STAT/MA 41600
Practice Problems: October 15, 2014

1. Consider a random variable X with density

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

a. Find $P(3 \leq X \leq 5)$.

b. Find an expression for the CDF $F_X(x)$ of X.

c. Graph the CDF $F_X(x)$ of X.

2. Let X have density $f_X(x) = kx^2(1-x)^2$ for $0 \leq x \leq 1$, and $f_X(x) = 0$ otherwise, where k is constant.

a. Find the value of k.

b. Find $P(X \geq 3/4)$.

3. Assume X has constant density on the interval $[0, 25]$, and the density of X is 0 otherwise. Find $P(13.2 \leq X \leq 19.9)$.

4. Suppose X has CDF

$$F_X(x) = \begin{cases} 0 & \text{if } x < 0, \\ x^4(5-4x) & \text{if } 0 \le x \le 1, \\ 1 & \text{if } x > 1. \end{cases}$$

a. Find $P(X > 1/2)$.

b. Find the density $f_X(x)$ of X.

5. Let X have density $f_X(x) = \frac{\sqrt{3(x+2)}}{6}$ for $-2 \leq x \leq 1$, and $f_X(x) = 0$ otherwise. Find the probability that X is positive.