Section 5.2

After viewing the lecture videos and reading the textbook, you should be able to answer the following questions:

1. What is sigma notation?
2. Suppose a sum can be written in sigma notation as $\sum_{k=1}^{n} a_k$.
    a. What is Σ? What does it stand for?
    b. What is the index of summation?
    c. What is the lower limit of summation?
    d. What is the upper limit of summation?
    e. What is the k-th term of the sum?
    f. Write the sum without sigma notation.
3. The algebra rules for finite sums are:

$$\sum_{k=1}^{n}(a_k + b_k) = \sum_{k=1}^{n} a_k + \sum_{k=1}^{n} b_k$$

$$\sum_{k=1}^{n}(a_k - b_k) = \sum_{k=1}^{n} a_k - \sum_{k=1}^{n} b_k$$

$$\sum_{k=1}^{n} ca_k = c \cdot \sum_{k=1}^{n} a_k$$

$$\sum_{k=1}^{n} c = n \cdot c$$

Suppose $\sum_{k=1}^{13} a_k = 3$ and $\sum_{k=1}^{13} b_k = 5$. Find the values of:

a. $\sum_{k=1}^{13}(a_k + b_k)$
b. $\sum_{k=1}^{13}(a_k - b_k)$
c. $\sum_{k=1}^{13} 7a_k$
d. $\sum_{k=1}^{13} 11$
e. $\sum_{k=1}^{13}(7a_k - b_k + 11)$

4. Which of the following is not true (select one):
    a. $\sum_{k=1}^{n}(a_k - 1) = \sum_{k=1}^{n} a_k - n$
    b. $\sum_{k=1}^{n}(a_k - 1) = \sum_{k=1}^{n} a_k - 1$
    c. $\sum_{k=1}^{n}(a_k - 1) = \sum_{k=1}^{n} a_k - \sum_{k=1}^{n} 1$
5. A Riemann sum for a bounded function f on a closed interval $[a, b]$ is the sum $S_P = \sum_{k=1}^{n} f(c_k) \cdot \Delta x_k$.
    a. What does n represent?
    b. The set P is called a **partition** of $[a, b]$. What is P? (Answer: P is any set such that $P = \{x_0, x_1, x_2, \dots, x_{n-1}, x_n\}$ where $a = x_0 < x_1 < x_2 < \cdots < x_{n-1} < x_n = b$)
    c. What is the k-th subinterval of $[a, b]$?
    d. What does Δx_k represent? How can we calculate Δx_k?
    e. What does c_k represent?
    f. Other than "the value of $f(x)$ at $x = c_k$", what does $f(c_k)$ represent?
6. If P is a partition of $[a, b]$, what is $\|P\|$ (the **norm** of P)?
7. The Riemann sum for a continuous function f on a closed interval $[a, b]$ approximates (choose one):
    a. The total area of the region bounded by the curve $y = f(x)$ and the x-axis over the interval $[a, b]$.
    b. The area above the x-axis of the region bounded by the curve $y = f(x)$ and the x-axis minus the area below the x-axis of the region bounded by the curve $y = f(x)$ and the x-axis over the interval $[a, b]$.
    c. It is just a random sum that we defined.