STAT/MA 41600
Practice Problems: October 27, 2014

1. Consider a pair of random variables X, Y with constant joint density on the triangle with vertices at $(0, 0)$, $(3, 0)$, and $(0, 3)$.

a. Find the expected value of the sum of X and Y, i.e., find $\mathbb{E}(X + Y)$.

b. Find the variance of X, i.e., find $\mathrm{Var}(X)$.

2. Consider a pair of random variables X, Y with constant joint density on the quadrilateral with vertices $(0, 0)$, $(2, 0)$, $(2, 6)$, $(0, 12)$.

a. Find the variance of X, i.e., find $\operatorname{Var} X$.

b. Find the variance of Y, i.e., find $\operatorname{Var} Y$.

3. Let X, Y have joint density $f_{X,Y}(x,y) = 14e^{-2x-7y}$ for $x > 0$ and $y > 0$; and $f_{X,Y}(x,y) = 0$ otherwise.

Find the variance of the sum of X and Y, i.e., find $\mathrm{Var}(X+Y)$.

4. Let X, Y have joint density $f_{X,Y}(x,y) = 18e^{-2x-7y}$ for $0 < y < x$; and $f_{X,Y}(x,y) = 0$ otherwise.

Find the variance of Y.

5. Suppose X, Y has joint density

$$f_{X,Y}(x,y) = \begin{cases} \frac{1}{9}(3-x)(2-y) & \text{if } 0 \le x \le 3 \text{ and } 0 \le y \le 2, \\ 0 & \text{otherwise.} \end{cases}$$

Find the expected value of $X^2 + Y^3$, i.e., find $\mathbb{E}(X^2 + Y^3)$.