SEQUENCE AND SERIES

Sequence and Series

Sequence: It is a set of numbers which are written in some particular order.
For example, take the numbers

1, 3, 5, 7, 9, ...

Here, we seem to have a rule. We have a sequence of odd numbers. To put this another way, we start with the number 1, which is an odd number, and then each successive number is obtained by adding 2 to give the next odd number.

Series: A series is something we obtain from a sequence by adding all the terms together.
For example, suppose we have the sequence u1, u2, u3, . . ., un .
The series we obtain from this is u1 + u2 + u3 + . . . + un , and we write Sn for the sum of these n terms.

Sequence and Series

I. Arithmetic Progression (AP):

It is a sequence where each new term after the first is obtained by adding a constant d, called the common difference, to the preceding term.

If the first term of the sequence is a then the arithmetic progression is

$$a, a + d, a + 2d, a + 3d, \ldots$$

$$T(\text{n-th term}) = a + (n - 1)d$$

$$Sn = 1/2\ n(2a + (n - 1)d)$$

$$Sn = 1/2\ n(a + l) \quad \text{(if last number is known)}$$

where,

a = First term

d = Common difference

n = number of terms

l = last term

Sequence and Series

Arithmetic Mean (AM):

The sum of all of the numbers in a list divided by the number of terms in that list gives the arithmetic mean of that list.

In the arithmetic progression, we know that if the three numbers are in AP, that means if a, b and c are in AP, then basically the first two terms a and b will have the difference which will be equal to the next two terms b and c.

So we can say,

$b - a = c - b$. Rearranging the terms,

$2b = a + c$

Or, $b = (a+c)/2$

So we can say that this term b is the arithmetic mean of the other two terms a and c.

Sequence and Series

II. Geometric progression (GP):

It is a sequence where each new term after the first is obtained by multiplying the preceding term by a constant r, called the common ratio.

If the first term of the sequence is a then the geometric progression is

a, ar, ar^2, ar^3, . . .

$T(\text{nth term}) = ar^{n-1}$

$S_n = a(1-r^n)/(1-r)$;when [r<1]

$S_n = a(r^n-1)/(r-1)$;when [r>1]

The sum to infinity of a geometric progression with starting value a and common ratio r is given by:

$S_\infty = a/(1 - r)$;when [-1<r<1]

where,

a is the first term

r is the common ratio

n is the number of the term

Sequence and Series

Geometric Mean (GM):

Geometric mean is defined as the nth root of the product of n numbers.

Consider, if x1, x2 …. Xn are the observation, then the G.M is defined as:

$$G.M = \sqrt[n]{x_1 \times x_2 \times \ldots x_n}$$

or

$$G.M = (x_1 \times x_2 \times \ldots x_n)^{\frac{1}{n}}$$

If a and b are two numbers which are in geometric progression, then geometric mean (GM) of a and b,

$$GM = \sqrt{ab}$$

Sequence and Series

1. Find the 49th odd number, starting from 1.

a. 97 b. 99 c. 103 d. 101

Sequence and Series

2. Find the missing term in the following AP. 13, x, 17

a. 14 b. 15 c. 16 d. none

Sequence and Series

3. If last term = 19, d = -1 and n = 18, then the first term is?

a. 36 b. 32 c. 37 d. none

Sequence and Series

4. Find the first three terms of the arithmetic sequence having $a_6 = 5$ and $d = 2/5$.

a. 3, 17/5, 19/5 b. 3, 17/5, 21/5 c. -7/2, 5, 4 d. 9,5/2,-3/2

Sequence and Series

5. The fourth term in an arithmetic sequence is -20, and the eighth term is -10. What is the 90th term in the sequence?

a. -180 b. 180 c. 195 d. 210

Sequence and Series

6. Which term of the series 72, 63, 54, ... Is 9?

a. 8^{th} b. 10^{th} c. 12^{th} d. 15^{th}

Sequence and Series

7. In the arithmetic sequence 13, 16, 19, 22…, which term has a value of 301?

a. 99 b. 97 c. 109 d. 112

Sequence and Series

8. If 4, 7, 10, 13, 16, 19, 22……is a sequence, Find nth term.

a. 3n-1 b. 3n-2 c. 3n+1 d. none

Sequence and Series

9. Find the sum of first 52 natural numbers.

a.1378 b. 1457 c. 1275 d. none

Sequence and Series

10. What is the sum of the following series?

-64, -66, -68, ... , -114

a. -2458 b. -2558 c. -2568 d. -2314

Sequence and Series

11. The sum of fourth and tenth term of an A.P is 8. Find the sum of the first 13 terms of the progression.

a. 46 b. 52 c. 42 d. 48

Sequence and Series

12. Find the value of the expression 1 - 2 + 3 - 4 + 5 - 6 + 7 - .... upto 200 terms?

a. -150 b. -50 c. -100 d. -70

Sequence and Series

13. The sum of the three numbers in A.P is 21 and the product of the first and third number of the sequence is 45. What are the three numbers?

a. 5, 7, and 9 b. 9, 7, and 5 c. 3, 7, and 11 d. Both (1) and (2)

Sequence and Series

14. Find 4+7+10+13+16 +…..upto 21 terms?

a.533 b. 653 c.714 d. 856

Sequence and Series

15. What is the sum of all positive integers up to 1000, which are divisible by 5 and are not divisible by 2?

a.10,050 b. 5050 c. 5000 d. 50,000

Sequence and Series

16. Find the 7th term in the sequence of 11, 33, 99, 297 . . .

a. 8019 b. 8765 c. 8345 d. 8567

Sequence and Series

17. Consider the sequence 1, 4, 16, 64, 256, 1024….. Find the 8th term.

a. 65536 b. 16284 c. 16384 d. 69034

Sequence and Series

18. Find the sum of 7 terms of the GP: 5, 10, 20, 40,.....

a. 635 b. 625 c. 695 d. 645

Sequence and Series

19. Find the sum to 7 terms of the GP: 3, 3/2, 3/4, 3/8, ...

a. 381/64 b. 382/64 c. 380/67 d. 380/63

Sequence and Series

20. Find the sum of the infinite series 4 + 2 + 1 + 1/2 + 1/4 + 1/8.....

a. 8 b. 7 c. 5 d. 6

Sequence and Series

21. The sum of the first 10 terms of a G.P. is equal to 244 times the sum of first 5 terms. Find common ratio.

a.3 b. 1236 c. 4236 d. None of these

Any Doubts???