\frac{1}{4000}\right) \frac{\sum_{\lambda=1,2,3,4,\dots} 5^\lambda}{\sum_{k=3,4,5,6,\dots} 5^k} \right] \right\}$$

so for $n = 1, \lambda = 1, k = 3; S_2$ is-

$$S_2 = \tan\left(\frac{\pi_\theta}{6}\right) - [23899 \times \left(\frac{1}{4000}\right) \times \frac{5}{5^3}]$$

$$S_2 = 0.57735 - \frac{23899}{100000}$$

$$S_2 = 0.57735 - 0.23899 = 0.33836$$

And for $n = 7, \lambda = 2, k = 4$

$$S_2 = \tan\left(\frac{7\pi_\theta}{6}\right) - [23899 \times \left(\frac{1}{4000}\right) \times \frac{5^2}{5^4}]$$

$$S_2 = 0.57735 - \frac{23899}{100000} = 0.57735 - 0.23899 = 0.33836$$

In the same way for $n = 13, \lambda = 3, k = 5; S_2$ will be-

$$S_2 = \tan\left(\frac{13\pi_\theta}{6}\right) - [23899 \times \left(\frac{1}{4000}\right) \times \frac{5^3}{5^5}]$$

$$S_2 = 0.57735 - \frac{23899}{100000} = 0.33836$$

So "pi" is therefore; $\pi = S_1 + S_2$

1. So for $N = 2, \lambda = 1, j = 0, i = 2, \eta = 10, n = 1, k = 3;$
 $S_1 + S_2 = 2.80323 + 0.33836 = 3.14159 = \pi.$

2. So for $N = 5, \lambda = 2, j = 2, i = 4, \eta = 11, n = 7, k = 4$
 $S_1 + S_2 = 2.80323 + 0.33836 = 3.14159 = \pi.$

3. So for $N = 8, \lambda = 3, j = 4, i = 6, \eta = 12, n = 13, k = 5$
 $S_1 + S_2 = 2.80323 + 0.33836 = 3.14159 = \pi.$

If you want gothrough more detailed calculation, you can ! Hence In this way I generate the number "Pi" (π) up to five decimal point of accuracy.

The easiest method to get the number is ; divide the formula into two series S_1 and S_2 . Then represent them as $S_1 + S_2$. The most surprising thing is that (Sequentially) in each time for different indexes and their value's there always a final outcome, which equals 3.14159 (from $S_1 + S_2$). In the expression of S_1 , the last term it always gives 7. Let's do something with it for some moments-

$$\frac{14}{\sqrt{\pi}} \sum_{\lambda=1,2,3,4,\dots} \Gamma\left(\lambda + \frac{1}{2}\right) \times 2^{2\lambda-1} \times \frac{\lambda!}{(2\lambda)!}$$

$$\text{For } \lambda = 1; \text{ we get } \frac{14}{\sqrt{\pi}} \Gamma\left(\frac{3}{2}\right) \times 2 \times \frac{1}{2} = \frac{14}{\sqrt{\pi}} \times \frac{\sqrt{\pi}}{2} \times 2 \times \frac{1}{2} = 7;$$

$$\text{For } \lambda = 2; \text{ we get } \frac{14}{\sqrt{\pi}} \Gamma\left(\frac{5}{2}\right) \times 2^3 \times \frac{2}{4 \times 3 \times 2} = \frac{14}{\sqrt{\pi}} \times \frac{3\sqrt{\pi}}{4} \times \frac{2}{3} = 7;$$

$$\text{For } \lambda = 3; \text{ we get } \frac{14}{\sqrt{\pi}} \Gamma\left(\frac{7}{2}\right) \times 2^5 \times \frac{3 \times 2}{6 \times 5 \times 4 \times 3 \times 2} = \frac{14}{\sqrt{\pi}} \times \frac{\sqrt{\pi}}{1} \times 1 \times \frac{1}{2} = 7;$$

II. Conclusion:

In this work I have presented a mathematical formulation that generates the value of "pi" (π) up to five decimal point accuracy. This derived expression $S_1 + S_2$ demonstrates a clear connection between the underlying mathematical structures and the fundamental constant "pi" (π). The result also provides an analytical

representation of π , which may be useful for further investigation of related series, special functions, and mathematical identities.

References:

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