Appendix E - Sigma Notation

Section Objective(s):

- Express sums using sigma notation.
- Memorize a few common finite sums.
- Understand basic properties of finite sums and use them to compute more complicated finite sums.

Definition(s) 4.1.7. If $a_m, a_{m+1}, \ldots, a_{n-1}, a_n$ are real numbers and m and n are integers such that $m \leq n$, then

$$\sum_{i=m}^{n} a_i =$$

Definition(s) 4.1.8. This way of short-handing sums of many numbers is called _____ (uses the Greek letter Σ "Sigma"). The letter i above is called the _____ and it takes on consecutive integer values starting with m and ending with n.

Theorem 4.1.9. If c is any constant then:

(a) $\displaystyle\sum_{i=m}^{n} ca_i =$

(b) $\displaystyle\sum_{i=m}^{n} (a_i + b_i) =$

(c) $\displaystyle\sum_{i=m}^{n} (a_i - b_i) =$

Theorem 4.1.10. Let c be a constant and n a positive integer. Then

(a) $\displaystyle\sum_{i=1}^{n} 1 =$

(b) $\displaystyle\sum_{i=1}^{n} i =$

(c) $\displaystyle\sum_{i=1}^{n} i^2 =$

Watch the video at https://mediaspace.msu.edu/media/t/1_5dcr9asq and fill in all the blanks. Due on Mar 31 (as quiz 9)

Example 4.1.11. Evaluate the following sums

(a) $\displaystyle\sum_{k=0}^{4} \frac{2k-1}{2k+1}$

(b) $\displaystyle\sum_{i=0}^{4} (2-3i)$

(c) $\displaystyle\sum_{i=1}^{38} (3^i - 3^{i-1})$

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Example 4.1.12. Write the sum: $\sqrt{3} + \sqrt{4} + \cdots + \sqrt{25}$ in sigma notation

Example 4.1.13. Write the sum: $\sqrt{3} - \sqrt{5} + \sqrt{7} - \sqrt{9} + \cdots + \sqrt{27}$ in sigma notation