Problem Set 4: Integral Calculus
CSSS 505/ SOC 512
Due: February 3, 2021

1. (a) Graph the function defined by:

$$f(x) = \begin{cases} \frac{1}{10} & \text{if } x \in [0, 10] \\ 0 & \text{otherwise} \end{cases}$$

This is an example of the uniform probability distribution.

(b) By studying the graph and without using calculus, compute the area under the curve on the interval [2,7].

(c) Now compute the same area using integral calculus.

Integrate, and check by differentiating:

2. $\int x^7 dx$

3. $\int x^2 + 6x^5 dx$

4. $\int \frac{1}{x^2} dx$

5. $\int \frac{1}{x} dx$

6. $\int (3 - x)^{10} dx$

7. $\int \sqrt{7x + 9} dx$

8. $\int e^{5x+2} dx$

9. Compute the area under the curve:

$$\int_{0.5}^{1} x(1 - x)^2 dx$$

This is an example of the beta distribution, a probability distribution which we'll see later this quarter.

10. Compute the area under the curve:

$$\int_2^\infty 4e^{-4x}dx$$

This is an example of the exponential probability distribution, which we'll study later this quarter.