STAT/MA 41600
In-Class Problem Set #24: October 11, 2017

1. Consider a continuous random variable Y that has the probability density function $f_Y(y) = 7e^{-7y}$ for $y > 0$, and $f_Y(y) = 0$ otherwise.
1a. What is the probability that Y is greater than $1/2$?
1b. Find the probability that Y is in the range $[0, 1/3]$.

2. Suppose that X is a continuous random variable with density $f_X(x) = (k)(2-x)(3-x)$ for $0 \leq x \leq 2$, and $f_X(x) = 0$ otherwise.
2a. Find the value of k that makes this a valid density.
2b. Find the probability that X is in the range $[1, 2]$.

3a. Find the cumulative distribution function (CDF) of the random variable Y in question 1.
3b. Find the cumulative distribution function (CDF) of the random variable X in question 2.

4a. For the random variable Y in question 1, calculate $P(|Y - 1/4| < 1/8)$.
4b. For the random variable Y in question 1, what is the median? In other words, for which value of "a" do we have $P(Y \leq a) = 1/2$?