Warm-up Problems

1. Find the sum
   \[ 1 + 2 + 3 + \cdots + 99 + 100 = \]

2. Find the sum
   \[ 1 + 3 + 5 + 7 + 11 + \cdots + 25 = \]

3. Find the sum
   \[ 1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} + \cdots = \]

4. Find the sum
   \[ 1 + 2^2 + 3^2 + 4^2 + \cdots + 100^2 = \]

5. Find the sum
   \[ 1^3 + 2^3 + 3^3 + 4^3 + \cdots + 100^3 = \]

Lecture Problems

6. Compute the following sums:

   (a) \[ \sum_{k=1}^{5} k = \]

   (b) \[ \sum_{k=1}^{5} k - 3 = \]

   (c) \[ \sum_{k=4}^{10} k - 3 = \]

   (d) \[ \sum_{k=0}^{5} k^2 = \]

   (e) \[ \sum_{k=-3}^{5} k^2 = \]

   (f) \[ \sum_{k=2}^{7} 2k + 3 = \]

   (g) \[ \sum_{k=0}^{99} \frac{1}{2} = \]

   (h) \[ \sum_{k=0}^{\infty} \frac{1}{2} = \]

   (i) \[ \sum_{k=0}^{\infty} \frac{1}{2^k} = \]
7. Find the pattern and write in sigma notation (can you write in ∑ notation in several different ways?)

(a) $1 + 3 + 5 + \cdots + 11 =$
(b) $9 + 12 + 15 + \cdots + 21 =$
(c) $\frac{4}{5} + \frac{5}{6} + \frac{6}{7} + \cdots + \frac{10}{11} =$
(d) $\frac{16}{3} + \frac{25}{4} + \frac{36}{5} + \cdots + \frac{100}{9} =$

8. “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: $f(x) =$
(b) Identify the end points: $a = , \quad b =$
(c) You will divide the domain into $n$ subintervals. Find $\Delta x =$
(d) For your $n$-subintervals, find the coordinates of these divisions: $x_k =$
(e) Find the height at each point $f(x_k) =$
(f) Find and simplify the term within the sum $f(x_k) \cdot \Delta x =$

(g) Find the sum $\sum_{k=1}^{n} f(x_k) \cdot \Delta x =$

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