Midterm Bonus

Math 13200
Instructor: Reid Harris
February 8, 2017

1. (10 points) Evaluate the sum

$$1 + 2 + 3 + 4 + 5 + \cdots + 2016 + 2017$$

by first expressing it in summation notation.

2. (10 points) Evaluate the sum

$$3 + 6 + 9 + 12 + \cdots + 105 + 108$$

by first expressing it in summation notation. (What's the pattern in the numbers you are adding?)

3. (10 points) Evaluate the sum

$$1 + 3 + 5 + 7 + 9 + 11 + \cdots + 2015 + 2017$$

by first expressing it in summation notation.

4. (10 points) Evaluate the sum

$$3^2 + 6^2 + 9^2 + 12^2 + \cdots + 105^2 + 108^2$$

by first expressing it in summation notation.

5. (10 points) Evaluate the sum

$$1^3 + 3^3 + 5^3 + 7^3 + 9^3 + 11^3 + \cdots + 2015^3 + 2017^3$$

by first expressing it in summation notation.

6. Consider the function $f(x) = x + 2$ defined on $[0, 3]$.

   (a) (5 points) Consider a partition of $[0, 3]$ into intervals

   $$[x_0, x_1], [x_1, x_2], \ldots [x_i, x_{i+1}], \ldots, [x_{n-1}, x_n]$$

   of equal length. What is the length of each interval?

   (b) (5 points) Write each x_i in the partition in terms of i.

   (c) (5 points) Approximate the area under the graph of $f(x)$ using rectangles with base $[x_i, x_{i+1}]$ and height $f(x_i)$. You do not need to write the sum in a closed form.

   (d) (5 points) Evaluate the sum.

7. (20 points) Do the same as above with $f(x) = x^2 - x$ on the interval $[1, 2]$.

8. (20 points) Do the same with the function $f(x) = 3x^2 - 1$ on the interval $[1, 2]$.