Homework 3

1. Assume that a random vector (X, Y) has the following join probability density function

$$f(x,y) = \begin{cases} Ae^{-(3x+4y)}, x > 0, y > 0 \\ 0, \qquad \text{otherwise} \end{cases}$$

   (1). Find the value of A.

   (2). Compute the probability $P(0 \le X < 1, 0 \le Y < 2)$.

   (3). Find marginal probability density functions $f_X(x)$ and $f_Y(y)$.

   (4). Calculate $E(X)$, $E(Y)$ and $E(XY)$.

   (5). Are X and (Y) independent or not? Why?

2. Assume that a random vector (X, Y) has the following join probability density function

$$f(x,y) = \begin{cases} 1, \qquad 0 < x < 1, \ |y| < x, \\ 0, \qquad \text{otherwise} \end{cases}$$

   (1). Find the conditional probability density functions $f_{Y|X}(y|x)$ and $f_{X|Y}(x|y)$.