

Unit 7: Discrete Functions
Patterns and Sequences

Definitions:

1) A sequence is an ordered list of terms (numbers and/or variables).

The terms are denoted by $t_n, n \in \mathbb{N}$.

ex: 1, 3, 5, 7, ...

note: 3 is t_2 , since it is the second term in the sequence.

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2) A finite sequence is a sequence with a specific number of terms (i.e., the list ends).

ex: 1, 3, 5, 7, 9. (*there are 5 terms*)

3) An infinite sequence is a sequence that continues without end (i.e., there are infinite terms).

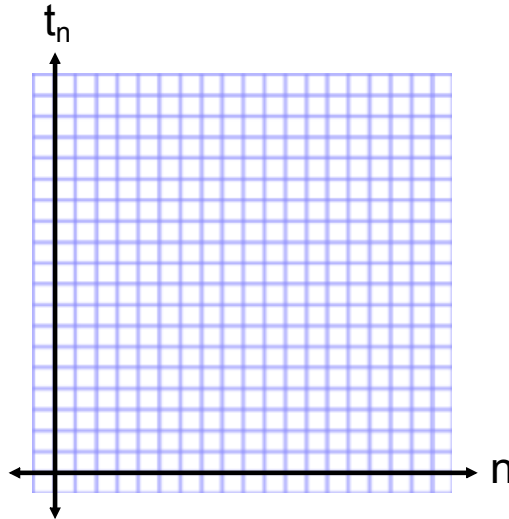
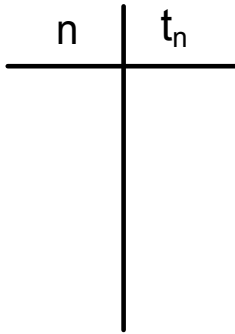
ex: 1, 3, 5, 7, 9, 11, ...

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Note:

- 1) The number of terms in a sequence is a natural number ($n \in \mathbf{N}$), thus we say it is discrete.
- 2) A sequence can be plotted on a grid, but the points may not be joined since the position is discrete.

ex: 2, 4, 6, 8



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- 3) Sequences that have a pattern can be described using an algebraic expression. The general term, t_n , is represented with the algebraic expression.

ex: , 6, 9, 12, ...

Find the pattern that relates the term value with the term number:

$$t_1 = 3$$

$$t_2 = 6$$

$$t_3 = 9$$

each value is 3 times the term number

so $t_n = 3n$

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Ex 1) Determine the general term for each of the following sequences

a) 10, 15, 20, ...

b) 1, 4, 9, 16, ...

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Ex 2) Find the first three terms in each of the following sequences

a) $t_n = 2n + 1$

b) $t_n = n^2 + 4$

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Assigned Work:

p.433 #1ace, 2ace, 3bdgk, 5a, 8

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p. 434 # 8

0.25cm/week

10 cm to start

(a) 10, 10.25, 10.5, 10.75, ...

0 1week 2weeks

6weeks \rightarrow grow by $6(0.25) = 1.5$

length: $10 + 1.5 = 11.5$ cm

(b) for 15cm, grow by 5cm

$$0.25t = 5$$

$$t = \frac{5}{0.25}$$

$$t = 20$$

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