Exercise 3

Find the sum of the following infinite series:

$$\frac{5}{6}x + \frac{5}{36}x + \frac{5}{216}x + \frac{5}{1296}x + \cdots$$

Solution

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

$$a_1 = \frac{5}{6}x,$$

and the common ratio is

$$r = \frac{1}{6}.$$

Therefore, the sum of the series is

$$
\begin{aligned}
S &= \frac{a_1}{1 - r} \\
&= \frac{5/6}{5/6}x \\
&= x.
\end{aligned}
$$