**Math 131 - November 21, 2014**

# 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

$$1 + 2^2 + 3^2 + 4^2 + \ldots + 100^2 =$$

5. Find the sum

$$1^3 + 2^3 + 3^3 + 4^3 + \ldots + 100^3 =$$

# Lecture Problems

6. Compute the following sums:

(a) $\displaystyle\sum_{k=1}^{5} k =$

(b) $\displaystyle\sum_{k=1}^{5} k - 3 =$

(c) $\displaystyle\sum_{k=4}^{10} k - 3 =$

(d) $\displaystyle\sum_{k=0}^{5} k^2 =$

(e) $\displaystyle\sum_{k=-3}^{5} k^2 =$

(f) $\displaystyle\sum_{k=2}^{7} 2\,k + 3 =$

(g) $\displaystyle\sum_{k=0}^{99} \frac{1}{2} =$

(h) $\displaystyle\sum_{k=0}^{\infty} \frac{1}{2} =$

(i) $\displaystyle\sum_{k=0}^{\infty} \frac{1}{2^k} =$

7. Find the pattern and write in sigma notation (can you write in $\sum$ 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 $\displaystyle\sum_{k=1}^{n} f(x_k) \cdot \Delta x =$

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