Due Date: 4:00pm, November 22, 2019 (in Assignment box)

Problem 1: (6 marks)
Random variables X and Y have joint PDF given by

$$f_{XY}(x,y)=\begin{cases}4xy, & 0\le x\le 1,\ 0\le y\le 1,\\ 0, & \text{otherwise}\end{cases}.$$

(a) Find μ_X and σ_X^2.

(b) Find μ_Y and σ_Y^2.

(c) Find $Cov[X,Y]$.

(d) Find the correlation coefficient.

(e) Find $E[X+Y]$.

(f) $Var[X+Y]$.

Problem 2: (5 marks)
The random variables X and Y have a joint PDF given by

$$f_{XY}(x,y)=\begin{cases}2, & 0<x<y<1\\ 0, & \text{elsewhere}\end{cases}$$

(a) Show whether X and Y are independent or dependent.

(b) Show whether X and Y are uncorrelated or correlated.

Problem 3: (5 marks)
Two refills, X and Y, for a ballpoint pen are selected at random from a certain box, and the following is the joint probability distribution:

$f_{XY}(x,y)$	$x=0$	$x=1$	$x=2$
$y=0$	3/28	9/28	3/28
$y=1$	3/14	3/14	
$y=2$	1/28	0	0

(a) Find μ_X, μ_Y, $E[X^2]$ and $E[Y^2]$.

(b) Find σ_X^2 and σ_Y^2.

(c) Find $E[XY]$, C_{XY} and ρ_{XY}

(d) Find $P[X\le 0]$.

Problem 4: (4 marks)
The random variables have a joint PDF given by

$$f_{XY}(x,y)=\begin{cases}2, & 0<x<y<1\\ 0, & \text{elsewhere}\end{cases}$$

Find the correlation coefficient between X and Y.