DCP1206 Fall 2019: Probability **(Due: 2019/11/27 in class)**

Homework 4, Part II: Bivariate Distributions

Problem 4 (Conditional Distributions) (10+10+10=30 points)

The joint PDF of X and Y is given by

$$f(x,y) = \begin{cases} C \cdot \exp(-x), & \text{if } x \geq 0, |y| < x \\ 0, & \text{else} \end{cases}$$

(a) Find the value of C. (Hint: You may want to use $\int_{-\infty}^{\infty}\int_{-\infty}^{\infty} f(x,y)dxdy = 1$)

(b) Find $f_{X|Y}(x|y)$ and $f_{Y|X}(y|x)$.

(c) Calculate $E[Y|X = x]$.

Problem 5 (Bivariate Normal Random Variables) (14 points)

The random variables X and Y are described by a joint PDF of the form:

$$f_{XY}(x,y) = c \cdot \exp(-8x^2 - 6xy - 18y^2).$$

Find the value of c, the means, variances, and the correlation coefficient of X and Y. (Hint: Joint PDF of bivariate normal)