1.) Write down the first 5 terms of the sequence \( s_n = \{ n^2 + 1 \} \).

2.) Write down the first 5 terms of the sequence \( s_n = \left\{ \frac{2^n}{3^n + 1} \right\} \).

3.) Write down the nth term of a sequence \( \{ a_n \} \) suggested by the pattern \( \frac{2}{3}, \frac{4}{9}, \frac{8}{27}, \frac{16}{81}, \ldots \)

4.) Write down the first five terms of a recursively defined sequence with \( a_1 = 3 \) and \( a_n = 4 - a_{n-1} \).

5.) Write down the first five terms of a recursively defined sequence with \( a_1 = -1, a_2 = 1, \) and \( a_n = a_{n-2} + na_{n-1} \).

6.) Write out the sum \( \sum_{k=1}^{n} (k + 1)^2 \).

7.) Write out the sum \( \sum_{k=3}^{n} (-1)^{k+1}2^k \).

8.) Express each sum using summation notation.
   a.) \( 1 + 2 + 3 + \ldots + 20 \)  
   b.) \( \frac{2}{3} - \frac{4}{9} + \frac{8}{27} - \ldots + (-1)^{12} \left( \frac{2}{3} \right)^{11} \)

9.) Find the sum of each sequence.
   a.) \( \sum_{k=1}^{26} (3k - 7) \)  
   b.) \( \sum_{k=1}^{16} (k^2 + 4) \)
10.) Find the nth term of the arithmetic sequence \( \{a_n\} \) whose initial term \( a \) and common difference \( d \) are given.
   What is the 51st term?
   a.) \( a_1 = -2; \ d = 4 \) 
   b.) \( a_1 = 1; \ d = \frac{1}{3} \)

11.) Find the 80th term of -1, 1, 3, . . .

12.) Find the first term and the common difference of the arithmetic sequence described. Give a recursive formula for the sequence. Find a formula for the nth term.
   a.) 8th term is 4; 18th term is -96 
   b.) 5th term is -2; 13th term is 30

13.) Find each sum.
   a.) \( 7 + 1 - 5 - 11 - \ldots - 299 \) 
   b.) \( 2 + 5 + 8 + \ldots + 41 \) 
   c.) \( \sum_{n=1}^{90} (3 - 2n) \)

14.) Find \( x \) so that \( 2x, 3x + 2, \) and \( 5x + 3 \) are consecutive terms of an arithmetic sequence.
15.) Find the fifth term of the geometric sequence whose initial term $a_1$ and common ratio $r$ are given.
   a.) $a_1 = -2; r = 4$
   b.) $a_1 = 1; r = \frac{1}{3}$

16.) Find the 10th term of -1, 2, -4, ...

17.) Find the nth term, $a_n$, of each geometric sequence.
   a.) 4, 1, $\frac{1}{4}$, $\frac{1}{16}$, ...
   b.) $a_6 = 243; r = -3$
   c.) $a_3 = \frac{1}{3}; a_6 = \frac{1}{81}$

18.) Find the sum of $2 + \frac{6}{5} + \frac{18}{25} + \cdots + 2\left(\frac{3}{5}\right)^{n-1}$.

19.) Does the infinite sequence of $\sum_1^{\infty} \frac{1}{2} \cdot 3^{k-1}$ converge or diverge? If it converges, find its sum.