RAFFLES INSTITUTION
H2 Mathematics (9758)
2025 Year 5

Tutorial 7B: Arithmetic Progression and Geometric Progression

Section A (Basic Questions)

1 In the sequence 1.0, 1.1, 1.2, … , 99.9, 100.0, each number after the first is 0.1 greater than the preceding number. Find

(a) how many numbers there are in the sequence,

(b) the sum of all the numbers in the sequence.

Solutions

(a)	Sequence is an AP. Let the first term be a and the common difference be d. Hence, $a = 1.0$ and $d = 0.1$ Let the number of terms be n. nth term : $u_n = a + (n-1)d$ Hence, $100.0 = 1.0 + (n - 1)(0.1)$ $\Rightarrow\ n = 991$
(b)	Required sum of AP, $S_n = \frac{n}{2}\left(2a + (n-1)d\right)$ $= = \frac{991}{2}\left(2(1.0) + (991-1)(0.1)\right) = 50045.5$

2 The first term of a geometric progression is 10 and its sum to infinity is 15. Find

(a) the third term of the progression.

(b) the sum of the first 5 terms of the progression.

Solutions

(a)	Let the first term be a and the common ratio be r. Hence, $a = 10$. Given that the sum to infinity = 15. Therefore, $\frac{a}{1-r} = 15$ $\Rightarrow \quad \frac{10}{1-r} = 15$

	$\Rightarrow \quad r=\frac{1}{3}$ Hence, the third term of the progression = $ar^{3-1} = (10)\left(\frac{1}{3}\right)^2 = \frac{10}{9}$
(b)	Sum of first 5 terms = $\frac{a(1-r^n)}{1-r} = \frac{10\left(1-\left(\frac{1}{3}\right)^5\right)}{1-\frac{1}{3}} = 15\left(1-\left(\frac{1}{3}\right)^5\right) = \frac{1210}{81}$.

3 The ninth term of an arithmetic progression is 43 and the sum of the first 15 terms is 570. It is given that the sum of the first n terms is greater than 2265. Find the least possible value of n.

Solutions

Let the first term be a and the common difference be d.

Given that the ninth term = 43.

Therefore, $a+(9-1)d=43$

$$a+8d=43 \quad \ldots (1)$$

Given that the sum of the first 15 terms = 570.

Therefore, $\frac{15}{2}\big(2a+(15-1)d\big)=570$

$$a+7d=38 \quad \ldots (2)$$

Solving (1) and (2) : $a=3$ and $d=5$

Given $S_n > 2265$.

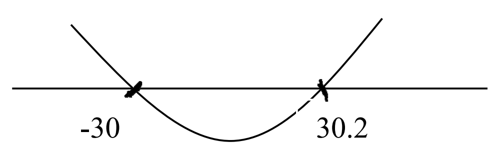
Therefore, $\frac{n}{2}\big(2a+(n-1)d\big)>2265$

$$n\big(6+5(n-1)\big)>4530$$

$$5n^2-n-4530>0$$

$$(5n-151)(n+30)>0$$

$$n<-30 \quad \text{or} \quad n>30.2$$



Hence, least n = 31.