RD Sharma Solutions Class 11 Maths Chapter 19 Ex 19.1

Arithematic Progressions Ex 19.1 Q1

$a_n = n^2 - n + 1$ ---(i) is the given sequence

Then, first 5 terms are a_1, a_2, a_3, a_4 and a_5

$$a_1 = (1)^2 - 1 + 1 = 1$$

$$a_2 = (2)^2 - 2 + 1 = 3$$

$$a_3 = (3)^2 - 3 + 1 = 7$$

$$a_4 = (4)^2 - 4 + 1 = 13$$

$$a_5 = (5)^2 - 5 + 1 = 21$$

First 5 terms 1, 3, 7, 13 and 21.

Arithematic Progressions Ex 19.1 Q2

$a_n = n^3 - 6n^2 + 11n - 6$ $n \in N$.

The first three terms are a_1, a_2 and a_3

$$a_1 = (1)^3 - 6(1)^2 + 11(1) - 6 = 0$$

$$a_2 = (2)^3 - 6(2)^2 + 11(2) - 6 = 0$$

$$a_3 = (3)^3 - 6(3)^2 + 11(3) - 6 = 0$$

$\therefore$ The 1st 3 terms are zero.

and

$$a_n = n^3 - 6n^2 + 11n - 6$$

$= (n-2)^3 - (n-2)$ is positive as $n \geq 4$

$\therefore$ a_n is always positive.

Arithematic Progressions Ex 19.1 Q3

$a_n = 3a_{n-1} + 2$ for $n > 1$

$\therefore$ $a_2 = 3a_{2-1} + 2 = 3a_1 + 2$

$= 3(3) + 2 = 11$ $[\because a_1 = 3]$

$a_3 = 3a_{3-1} + 2 = 3a_2 + 2$

$= (11) + 2 = 35$ $[\because a_2 = 11]$

$a_4 = 3a_{4-1} + 2 = 3a_2 + 2$

$= 3(35) + 2 = 107$ $[\because a_3 = 35]$

$\therefore$ The first four terms of A.P are 3, 11, 35, 107.

Arithematic Progressions Ex 19.1 Q4

(i) $a_1 = 1,\ a_n = a_{n-1} + 2,\ n \geq 2$

$a_2 = a_{2-1} + 2 = a_{1+2} = 3$ $[\because a_1 = 1]$

$a_3 = a_{3-1} + 2 = a_2 + 2 = 5$ $[\because a_2 = 3]$

$a_4 = a_{4-1} + 2 = a_3 + 2 = 7$ $[\because a_3 = 5]$

$a_5 = a_{5-1} + 2 = a_4 + 2 = 9$ $[\because a_4 = 7]$

$\therefore$ The first 5 terms of series are $1, 3, 5, 7, 11$.

(ii) $a_1 = a_2 = 1$

$a_n = a_{n-1} + a_{n-2}$ $n > 2$

$\Rightarrow a_3 = a_{3-1} + a_{3-2}$

$= a_2 + a_1 = 1 + 1 = 2$

$\Rightarrow a_4 = a_{4-1} + a_{4-2}$

$= a_3 + a_2 = 2 + 1 = 3$

$\Rightarrow a_5 = a_{5-1} + a_{5-2}$

$= a_4 + a_3 = 5$

$\therefore$ The given sequence is $1, 1, 3, 5$.

(iii) $a_1 = a_2 = 2$

$a_n = a_{n-1} - 1 \quad n > 2$

$\Rightarrow a_3 = a_{3-1} - 1$

$= a_2 - 1$

$= 2 - 1 = 1$

$\Rightarrow a_4 = a_{4-1} - 1$

$= a_3 - 1 = 1 - 1 = 0$

$\Rightarrow a_5 = a_{5-1} - 1$

$= 0 - 1 = -1$

$\therefore$ The first 5 terms of the sequence are $2, 2, 1, 0, -1$.

