

Exercise 8

Find the sum of the following infinite series:

$$\frac{e}{\pi} + \frac{e^2}{\pi^2} + \frac{e^3}{\pi^3} + \frac{e^4}{\pi^4} + \cdots$$

Solution

Inspecting the series, we see that it is geometric. The first term is

$$a_1 = \frac{e}{\pi},$$

and the common ratio is

$$r = \frac{e}{\pi}.$$

Therefore, the sum of the series is

$$\begin{aligned} S &= \frac{a_1}{1 - r} \\ &= \frac{\frac{e}{\pi}}{1 - \frac{e}{\pi}} \\ &= \frac{e}{\pi - e}. \end{aligned}$$