STAT/MA 41600
Practice Problems: December 1, 2014

1. Let X and Y have a joint uniform distribution on the triangle with corners at $(0, 2)$, $(2, 0)$, and the origin. Find $\mathbb{E}(Y \mid X = 1/2)$.

2. Roll two 6-sided dice. Let X denote the minimum value that appears, and let Y denote the maximum value that appears.

a. Find $\mathbb{E}(Y \mid X = 3)$.

b. Find $\mathbb{E}(X + Y \mid X = 3)$. [Hint: Using (a)'s answer, you can solve (b) in one line!]

3. Let X_1 and X_2 be independent exponential random variables, each with mean 1. Let $Y = X_1 + X_2$. Find $\mathbb{E}(X_1 \mid Y = 3)$.

4. Consider a tray with 8 lemonades and 3 raspberry juices. Alice and Bob each take 1 drink from the tray, without replacement. Assume that all of their choices are equally likely. Let X_1 and X_2 indicate (respectively) if Alice and Bob (respectively) get lemonade. In other words, $X_1 = 1$ if Alice gets lemonade, or $X_1 = 0$ otherwise; and $X_2 = 1$ if Bob gets lemonade, or $X_2 = 0$ otherwise.

a. Find $\mathbb{E}(X_1 \mid X_2 = 1)$.

b. Find $\mathbb{E}(X_1 \mid X_2 = 0)$.

5. Sally and David each pick 10 flowers from the case without paying attention to what type of flowers they are picking. There are a large quantity of flowers available, 20% of which are roses. Let X be the number of roses that Sally picks, and let Y be the number of roses that the couple picks altogether. Find the number of roses that we expect Sally to pick if the total number of roses picked is $Y = 12$.