# Math 477, Worksheet for lecture 22

**Name:** _____

**Net ID:** _____

1. Suppose that $X$ and $Y$ are random variables, with joint density function

$$f(x, y) = \begin{cases} \frac{x+y}{5} & 0 \le x \le 2, \ 1 \le y \le 2 \\ 0 & \text{otherwise.} \end{cases}$$

   (a) Find the marginal density function $f_X(x)$ of $X$. What is the probability that $1 \le X \le 2$?

   (b) If we know that $Y = 1.25$, find the probability that $1 \le X \le 2$.

2. Suppose that $X$ and $Y$ are random variables, with joint density function

$$f(x, y) = \begin{cases} 3/2(x^2 + y^2) & x, y \in [0, 1] \\ 0 & \text{otherwise.} \end{cases}$$

   (a) What is the probability that $X < 1/4$?

   (b) What is the probability that $X < 1/4$ if we know that $X < Y$?

   (c) What is the probability that $X < 1/4$ if we know that $X < Y$ and $Y = 50$?

3. If we roll a fair die, what is the expected number of rolls needed in order for each value to come up at least once?