## HW 8

## STAT 544, Fall 2015

Each homework assignment will be worth 20 points, and your best 10 of 12 assignment scores will be averaged to determine the homework contribution to your overall course average.

**Note:** Five of the of the seven parts below will be graded, with each graded part worth 4 points. (I won't specify which parts will be graded until after the papers have been submitted.)

1) Letting X be a normal random variable having mean 2 and variance 9, give the value of P(1/X < 1/2), rounding your answer to the nearest thousandth. (Suggestion: Sketch the function g(x) = 1/x for both positive and negative values of x, and determine what positive values of x result in 1/x being less than 1/2, and what negative values of x result in 1/x being less than 1/2. Don't worry about 1/X being undefined if X assumes the value 0, since that possibility has probability 0.)

2) When playing *Texas Hold 'em* poker, each hand starts with each player being dealt two cards from a randomly-ordered deck. If a player's two cards are of the same rank (e.g., two 7s, or two Queens) then he is said to have been dealt a "pocket pair." Suppose that a player plays 170 hands of *Texas Hold 'em*. Letting Y be the number of times he is dealt pocket pairs, use the normal approximation (with a continuity correction) to approximate the value of P(Y < E(Y)).

3) Suppose that a "fun-sized" bag of Halloween candy will contain 6 pieces, and that each of the 6 pieces put into the bag will be equally likely to be brandy, gin, or scotch flavored, independently of what the flavors of the other pieces are. What is the probability that at least half of the pieces in the bag will be the same flavor? (*Hint*: Consider the complement — what needs to happen in order to not have at least half of the pieces be the same flavor?)

4) Let X and Y have the following joint density:

$$f_{X,Y}(x,y) = \begin{cases} y/x^2, & 0 < y < x < 2, \\ 0, & \text{otherwise.} \end{cases}$$

- (a) Give the marginal pdf of Y. (As a partial check of your method, I'll give you that the marginal pdf of X is  $\frac{1}{2}I_{(0,2)}(x)$ .)
- (b) Give the value of P(X > 3/2, Y > 3/2).
- (c) Give the value of P(Y|X > 1/2).
- (d) Letting V = X Y, give the cdf of V.