Math 131 - November 21, 2014
Solutions

Warm-up Problems

1. Compute the following:

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

2. Put the signs $+$, $-$, $\times$, $\div$, 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 $\Delta x = 5/n$

   (d) For your n-subintervals, find the coordinates of these divisions: $x_k = 2 + \frac{5k}{n}$

   (e) Find the height at each point $f(x_k) = (2 + 5k/n)^2 + 1$

   (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 $\displaystyle\sum_{k=1}^{n} f(x_k) \cdot \Delta x = \frac{25\,(28\,n^2 + 27\,n + 5)}{6\,n^2}$

   (h) Take the limit of the sum: $\displaystyle\lim_{n\to\infty} \left[\sum_{k=1}^{n} f(x_k) \cdot \Delta x\right] = \frac{350}{3}$

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 $\Delta x = 5/n$

   (d) For your n-subintervals, find the coordinates of these divisions: $x_k = -2 + \frac{5k}{n}$

   (e) Find the height at each point $f(x_k) = -\frac{75\,k^2 - 70\,kn + 16\,n^2}{n^2}$

   (f) Find and simplify the term within the sum $f(x_k) \cdot \Delta x = -\frac{5\left(75\,k^2 - 70\,kn + 16\,n^2\right)}{n^3}$

   (g) Find the sum $\displaystyle\sum_{k=1}^{n} f(x_k) \cdot \Delta x = -\frac{5\,(12\,n^2 + 5\,n + 25)}{2\,n^2}$

   (h) Take the limit of the sum: $\displaystyle\lim_{n\to\infty} \left[\sum_{k=1}^{n} f(x_k) \cdot \Delta x\right] = -30$