HW6 FOR MATH441/STAT461/STA561 DUE 11/6/17

1. Suppose X has an exponential distribution with rate λ. Find the pdf of $Y = X^2$. Please specify $f_Y(y)$ as a function defined on the entire real line either as a piecewise function or using an indicator function.

2. Suppose X has an exponential distribution with rate λ. Find the pdf of $Y = \sqrt{X}$. Please specify $f_Y(y)$ as a function defined on the entire real line either as a piecewise function or using an indicator function.

3. Suppose X and Y have the following joint distribution for $i, j \in \{1, 2, 3\}$ (i.e., the i, j entry of the table is $P(X = i, Y = j)$).

		Y	
X	1	2	3
1	0.2	0.2	0.3
2	0.1	0.1	0.02
3	0.01	0.03	0.04

(a) Write the marginal distribution of Y as a pmf.

(b) What is $P(X \le i, Y \le j)$ for $i, j \in \{1, 2, 3\}$)?

(c) What is $P(X = 2|Y \le 2)$?

(d) Let $Z = X + Y$. Find the pmf of Z (this is somewhat tedious, and you just have to figure the possible values of Z, much like rolling two three-sided “dice”.

(e) Find $Cov(X, Y)$ and $Cor(X, Y)$ where

$$Cor(X, Y) = \frac{Cov(X, Y)}{SD(X)SD(Y)}$$

4. Let X have density

$$f_X(x) = \begin{cases} k\lambda e^{-\lambda|x|} & -\infty < x < \infty \end{cases}$$

where k is a normalizing constant. This density is sometimes called a double exponential, and looks like an exponential density for positive x and the mirror image of an exponential for negative x.

(a) Find k.

(b) Show that $E[X] = 0$.

(c) Let $Z = 2X + 1$. Find the density function $f_Z(z)$.

(d) (Graduate students) Let $Y = |X|$. Find the density for Y.