

BY ALONE WOLF GROUP

Lecture No.19

Sequence

SEQUENCE:

A sequence is just a list of elements usually written in a row.

EXAMPLES:

1. 1, 2, 3, 4, 5,.....

2. 4, 8, 12, 16, 20, ...

3. 2, 4, 8, 16, 32,.....

4. 1, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, ...

5. 1, 4, 9, 16, 25, ...

6. 1, -1, 1, -1, 1, -1, ...

The symbol “...” is called ellipsis, and reads “and so forth”

FORMAL DEFINITION:

A sequence is a function whose domain is the set of integers greater than or equal to a particular integer n_0 .

Usually this set is the set of Natural numbers $\{1, 2, 3, \dots\}$ or the set of whole numbers $\{0, 1, 2, 3, \dots\}$.

ARITHMETIC SEQUENCE:

A sequence in which every term after the first is obtained from the preceding term by adding a constant number is called an arithmetic sequence or **arithmetic progression (A.P.)**

Common difference of A.P

The constant number, being the difference of any two consecutive terms is called the common difference of A.P., commonly denoted by “d”.

GENERAL TERM OF AN ARITHMETIC SEQUENCE:

An arithmetic sequence is a sequence where the difference d between successive terms is constant. The general term of an arithmetic sequence can be written in terms of its first term a_1 , common difference d , and index n as follows: $a_n = a_1 + (n-1)d$. An arithmetic series is the sum of the terms of an arithmetic sequence.

GEOMETRIC SEQUENCE:

A sequence in which every term after the first is obtained from the preceding term by multiplying it with a constant number is called a **geometric sequence or geometric progression (G.P.)**

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Common ratio of the G.P

The constant number, being the ratio of any two consecutive terms is called the common ratio of the G.P. commonly denoted by “r”.

GENERAL TERM OF A GEOMETRIC SEQUENCE:

Let a be the first term and r be the common ratio of a geometric sequence. Then the sequence is $a, ar^1, ar^2, ar^3 \dots$

$a_n = \text{nth term} = ar^{n-1}$ for all integers $n \geq 1$

SEQUENCES IN COMPUTER PROGRAMMING:

An important data type in computer programming consists of finite sequences known as one-dimensional arrays; a single variable in which a sequence of variables may be stored.

The names of k students in a class may be represented by an array of k elements “name” as: $\text{name}[0], \text{name}[1], \text{name}[2] \dots \text{name}[k-1]$