

## Properties of Sequences

### Aim

To introduce the elementary properties of sequences.

### Learning Outcomes

At the end of this section you will:

- Know some of the elementary properties of sequences.

The following are three of the elementary properties of sequences. For any given sequence, the following properties should hold.

1. If  $\{a_n\}_{n=1}^{\infty} \rightarrow a$  and  $\{b_n\}_{n=1}^{\infty} \rightarrow b$  are convergent sequences then  $\{c_n\}_{n=1}^{\infty} \rightarrow a + b$  when  $c_n = a_n + b_n$ .
2. If  $\{a_n\}_{n=1}^{\infty} \rightarrow a$  and  $\{b_n\}_{n=1}^{\infty} \rightarrow b$  are convergent sequences then  $\{c_n\}_{n=1}^{\infty} \rightarrow a \times b$  when  $c_n = a_n \times b_n$ .
3. If  $\{a_n\}_{n=1}^{\infty} \rightarrow a$  and  $\{b_n\}_{n=1}^{\infty} \rightarrow b$  are convergent sequences with  $b \neq 0$  then  $\{c_n\}_{n=1}^{\infty} \rightarrow \frac{a}{b}$  when  $c_n = \frac{a_n}{b_n}$ .

The following example can be used to test all three of the above elementary properties of sequences;

$$a_n = 1 + \frac{1}{n} \quad \text{and} \quad b_n = 1 - \frac{1}{n}$$

### Related Reading

Gersting, J.L. 2007. *Mathematical Structures for Computer Science*. 6<sup>th</sup> Edition. Freeman & Company.