Sequence and series Sequence & series.

Thursday, October 1, 2020 6:12 AM

Sequence :-

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

2, 4, 6, 8, 10 . . .

14, 11, 8, 5, 2.

The set of numbers that are arranged in specific order. (certain Rule).

Finite & infinite sequence.

Finite: fixed number of terms

Infinite: infinite no. of terms.

constant difference.

{2, 4, 6, 8, 10, 12, 14, 16, 18, 20.}

⇒ ⇒ $2, 2^2, 2^3, 2^4 \ldots$

$\frac{2^2}{2}, \frac{2^3}{2^2}, \frac{2^4}{2^3}$

a^5

Ratio constant = 2, 2, 2

Arithmetic ⇒ constant difference. & **geometric sequence.** Constant ratio.

Ex Find an expression for the general term for each of the following sequences (192)

a) 3, 6, 9, 12 . . . n: 1 2 3 4 (5)

3, 3.2, 3.3, 3.4 ⇒ $3 \times (-4)^0$, 3×-4, $3 \times (-4)^2$, $3 \times (-4)^3$

$u_n = 3n$

b) 3, -12, 48, -192, n: 1 2 3 4

Geometric S.

5th term :- $3 \times (-4)^4$

∴ difference is constant.

$u_n = 3n$

5^{th} term :- $3 \times (-4)^{}$

Geometric S.

$\therefore$ difference is constant.

Arithmetic sequence. 12^{th} term :- $3 \times (-4)^{11}$

ratio is constant.

n^{th} term :- $3 \times (-4)^{n-1}$

General term.

Rahim

3) $2, 10, 50, 250, \ldots$

$2 \times (5)^0, \quad 2 \times 5, \quad 2 \times (5)^2, \quad 2 \times (5)^3$

$u_n = 5n$ ✗

$u_n = 2 \times (5)^{n-1}$

$r = \frac{10}{2} = \frac{50}{10} = \frac{250}{50} = 5$

Geometric Sequence.

Rahman

5) $\frac{1}{3}, \frac{2}{5}, \frac{3}{7}, \frac{4}{9}, \ldots$

$u_n =$

$T_n = \frac{n}{n+2}$ ✗

$T_3 = \frac{3}{3+2} = \frac{3}{5}$

$u_n = \frac{n}{2n+1}$ ✓

Neither arithmetic nor geometric.

Ex Find the first four terms of each of the following recursive sequence.

1) $u_n = \frac{u_{n-1}}{3} + 3$ and $u_1 = 9$

$n = 2$

Recursive formula.

$u_2 = \frac{u_{2-1}}{3} + 3$

$= \frac{u_1}{3} + 3 = \frac{9}{3} + 3$

$u_2 = 6$

$u_3 = 5$ ✓ , $u_4 = \frac{14}{3}$ ✓

$u_5 = \frac{41}{9}$ ✓

$9, 6, 5, \frac{14}{3}, \frac{41}{9}.$

b) $u_n = 2u_{n-1} - 3$ and $u_1 = 1$

$u_2 = -1$ ✓, $u_3 = -5$

$u_4 = -13$, $u_5 = -29.$

Ex For each of the recursive sequences below, find recursive formula.

a) 12, 8, 4, 0, ----

$u_n = u_{n-1} - 4$ where $u_1 = 12$

✓ b) $-0.32, 3.2, -32, 320, \ldots$

$u_n = 10\, u_{n-1}$

$u_n = -10\, u_{n-1}$, where $u_1 = -0.32$

c) 500, 100, 20, 4, ---

$u_n = \frac{1}{5} u_{n-1}$, where $u_1 = 500.$

Series.

$500 + 100 + 20 + 4 + \ldots$

Σ — Sigma.