Homework 4: Due 6/26/14

1. Let the joint p.m.f. of X and Y be defined by

$$f(x,y) = \frac{x+2y}{33}, \quad x = 1,2,\ y = 1,2,3.$$

Find the marginal p.d.f. of X and that of Y. Find $P(X > Y)$, $P(Y > X)$ and $P(X+Y) = 2$. Are X and Y independent?

2. With the joint p.d.f. defined above in Problem 1, find the means μ_X, μ_Y, the variances σ_X^2, σ_Y^2 and the correlation coefficient ρ.

3. Select an even integer uniformly at random from the list $\{0, 2, 4, 6, 8\}$ and then select an integer uniformly at random from the list $\{0, 1, 2, 3, 4\}$. Let X be the number selected from the first list and Y equal the sum of the two numbers. Find the joint p.m.f. of X and Y and the marginal p.d.f. of each. Are X and Y independent?

4. Let X and Y be continuous random variables with joint p.d.f.

$$f(x, y) = 2, \quad 0 \leq y \leq x \leq 1.$$

Sketch the domain of f. Find the marginal p.d.f.'s of X and Y and compute $\mu_X, \mu_Y, \sigma_X^2, \sigma_Y^2, \mathrm{Cov}(X, Y)$, and ρ.