STAT/MA 41600
In-Class Problem Set #24: October 10, 2018

1. Suppose that the time (in seconds) until the next message arrives in Group Me is a continuous random variable X, with probability density function $f_X(x) = \frac{1}{25}e^{-x/25}$ for $x > 0$, and $f_X(x) = 0$ otherwise.
1a. Calculate $P(X > 20)$.
1b. What is the probability that no Group Me message arrives during the next 1 minute?
1c. Find the median of X, i.e., find the value of a so that $P(X > a) = 0.50$.

2. Suppose that a continuous random variable X has a constant density on the range $[0, 6.2]$ (and the density is 0 otherwise).
2a. What is the value of the (constant) density of X in the range $[0, 6.2]$?
2b. Calculate $P(X > 2)$.
2c. Find the median of X.

3a. For the random variable in question #1, calculate $P(28 < 2X < 65)$.
3b. For the random variable in question #2, calculate $P(|X - 3.1| > 1.5)$.

4. Consider a random variable X that only takes on values in the range $[3, 4]$. Suppose that the probability density function of X has the form $f_X(x) = (k)(x - 3)(x - 4)$ for $3 \leq x \leq 4$ (where k is assumed to be a constant), and $f_X(x) = 0$ otherwise.
4a. What is the value of k?
4b. What is the probability that X is larger than 3.25 ?