Warm-up Problems

1. Compute the following:

\[ 1 - 3 + 5 - 7 + 9 - 11 + \cdots + 97 - 99 = -50 \]

2. Put the signs +, −, ×, ÷, and/or parenthesis between the digits below to produce a correct formula:

\[ 4 \quad 4 \quad 4 \quad 4 \quad = \quad 5 \]

Lecture Problems

3. “Copy” the work done in class to find \( \int_{2}^{7} x^2 + 1 \, dx \). Lets do a right hand sum step by step:

(a) Identify the function: \( f(x) = x^2 + 1 \)
(b) Identify the end points: \( a = 2, \quad b = 7 \)
(c) You will divide the domain into \( n \) subintervals. Find \( \Delta x = \frac{5}{n} \)
(d) For your \( n \)-subintervals, find the coordinates of these divisions: \( x_k = 2 + \frac{5k}{n} \)
(e) Find the height at each point \( f(x_k) = (2 + \frac{5k}{n})^2 + 1 \)
(f) Find and simplify the term within the sum \( f(x_k) \cdot \Delta x = \left( \left( \frac{5k}{n} + 2 \right)^2 + 1 \right) \cdot \frac{5}{n} \)
(g) Find the sum \( \sum_{k=1}^{n} f(x_k) \cdot \Delta x = \frac{25(28n^2 + 27n + 5)}{6n^2} \)
(h) Take the limit of the sum: \( \lim_{n \to \infty} \left[ \sum_{k=1}^{n} f(x_k) \cdot \Delta x \right] = \frac{350}{3} \)

4. Find \( \int_{-2}^{3} 2x - 3x^2 \, dx \) using a right hand sum, step by step

(a) Identify the function: \( f(x) = 2x - 3x^2 \)
(b) Identify the end points: \( a = -2, \quad b = 3 \)
(c) You will divide the domain into \( n \) subintervals. Find \( \Delta x = \frac{5}{n} \)
(d) For your \( n \)-subintervals, find the coordinates of these divisions: \( x_k = -2 + \frac{5k}{n} \)
(e) Find the height at each point \( f(x_k) = -\frac{75k^2 - 70kn + 16n^2}{n^2} \)
(f) Find and simplify the term within the sum \( f(x_k) \cdot \Delta x = \frac{-5(75k^2 - 70kn + 16n^2)}{n^3} \)
(g) Find the sum \( \sum_{k=1}^{n} f(x_k) \cdot \Delta x = -\frac{5(12n^2 + 5n + 25)}{2n^2} \)
(h) Take the limit of the sum: \( \lim_{n \to \infty} \left[ \sum_{k=1}^{n} f(x_k) \cdot \Delta x \right] = -30 \)