Math 5710
Joint Continuous Probability Distributions

Example 1. Suppose X , Y are continuous random variables with joint density

$$f(x,y)=\begin{cases} 2y\,e^{-x} & \text{for } 0<y<1\ ,\ x>0 \\ \\ 0 & \text{otherwise} \end{cases}$$

a) Find $P\,(\,X\le 3\ ,\ Y\le 1\,)$.

b) Find $f_X(x)$ and $f_Y(y)$. Are X , Y independent?

c) Find $P(\,X+Y\le 1\,)$. Write your answer as an integral; do not evaluate.

Example 2. The joint probability density function of X and Y is given by

$$f(x,y)=\frac{1}{8}(y^2-x^2)e^{-y} \quad \text{for} \quad -y\le x\le y\,,\ \ 0<y<\infty$$

Write the density of X in terms of an integral with the appropriate limits of integration. Do not evaluate the integral.

Example 3. The joint probability density function of X and Y and is given by

$$f(x,y)=e^{-(x+y)} \quad \text{for} \quad 0\le x<\infty \ \ ,\ \ 0\le y<\infty$$

Find $P(X<Y)$, $f_X(x)$, and $f_Y(y)$.