Precalculus 11

Sigma notation is a method in which a Greek symbol is used to represent the sum of any series.

$$\sum_{k=a}^{b} = f(k)$$

- f(k) = function of the any series
- k = input variable of the function
- *a* = value of input variable for first term
- b = value of input variable for last term

For example,

$$\circ \sum_{k=1}^{5} f(k) = f(1) + f(2) + f(3) + f(4) + f(5)$$

 $\circ \quad \sum_{k=5}^{5} f(k) = f(5) + f(6) + f(7) + f(8) + f(9)$

Notice that the number of terms in each of the series is n = 5

• To determine the total number of terms in any series: n=b-a+1

Example 1: Expand and evaluate the following series

a)
$$\sum_{k=2}^{6} 2^{k} =$$

b) $\sum_{k=4}^{7} 4(-3)^{k-1} =$
c) $\sum_{k=2}^{5} \frac{3}{4^{k}} =$

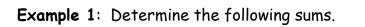
It's important that you're able to recognize a geometric series and which formula to use when determining the geometric sum

• If there are a finite number of terms (value of r is flexible)

$$S_n = \frac{a\left(1 - r^n\right)}{\left(1 - r\right)}$$

• If there are an infinite number of terms (only if -1 < r < 1)

$$S_n = \frac{a}{(1-r)}$$



a)
$$\sum_{k=5}^{60} \left(\frac{2}{3}\right)^k = \left(\frac{2}{3}\right)^5 + \left(\frac{2}{3}\right)^6 + \left(\frac{2}{3}\right)^7 + \dots + \left(\frac{2}{3}\right)^{60}$$

b) $\sum_{k=3}^{23} 6\left(-\frac{1}{2}\right)^{k-1} =$
c) $\sum_{k=-10}^{12} 3(2)^k =$
d) $\sum_{k=4}^{\infty} 6\left(\frac{2}{3}\right)^{k+2}$
e) $\sum_{k=1}^{\infty} 2(-3)^k =$

Homework:
