U7D1 SEQUENCES AND SERIES

Introduction

A function can be used to generate a sequence of numbers :

Example: $f(x) = x^2$ generates

$f(1) =$ $f(2) =$ $f(3) =$ $f(4) =$

We have the sequence 1, 4, 9, 16 . . . . .

Thus a sequence is the set of numbers generated by a function, f(x),
if x is restricted to the Natural Numbers.

N = $\{$ $\}$

Each element in a sequence is referred to as a _____. We use

t with a _____ to indicate a specific _____.

i.e., $t_1 =$ $t_2 =$ $t_3 =$ $t_4 =$ . . .

Types of Sequences

1. **Finite Sequences** :

e.g., 1, 4, 9, 16, 25

2. **Infinite Sequences** :

e.g., 1, 4, 9, 16, 25, 36, ...

In general, sequences can be generated using functions that utilize individual or combined mathematical operations, or even previous numbers in the sequence.

1. Arithmetic Sequences:

$t_n = n + 6$

2. Geometric Sequences:

$t_n = -3^n$

3. Recursive Sequences:

$t_{k+2} = t_k + t_{k+1}$, *where* $t_1 = 1$ *and* $t_2 = 1$

Examples:

1. Write the first 3 terms for the following sequences:

a) $t_n = n^3 - 5$ b) $t_n = n^2 + 2n$

c) $t_k = t_{k-1} + k$, *where* $t_1 = 5$

2. Write the general term for each of the following.

a) 5, 6, 7, 8 . . . . b) 2, 5, 8, 11 . . . c) 1,3, 9, 27, ...

c) $\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5} \ldots$ d) $2, \frac{3}{4}, \frac{4}{9}, \frac{5}{16}, \ldots$ e) $2, \frac{15}{8}, \frac{7}{4}, \frac{13}{8}, \frac{3}{2}, \ldots$

f) 4, 7, 10, 13 . . . g) -3, 0, 5, 12, … h) 3, 9, 19, 33, 51, …

U7D1 Practice: Handout