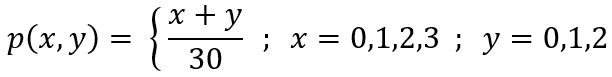
**STAT 351 Homework 8   Due by 11.59pm on Thursday, June 3**

Instructions:

* **Please see the lecture notes on May 25 and 27 for similar problems.**
* **Please write all the important steps of your work to get full points. If there are no clear steps of your work, you may lose points.**
* **Please provide only one final answer and if a question has a number for the final answer, then please circle or box the final answer.**
* **You are encouraged to work on this assignment in groups. However, you cannot write exactly same explanations.**
* **If I see the exact same explanation on two or more assignments, then I’ll give zero points for those assignments.**

**Problem 1:** Consider the joint probability distribution of X and Y given by



(a) Compute covariance between X and Y. **Your final answer must be a single number.**

>> p = [0/30, 1, 2; 1, 2, 3; 2, 3, 4; 3, 4, 5]

p =

0 1 2

1 2 3

2 3 4

3 4 5

>> pXY = p/30

pXY =

0 0.0333 0.0667

0.0333 0.0667 0.1000

0.0667 0.1000 0.1333

0.1000 0.1333 0.1667

>> x = [0,1,2,3]

x = 0 1 2 3

>> y = [0,1,2]

y = 0 1 2

>> lx = length(x); ly = length(y)

>> s1 = 0; for i = 1:1x; for j = 1:ly; s1 = s1 + x(i) \* y(j) \* pXY(i,j); end; end

S1== 0 there for we know for the independent random variables X and Y, they are unrelated (or have a non-linear relationship.).

(b) Based on computed covariance between X and Y, explain the relationship between X and Y.

S1== 0 there for we know for the independent random variables X and Y, they are unrelated (or have a non-linear relationship.).

(c) Compute correlation between X and Y. **Your final answer must be a single number.**

(d) Based on compute correlation between X and Y, explain the relationship between X and Y.

(e) Compute the expected value of 2+Y−X. **Your final answer must be a single number.**

(f) Compute the variance of 2+Y−X. **Your final answer must be a single number.**

**Problem 2**: A car dealership sells 0, 1, or 2 luxury cars on any day. When selling a car, the dealer also tries to persuade the customer to buy an extended warranty for the car.

Let X denote the number of luxury cars sold in a given day, and let Y denote the number of extended warranties sold.

The joint probability function of X and Y can be given by the following table.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | Y | | |
|  |  | 0 | 1 | 2 |
| X | 0 | 1/6 | 0 | 0 |
| 1 | 1/12 | 1/6 | 0 |
| 2 | 1/12 | 1/3 | 1/6 |

(a) Compute covariance between the number of luxury cars and the number of extended warranties sold on a given day. **Your final answer must be a single number.**

(b) Based on computed covariance, explain the relationship between the number of luxury cars and the number of extended warranties sold on a given day.

(c) Compute correlation between X and Y. **Your final answer must be a single number.**

(d) Based on computed correlation, explain the relationship between the number of luxury cars and the number of extended warranties sold on a given day.

**Problem 3:** Given the joint density function 

(a) Compute covariance between X and Y. **Your final answer must be a single number.**

(b) Based on computed covariance between X and Y, explain the relationship between X and Y.

(c) Compute correlation between X and Y. **Your final answer must be a single number.**

(d) Based on computed correlation between X and Y, explain the relationship between X and Y.

**Problem 4**:

An electronic system has each of two different types of components in joint operation.

Let X and Y denote the lengths of life, in hundreds of hours, for components of type I and type II, respectively.

The performance of a component is independent for each other.

Let E(X) = 3, E(Y) = 2, E(X2) = 20, and E(Y2) = 7.

The cost of replacing the two components depends upon their length of life at failure and it is given by C = 50 + 2X + 4Y.

(a) Compute the average cost of replacing the two components. That is, compute the expected value of the given cost function. **Your final answer must be a single number.**

(b) Compute the standard deviation of cost of replacing the two components. That is, compute the standard deviation of the given cost function. **Your final answer must be a single number.**

**Problem 5**:

Let E(X) = 2, E(Y) = −1, Var(X) = 1, Var(Y) = 4, and E(XY) = −3.5.

(a) Compute Corr(X,Y). That is, compute correlation between X and Y. **Your final answer must be a single number.**

(b) Based on computed correlation between X and Y, explain the relationship between X and Y.

(c) Compute E(X – Y2). That is, compute expected value of X – Y2. **Your final answer must be a single number.**

(d) Compute Var(X + 2Y). That is, compute variance of X + 2Y. **Your final answer must be a single number.**

(e) Compute E(3Y-2X+5)**.** That is, compute expected value of 3Y-2X+5. **Your final answer must be a single number.**

(f) Compute Var(3Y-2X+5). That is, compute variance of 3Y-2X+5. **Your final answer must be a single number.**