2.4 Sequences and Summations - Worksheet

1. What are the terms a_1, a_0, a_2, and a_3 of the sequence $\{a_n\}$, where a_n equals

   (a) $(2)^n$?

   (b) 3?

   (c) $7 + 4^n$?

   (d) $2^n + (-2)^n$?

2. Find the first six terms of the sequence defined by each of these recurrence relations and initial conditions.

   (a) $a_n = -2a_{n-1}$, $a_0 = -1$

   (b) $a_n = a_{n-1} - a_{n-2}$, $a_0 = 2$, $a_1 = -1$

   (c) $a_n = 3a_{n-1}^2$, $a_0 = 1$

   (d) $a_n = na_{n-1} + a_{n-1}^2$, $a_0 = -1$, $a_1 = 0$

   (e) $a_n = a_{n1} - a_{n-2} + a_{n-3}$, $a_0 = 1$, $a_1 = 1$, $a_2 = 2$

3. For each of these lists of integers, provide a simple formula or rule that generates the terms of an integer sequence that begins with the given list.Assuming that your formula or rule is correct, determine the next three terms of the sequence.

   (a) $1, 3, 5, 7, 9, \ldots$

   (b) $3, 6, 11, 18, 27, 38, 51, 66, 83, 102, \ldots$

   (c) $1, -1, 1, -1, 1, -1, \ldots$

   (d) $7, 11, 15, 19, 23, 27, 31, 35, 39, 43, \ldots$

   (e) $1, 10, 11, 100, 101, 110, 111, 1000, 1001, 1010, 1011, \ldots$

   (f) $1, 2, 2, 2, 3, 3, 3, 3, 3, 5, 5, 5, 5, 5, 5, 5, \ldots$

   (g) $1, 1/2, 1/4, 1/8, 1/16, \ldots$

4. What are the values of these sums, where$S = \{1, 3, 5, 7\}$?

   (a) $\sum_{j \in S} j$

   (b) $\sum_{j \in S} j^2$

   (c) $\sum_{j \in S} \frac{1}{j}$

   (d) $\sum_{j \in S} 1$

5. Compute each of these double sums.

(a) $\sum_{i=1}^{3} \sum_{j=1}^{2} (i - j)$

(b) $\sum_{i=0}^{3} \sum_{j=0}^{2} (3i + 2j)$

(c) $\sum_{i=1}^{3} \sum_{j=0}^{2} j$

(d) $\sum_{i=0}^{2} \sum_{j=0}^{3} i^2 j^3$