STAT/MA 41600
In-Class Problem Set #24: October 14, 2015

1. Suppose that X is a random variable with density function

$$f_X(x) = \begin{cases} \frac{2}{3}e^{-(2/3)x} & \text{for } x > 0, \\ 0 & \text{otherwise.} \end{cases}$$

1a. Calculate $P(0.5 < X < 2.5)$.
1b. Calculate $P(X = 2.5)$. (Why do you get that value?)
1c. Find a formula for the CDF $F_X(x)$.

2. Suppose that X is a continuous random variable with a probability density function that is a positive constant on the interval $[8, 20]$, and is 0 otherwise.
2a. What is the positive constant mentioned above?
2b. Calculate $P(10 \leq X \leq 15)$.
2c. Find an expression for the CDF $F_X(x)$.

3. Suppose that X has CDF

$$F_X(x) = \begin{cases} 1 - e^{-5x} & \text{for } x > 0, \\ 0 & \text{otherwise.} \end{cases}$$

3a. What is the 25th percentile of X? I.e., what is the value "a" such that $P(X \leq a) = 1/4$?
3b. What is the median (also called 50th percentile) of X, i.e., what is the value "a" such that $P(X \leq a) = 1/2$?
3c. What is the 75th percentile of X?

4a. Make a graph that depicts the CDF $F_X(x)$ from problem **1c**.
4b. Make a graph that depicts the CDF $F_X(x)$ from problem **2c**.