Arithematic Progressions Ex 19.1 Q5

$a_n = a_{n-1} + a_{n-2}$ for $n > 2$

$\Rightarrow \quad a_3 = a_{3-1} + a_{3-2} = a_2 + a_1 = 1 + 1 = 2$

$\Rightarrow \quad a_4 = a_{4-1} + a_{4-2} = a_3 + a_2 = 2 + 1 = 3$

$\Rightarrow \quad a_5 = a_{5-1} + a_{5-2} = a_4 + a_3 = 3 + 2 = 5$

$\Rightarrow \quad a_6 = a_{6-1} + a_{6-2} = a_5 + a_4 = 5 + 31 = 8$

$\therefore$ For $n = 1$

$$\frac{a_{n+1}}{a_n} = \frac{a_2}{a_1} = \frac{1}{1} = 1$$

For $n = 2$

$$\frac{a^3}{a_2} = \frac{2}{1} = 2$$

For $n = 3$

$$\frac{a_4}{a_3} = \frac{3}{2} = 1.5$$

For $n = 4$ and $n = 5$

$$\frac{a_5}{a_4} = \frac{5}{3} \quad \text{and} \quad \frac{a_6}{a_5} = \frac{8}{5}$$

$\therefore$ The required series is $1, 2, \frac{3}{2}, \frac{5}{3}, \frac{8}{5}, \ldots$

Arithematic Progressions Ex 19.1 Q6(i)

$3, -1, -5, -9 \ldots$

$a_1 = 3, \ a_2 = -1, \ a_3 = -5, \ a_4 = -9$

$a_2 - a_1 = -1 - 3 = -4$

$a_3 - a_2 = -5 - (-1) = -4$

$a_4 - a_3 = -9 (-5) = -4$

$\therefore$ Common difirence is $d = -4$

$a_4 - a_3 = a_3 - a_2 = a$

$\therefore$ The given sequence is a A.P

$\therefore \quad a_5 = 3 + (5 - 1)(-4) = -13$

$a_6 = 3 + (6 - 1)(-4) = -17$

$a_7 = 3 + (7 - 1)(-4) = -21$

Arithematic Progressions Ex 19.1 Q6(ii)

$-1, \frac{1}{4}, \frac{3}{2}, \frac{11}{4} \ldots$

$a_1 = -1, \ a_2 = \frac{1}{4}, \ a_3 = \frac{3}{2}, \ a_4 = \frac{11}{4}$

$a_4 - a_3 = a_3 - a_2 = a_2 - a_1 = \frac{5}{4}$

$\therefore$ Common difference is $d = \frac{5}{4}$

$\therefore$ The given sequence is A.P

$a_5 = -1 + (5 - 1)\frac{5}{4} = 4$

$a_6 = -1 + (6 - 1)\frac{5}{4} = \frac{21}{4}$

$a_7 = -1 + (7 - 1)\frac{5}{4} = \frac{26}{4} = \frac{13}{2}$

Arithematic Progressions Ex 19.1 Q6(iii)

(iii) $\sqrt{2},\ 3\sqrt{2},\ 5\sqrt{2},\ 7\sqrt{2}...$

$a_1 = \sqrt{2},\ a_2 = 3\sqrt{2},\ a_3 = 5\sqrt{2},\ a_4 = 7\sqrt{2}$

$a_4 - a_3 = a_3 - a_2 = a_2 - a_1 = 2\sqrt{2}$

$\therefore$ The common difference is $2\sqrt{2}$

and the given sequence is A.P

$a_5 = \sqrt{2} + 2\sqrt{2}(5-1) = 9\sqrt{2}$

$a_6 = \sqrt{2} + 2\sqrt{2}(6-1) = 11\sqrt{2}$

$a_7 = \sqrt{2} + 2\sqrt{2}(7-1) = 13\sqrt{2}$

Arithematic Progressions Ex 19.1 Q6(iv)

9, 7, 5, 3, ...

$a_4 - a_3 = a_3 - a_2 = a_2 - a_1 = -2$

$\therefore$ The common difference is -2

and the given sequence is A.P

$a_5 = 9 + (-2)(5-1) = 1$

$a_6 = 9 + (-2)(6-1) = -1$

$a_7 = 9 + (-2)(7-1) = -3$

Arithematic Progressions Ex 19.1 Q7

$a_n = 2n + 7$

$a_1 = 2(1) + 7 = 9$

$a_2 = 2(2) + 7 = 11$

$a_3 = 2(3) + 7 = 13$

Here, $a_3 - a_2 = a_2 - a_1 = 2$

$\therefore$ The given sequence is A.P

$a_7 = 2(7) + 7 = 21$

7th term is 21.

Arithematic Progressions Ex 19.1 Q8

$a_n = 2n^2 + n + 1$

$a_1 = 2(1)^2 + (1) + 1 = 4$

$a_2 = 2(2)^2 + (2) + 1 = 11$

$a_3 = 2(3)^2 + (3) + 1 = 21$

$a_3 - a_2 \neq a_2 - a_1$

$\therefore$ The given sequence is not as A.P as consequtive terms do not have a common difference.