

# Sequences and Series Worksheet

-Priyanka Rana

## Summary:

An expression of the form  $a_1 + a_2 + a_3 + \dots + a_n$  is called a **series**, where  $a_1, a_2, a_3, \dots, a_n$  is a **sequence** of numbers.

Practice following questions to understand the concept of  $n^{\text{th}}$  term of sequences better.

1. Write the  $n^{\text{th}}$  term of each of the following series:

a.  $-2 + 4 - 6 + 8 - \dots$

b.  $1 - 1 + 1 - 1 + 1 - \dots$

c.  $-4 + 16 - 64 + 256 - \dots$

d.  $\sqrt{2} + \sqrt{3} + 2 + \sqrt{5} + \dots$

2. Write the first 6 terms of each of the following series, whose  $n^{\text{th}}$  term is given by:

a.  $\frac{n^2-1}{2n-3}$

3. Find the  $n^{\text{th}}$  term and then sum of first  $n$  terms of the series  $1.3 + 3.5 + 5.7 + \dots$

4. Find the  $n^{\text{th}}$  term and then sum of first  $n$  terms of the series  $1.2^2 + 2.3^2 + 3.4^2 + \dots$

5. Find the  $n^{\text{th}}$  term and then sum of first  $n$  terms of the series  $\frac{1}{1*4} + \frac{1}{4*7} + \frac{1}{7*10} + \dots$

6. Find the  $n^{\text{th}}$  term and then sum of first  $n$  terms of the series  $1 + 3 + 7 + 15 + 31 + \dots$

7. Find the  $n^{\text{th}}$  term and then sum of first  $n$  terms of the series  $\frac{3}{1*4} + \frac{5}{4*9} + \frac{7}{9*16} + \frac{9}{16*25} + \dots$

8. Find the  $n^{\text{th}}$  term and then sum of first  $n$  terms of the series  $5 + 7 + 13 + 31 + \dots$

9. Find the  $n^{\text{th}}$  term and then sum of first  $n$  terms of the series  $1 + \frac{4}{5} + \frac{7}{5^2} + \frac{10}{5^3} + \dots$

10. Show that 
$$\frac{1 \times 2^2 + 2 \times 3^2 + \dots + n \times (n+1)^2}{1^2 \times 2 + 2^2 \times 3 + \dots + n^2 \times (n+1)} = \frac{3n+5}{3n+1}$$