

Problem 5

Use equation (1.8) to find the fractions that are equivalent to the following repeating decimals:

$$0.583333 \dots$$

Solution

$$\begin{aligned} 0.583333 \dots &= 0.58 + 0.003 + 0.0003 + \dots \\ &= \frac{29}{50} + \frac{3}{1000} + \frac{3}{10000} + \dots \\ &= \frac{29}{50} + \sum_{i=0}^{\infty} \left(\frac{3}{1000} \right) \frac{1}{10^i} \\ &= \frac{29}{50} + \sum_{i=0}^{\infty} \left(\frac{3}{1000} \right) \left(\frac{1}{10} \right)^i \\ &= \frac{29}{50} + \frac{\frac{3}{1000}}{1 - \left(\frac{1}{10} \right)} \\ &= \frac{7}{12} \end{aligned}$$