

$$\arctan(x) = x - \frac{x^3}{3} + \frac{x^5}{5} - \frac{x^7}{7} + \dots$$

MADHAVA'S FORMULA

If $x = 1$, then:

$$\frac{\pi}{4} = 1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \dots$$

Let $n =$ number of terms,
and $m =$ number of correct digits.

We observe that $m = \log_{10}(n)$, so finding 8 correct digits requires 10^8 terms.

MACHIN'S FORMULA:

$$\frac{\pi}{4} = 4 \cdot \arctan\left(\frac{1}{5}\right) - \arctan\left(\frac{1}{239}\right)$$