MATH 3332, Homework Assignment 3

This HW is due on 7/11 at 12:01PM. Details instructions about how to submit your solutions with be given shortly in another file.

Problems:

1. X and Y are discrete random variables with joint pmf

	$X=1$	$X=2$	$X=3$
$Y=1$	0.1	0.2	0.1
$Y=2$	0.2	0.1	0.3

   (a) Find $E(X)$ and $Var(X)$.

   (b) Find $E(Y)$ and $Var(Y)$.

   (c) Find $E(XY)$.

   (d) Find $Cov(X,Y)$. Find the correlation of X and Y.

   (e) Find $E(Y \mid X=2)$ and $Var(Y \mid X=2)$.

2. X and Y are continuous random variables with joint pdf

$$f(x,y) = 2-x-y, \quad 0<x<1, 0<y<1.$$

   (a) Find the marginal distribution of Y.

   (b) Determine whether X and Y are independent.

   (c) Find the conditional distribution of X given $Y=1/3$.

   (d) Find $E(X \mid Y=1/3)$.

3. X is a continuous random variable with pdf

$$f(x) = \frac{x}{2}, \quad 0<x<2.$$

   Find the pdf of $Y=X^2$.

4. $X_1, X_2, \cdots, X_{10}$ are iid $N(0,1)$ random variables.

   Name the distribution of $T = X_1^2 + \cdots + X_{10}^2$ with all parameters of the distribution specified.

5. X is a random variable with $\chi^2(25)$ distribution.

   Y is a random variable with $N(0,1)$ distribution.

   X and Y are independent.

   Name the distribution of $T = \frac{Y}{\sqrt{X/25}}$ with all parameters specified.

6. X is a random variable with $N(3, 2)$ distribution.

   Name the distribution of $4X + 5$ with all parameters specified.

7. X is a random variable with $N(3, 2)$ distribution.

   Y is a random variable with $N(-1, 2)$ distribution.

   X and Y are independent.

   Name the distribution of $T = 4X - Y$ with all parameters specified.

8. $X_1, X_2, \cdots, X_{17}$ are iid $N(8, 2)$ distributions.

$$S^2 = \frac{1}{16} \sum_{i=1}^{17} (X_i - \bar{X})^2.$$

   Name the distribution of $T = 8S^2$ with all parameters specified.