Homework Set 1: Sequences

Find the next term in the sequence.

1. \( \{5, 6, 7, 8, 9, \ldots \} \) \( a_6 = \) 

2. \( \{2, 6, 18, 54, 162, \ldots \} \) \( a_6 = \) 

3. \( \{1, 6, 15, 28, 45, \ldots \} \) \( a_6 = \) 

4. \( \{0, 1, 3, 6, 10, \ldots \} \) \( a_6 = \) 

5. \( \{0, 3, 8, 15, 24, \ldots \} \) \( a_6 = \) 

Find a formula for the general term \( a_n \), assuming that the pattern of the first terms continues.

1. \( \{3, 7, 11, 15, 19, \ldots \} \) \( a_n = \) 

2. \( \left\{ 1, \frac{2}{3}, \frac{4}{9}, -\frac{8}{27}, \frac{16}{81}, \ldots \right\} \) \( a_n = \) 

3. \( \left\{ 2, \frac{4}{5}, \frac{8}{25}, \frac{16}{125}, \frac{32}{625}, \ldots \right\} \) \( a_n = \)
List the first 4 terms of the given sequence. Assume that the first term is $a_4$

4. $a_n = \frac{2n}{n^2 + 1}$

5. $a_n = \frac{(-1)^n n^3}{n^2 + 1}$

Determine whether the sequence converges or diverges. If it converges, find its limit.

6. $a_n = \frac{n - n^2}{2 + 7n^2}$

7. $a_n = \frac{n}{1 + \sqrt{n}}$

8. $a_n = \frac{3^n}{5^n + 1}$

9. $a_n = \frac{2(n+1)!}{n!}$

10. $a_n = \left(1 + \frac{3}{n}\right)^n$