

## Answer on Question #80849 – Math – Calculus

### Question

Using Maclaurin series of function  $W(x) = e^x$ , prove  $e = 2.7182818$ .

### Solution

Using Maclaurin series of function  $W(x) = e^x$

$$e^x = 1 + x + \frac{x^2}{2!} + \dots + \frac{x^n}{n!} + \dots$$

for  $x = 1$  get value  $e$ . Using the formula, we take the terms of the series while they are larger than 0.0000001. Hence

$$\begin{aligned} e &= 1 + 1 + \frac{1^2}{2!} + \frac{1^3}{3!} + \frac{1^4}{4!} + \frac{1^5}{5!} + \frac{1^6}{6!} + \frac{1^7}{7!} + \frac{1^8}{8!} + \frac{1^9}{9!} + \frac{1^{10}}{10!} = 1 + 1 + \frac{1}{2} + \frac{1}{6} + \frac{1}{24} + \frac{1}{120} + \frac{1}{720} + \\ &+ \frac{1}{5040} + \frac{1}{40320} + \frac{1}{362880} + \frac{1}{3628800} = 2 + 0.5 + 0.1666667 + 0.0416667 + 0.00833333 + \\ &+ 0.0013889 + 0.0001984 + 0.0000248 + 0.0000028 + 0.0000003 \approx 2.7182818. \end{aligned}$$