Math 483 HW 12 2023. Due Monday, Oct. 9. Quiz 5 is Friday, Oct 6. E(Y), V(Y), mgf m(t) for discrete and continuous RVs, Normal table. Find the constant k such that $\int_{-\infty}^{\infty} k\ g(y_1, y_2)dy_1dy_2 = 1$. Find marginal and conditional probability functions and pdf's. Exam 2 is on Thursday, Oct. 15, through section 5.3. **Two pages, problems A)-E).**

A) 5.72 Suppose that the joint distribution of Y_1 and Y_2 is given by the table below.

$p(y_1, y_2)$		$y_1 = 0$	1	2
y_2	0	1/9	2/9	1/9
	1	2/9	2/9	0
	2	1/9	0	0

a) Find $E(Y_1)$.

b) Find $V(Y_1)$.

c) Find $E(Y_1 - Y_2)$.

comment: Find the marginals $p_1(y_1)$ and $p_2(y_2)$. Then find $E(Y_1)$, $E(Y_1^2)$ and $E(Y_2)$.

B) 5.77 Let Y_1 and Y_2 have joint pdf

$$f(y_1, y_2) = \begin{cases} 6(1 - y_2), & \text{if } 0 \le y_1 \le y_2 \le 1 \\ 0, & \text{otherwise.} \end{cases}$$

a) Find $E(Y_1)$ and $E(Y_2)$.

b) Find $V(Y_1)$ and $V(Y_2)$.

c) Find $E(Y_1 - 3Y_2)$.

comment: In HW 10, Ea), you showed that

$$f_{Y_1}(y_1) = 3(1 - y_1)^2, \text{ for } 0 \le y_1 \le 1$$

and is zero elsewhere. Use this marginal to find $E(Y_1)$ and $V(Y_1)$. You also showed that

$$f_{Y_2}(y_2) = 6y_2(1 - y_2), \text{ for } 0 \le y_2 \le 1$$

and is zero elsewhere. Use this marginal to find $E(Y_2)$ and $V(Y_2)$.

C) 5.89 Suppose that the joint distribution of Y_1 and Y_2 is given by the table below. Find $Cov(Y_1, Y_2)$.

$p(y_1, y_2)$		y_1 0	1	2
y_2	0	1/9	2/9	1/9
	1	2/9	2/9	0
	2	1/9	0	0

comment: In problem A), you found $E(Y_1)$ and $E(Y_2)$. Now find $E(Y_1Y_2)$ and plug into the formula.

D) 5.91 Let Y_1 and Y_2 have joint pdf

$$f(y_1, y_2) = \begin{cases} 4y_1y_2, & \text{if } 0 \le y_1 \le 1,\ 0 \le y_2 \le 1 \\ 0, & \text{otherwise.} \end{cases}$$

Show that $Cov(Y_1, Y_2) = 0$.

comment: The easiest way to do this is to show that Y_1 and Y_2 are independent.

E) 5.92 Let Y_1 and Y_2 have joint pdf

$$f(y_1, y_2) = \begin{cases} 6(1 - y_2), & \text{if } 0 \le y_1 \le y_2 \le 1 \\ 0, & \text{otherwise.} \end{cases}$$

Find $Cov(Y_1, Y_2)$. Are Y_1 and Y_2 independent?

comment: In problem B), you found $E(Y_1)$ and $E(Y_2)$. Find $E(Y_1Y_2)$ and plug into the formula.