

Due date: 11:59 PM Tuesday 10/19/2021

Directions:

- **Examples** are demonstrated by TA. You should watch the TA working through the problem and takes notes.
- **Exercises** are for you to work on with/without the help of TA. You will be graded on your work for the exercises. Always show your work!
- Each part is worth 2 points. There are 5 parts in total.

Updated 3: Lab 07 was updated at 9:30 PM on Tuesday 10/12/2021. Exercise 2(b) was changed.

Example 1:

Let the random variables X and Y have the joint pmf

$$f(x, y) = \frac{x + y}{32}, \quad x = 1, 2, \quad y = 1, 2, 3, 4.$$

a) Find the expected value of X , μ_X , and the expected value of Y , μ_Y .

b) Find $P(X + Y < 5)$.

c) Find $P(X \cdot Y \geq 4)$.

Exercise 1:

Let X_1 and X_2 have the joint pmf

$$f(x_1, x_2) = \frac{x_1 + 3x_2}{27}, \quad x_1 = 1, 2, \quad x_2 = 0, 1, 2$$

a) Find the expected value of X_1 , μ_1 , and the expected value of X_2 , μ_2 .

b) Find $P(X_1 + 2X_2 \geq 4)$.

c) Find $E(X_1 \cdot X_2)$.

Example 2:

Suppose Jane has a fair 4-sided die, and Dick has a fair 6-sided die. Each day, they roll their dice at the same time (**independently**) until someone rolls a “1”. (Then the person who did not roll a “1” does the dishes.) Find the probability that ...

a) they roll the first “1” at the same time (after equal number of attempts)

b) Dick rolls the first “1” before Jane does.

Exercise 2:

Let X and Y be two **independent** random variables. X follows a Poisson distribution with mean of 5. And Y follows a Geometric distribution with the probability of success of $1/4$.

a) Find $P(X = Y)$.

b) Find $P(2X < Y)$.