

## Classifying Sequences

A sequence is **strictly increasing** if the terms are always increasing, i.e.

$$u_{n+1} > u_n \text{ for all } n \in \mathbb{N}.$$

e.g. 1, 2, 4, 8, 16, ...

Similarly a sequence is **strictly decreasing** if  $u_{n+1} < u_n$  for all  $n \in \mathbb{N}$

A sequence is **periodic** if the terms repeat in a cycle. The **order**  $k$  of a

sequence is **how often it repeats**, i.e.  $u_{n+k} = u_n$  for all  $n$ .

e.g. 2, 3, 0, 2, 3, 0, 2, 3, 0, 2, ... is periodic and has order 3.

### Examples

For each sequence:

- i) State whether the sequence is increasing, decreasing or periodic.
- ii) If the sequence is periodic, write down its order.

a)  $u_{n+1} = u_n + 3, u_1 = 7$

b)  $u_{n+1} = (u_n)^2, u_1 = \frac{1}{2}$

c)  $u_{n+1} = \sin(90n^\circ)$