Mathematical coincidences concerning π and $\sqrt{2}$

By

Aditya Raj

Abstract

In this note I present mathematical coincidences concerning the mathematical constant Pi (π) and Archimedes' constant ($\sqrt{2}$), containing other mathematical constants i.e. The Golden Ratio (φ), the Silver Ratio (δ_s) and the Euler's number (e).

$$\pi \approx \sqrt{\left[\left\{\sum_{i=01}^{10}\left(\frac{\ln\left(\varphi^{\varphi^i}\right)}{2i}\right)\right\} - \ln^2(\varphi)\right] - \left\{\sum_{j=01}^{\infty}\left(\frac{1}{10^{j+1}}\right)\right\}} \approx 3.141522 \ldots \quad (1)$$

Being about 0.0022 % accurate and correct up to 4 decimal places.

$$\pi \approx \left\{\sqrt{\sqrt{\sqrt{\sqrt{(\delta_s)^2 + (\varphi)^2}}}}\right\} + 1.998888 \ldots \approx 3.141549 \ldots \quad (2)$$

Being about 0.0014 % accurate and correct up to 4 decimal places.

$$\pi \approx 2\delta_s\sqrt{\varphi} - 3 \approx 3.141854 \ldots \quad (3)$$

Being about 0.008 % accurate and correct up to 3 decimal places.

$$\sqrt{2} \approx \left\{\sqrt[3]{\sqrt[3]{(\delta_s)^2 + (\varphi)^2 + (\pi)^2 + (e)^2}}\right\} - \sum_{k=01}^{\infty}\left(\frac{2}{10^{2k}}\right) \approx 1.414193 \ldots \quad (4)$$

Being about 0.0014 % accurate and correct up to 3 decimal places.