8.1 Sequences and Series

Sequence (Infinite Sequence) $\{a_n\}$**:** a function whose domain is the set of positive integers.

a_n : **the *n*th term**, or **general terms**, of a sequence

$a_1, a_2, a_3, a_4, \ldots, a_n, \ldots$

Ex. Write the first four terms of each sequence whose general term is given.

a.) $a_n = 4n - 1$

$a_1 =$

$a_2 =$

$a_3 =$

$a_4 =$

b.) $c_n = (-1)^{n+1}(n+4)$

$c_1 =$

$c_2 =$

$c_3 =$

$c_4 =$

❖ Summation Notation

Summation Notation: the sum of the first *n* terms of a sequence

$$\sum_{i=1}^{n} a_i = a_1 + a_2 + a_3 + a_4 + \cdots + a_n$$

i: the index of summation (*i*, *j*, and *k* are used commonly.)

n: the upper limit of summation

1: the lower limit of summation

Ex. Expand and evaluate the sum:

a.) $\sum_{k=1}^{4}(k-3)(k+2)$

b.) $\sum_{i=2}^{4}\left(-\frac{1}{3}\right)^i$

Ex. Express each sum using summation notation. Use 1 as the lower limit of summation and *i* for the index of summation.

a.) $1^4 + 2^4 + 3^4 + \cdots + 12^4$

b.) $\frac{1}{9} + \frac{2}{9^2} + \frac{3}{9^3} + \cdots + \frac{n}{9^n}$

c.) $3 + \frac{1}{2} + \frac{5}{27} + \frac{3}{32} + \cdots + \frac{n+2}{n^3}$