Answer on Question #49125 – Math – Calculus

Question: determine whether the series is convergent or divergent and find its sum if exists

$$6 + 0.6 + 0.06 + \cdots$$

Solution: let us transform the form of our series:

$$6 + 0.6 + 0.06 + \cdots = 6 \cdot (1 + 0.1 + 0.01 + \cdots) = 6 \cdot \sum_{n=0}^{\infty} (0.1)^n$$

It took the form of infinite geometrical series with common ratio $r = 0.1 < 1$, therefore it converges. The sum of infinite geometrical series is

$$\sum_{n=0}^{\infty} r^n = \frac{1}{1-r}$$

Thus, we obtain

$$6 \cdot \sum_{n=0}^{\infty} (0.1)^n = 6 \cdot \frac{1}{1-0.1} = \frac{6}{0.9} = \frac{20}{3}$$

Answer: the series is convergent and its sum is

$$6 + 0.6 + 0.06 + \cdots = \frac{20}{3}$$