MATH 321: In-Class 14

1. Let $f(x,y) = \dfrac{xy + y}{c}$ for $x = 1, 2, 3$ and $y = 1, 2$ be the joint pmf for the random vector (X, Y).

   (a) Find the value c that makes this a valid pmf.

   (b) Construct the joint pmf table for (X, Y) using your answer from part (a); add the marginal pmfs to the table as well.

   (c) Find the following probabilities: $P(X = Y)$, $P(X - Y = 1)$ and $P(X^2 \leq 4)$.

2. Let (X, Y) be a bivariate continuous random vector with joint pdf
   $$f(x, y) = \frac{1}{4} + \frac{x}{2} + \frac{y}{2} + xy \quad \text{for } 0 \leq x \leq 1 \text{ and } 0 \leq y \leq 1.$$

   (a) Find $P(0 \leq X \leq 0.5, 0.5 \leq Y \leq 1)$.

(b) Find the marginal pdf of X, $f_X(x)$ (Reminder: $f(x,y) = \dfrac{1}{4} + \dfrac{x}{2} + \dfrac{y}{2} + xy;$ $0 \le x \le 1, 0 \le y \le 1$).

3. Let (X,Y) be a bivariate continuous random vector with joint pdf
   $f(x,y) = 2x^2 + 3y$ for $0 \le y \le x \le 1$.

   Find $P(X+Y > 1)$.