Exercises: Sequences, Series and Recursion - Solutions

Exercise 1

Given the sequence $\{a_n\}_{n=1}^{5} = \{1, 3, 5, 7, 9\}$

a. 5

b. 25

Exercise 2

Expand the following series and find the sum

$$\sum_{n=0}^{4} 2n = 0 + 2 + 4 + 6 + 8 = 20$$

Exercise 3

List the first four terms of the following sequence, beginning with $n = 0$

$$1 \; -\frac{1}{2} \; \frac{1}{6} \; -\frac{1}{24}$$

Exercise 4

70

Exercise 5

Write the following series using summation notation, beginning with $n = 1$:

$$2 \; -4 \; +6 \; -8 \; +10 = \sum_{n=1}^{5} (-1)^{n+1}(2n)$$

Exercise 6

Write the following using summation notation

$$\frac{5}{6+3} + \frac{5}{7+3} + \frac{5}{8+3} + \cdots + \frac{5}{31+3} = \sum_{n=1}^{26} \frac{5}{(n+5)+3}$$

Exercise 7

Use summation formulae to determine the values of the sums below:

a. 55

b. 385

c. 5050

d. 2.5

e. 26,388,279,066,621

Exercise 8

A person deposits \$1000 in an account that yields 9% interest compounded annually.

a. $P_n = 1.09 \cdot P_{n-1}, \quad P_0 = 1000$

b. $P_n = (1.09)^n \cdot 1000$.

c. Approximately \$5529041.

Exercise 9

Suppose that the number of bacteria in a colony triples every hour.

a. $a_n = 3 \cdot a_{n-1}$.

b. $5,904,900$.

Exercise 10

A factory makes custom sports cars at an increasing rate. In the first month only one car is made, in the second month two cars are made, and so on, with n cars made in the n'th month.

a. $a_n = a_{n-1} + n, a_1 = 1$

b. 78 cars.

c. $a_n = \dfrac{n(n+1)}{2}$