Section 1: Definitions and notation

Exercise level 1

1. Look at the following sequences.

A	1, -3, 9, -27, 81 …
B	2, 5, 8, 11, 14 …
C	0, 1, 4, 5, 4, 1, 0, 1, 4 …
D	10, 6, 2, -2, -6 …
E	32, 16, 8, 4, 2 …

   Which of the sequences above are
   (i) increasing sequences
   (ii) decreasing sequences
   (iii) arithmetic sequences (Give the common difference in each case)
   (iv) geometric sequences (Give the common ratio in each case)
   (v) periodic (Give the period in each case)

2. Write down the first four terms of each sequence defined below, starting with $k = 1$ in each case.
   (i) $a_k = 3k - 1$ (ii) $a_k = 2 \times 3^k$
   (iii) $a_k = k^2$ (iv) $a_k = (-1)^k 2^k$
   (v) $a_{k+1} = 2a_k + 1, a_1 = 2$ (vi) $a_{k+1} = 1 - a_k, a_1 = 3$

3. Write down the first four terms of each sequence defined below, starting with $n = 5$ in each case.
   (i) $u_n = n - 5$
   (ii) $u_n = \dfrac{1}{n^2}$
   (iii) $u_n = (-1)^n \left(\frac{1}{2}\right)^n$
   (iv) $u_n = u_{n-1} + u_{n-2}, \; u_1 = 1, \; u_2 = -2$