

STAT/MA 41600
In-Class Problem Set #29: October 27, 2014

1. Consider a pair of random variables X, Y with constant joint density on the quadrilateral with vertices located at the points $(0, 0), (3, 0), (5, 2), (0, 2)$. Find $\mathbb{E}(XY)$.

2a. Same setup as in question #1. Use your solution to #1 from the previous assignment, to find $\text{Var}(X)$.

2b. Use your solution to #2 from the previous assignment, to find $\text{Var}(Y)$.

3. Suppose X and Y have joint probability density function

$$f_{X,Y}(x, y) = 10e^{-3x-2y}$$

for $0 < x < y$; and $f_{X,Y}(x, y) = 0$ otherwise. Find $\mathbb{E}(X^2)$. (Note that X and Y are not independent, since we are insisting that $X < Y$ in this setup!)

4. Same setup as in question #3. Find $\mathbb{E}(Y^2)$.

5. Suppose X and Y have joint probability density function

$$f_{X,Y}(x, y) = \frac{1}{2}(2-x)(2-y)$$

for $0 < x < y < 2$; and $f_{X,Y}(x, y) = 0$ otherwise. Find $\mathbb{E}(XY)$. (Note that X and Y are not independent, since we are again insisting that $X < Y$ in this setup!)

6a. Same setup as in question #5. Find $\mathbb{E}((XY)^2)$.

6b. Use your answer to #5 and #6a to find $\text{Var}(XY)$.