Exam 1

This assignment was locked Mar 11 at 4pm.

CSE-5301 Exam 1

Due : 3:50:00 pm (Central time)

Exam should be submitted electronically by uploading your documents (PDF) to Canvas .

If you are submitting the scanned version of your hand written solution, make sure that is readable, otherwise you will get a 0.

You need to write your name and your student Id at the top of Every Page you are submitting.

1. Assume that in a course we notice that 15 students are PhD students and 10 are master students (there might be some undergrads as well). 6 students are master and CS (computer science) major and 10 students are PhD and CS major. The total number of students who are master or PhD or CS major is 27. Find the total number of students who are CS major (include the calculations). (12 points)

2. Suppose that we have an unfair die which gives us the outcomes with the following probabilities:

Outcomes	1	2	3	4	5	6
Probability	0.15	0.1	0.2	0.05	0.4	0.1

Find the Mean, Variance and Standard deviation (include the calculations). (5 + 5 + 1 points)

3. You are given two random variable X and Y with their joint PMF shown below: (include the calculations)

	Y = 3	Y = 4	Y = 5

X = 1	1/8	1/24	1/12
X = 2	1/12	1/8	1/6
X = 3	1/4	1/12	1/24

1. Find $P(X = 3, Y \geq 2)$ (3 points)
2. Calculate the marginal PMF of X and Y. (10 points)
3. Find $P(X = 1 \mid Y = 3)$ (3 points)

4. There is a job opening for 5 positions in a company, Out of received applications, 15 of them are males and 9 are females. Find the probability that 2 females and 3 males will be chosen for the positions(include step by step calculations) (13 points)

5. You are given the following sets : E = {5, 3, 2} , F = {8, 9} , G = {2, 4, 6, 8} and the universal set is S= {0, 1, 2, 3, 4, 5, 6, 7, 8, 9}. Find the following sets: (include the calculations)(5 points each)

1. $(E \cup F \cup G)^C$
2. $(E \cap F \cap G)^C$
3. $E \cap (F \cup G)$
4. $E \cup (F \cap G)$

6. You are given X and Y as two jointly continuous random variable with their joint PDF as below: (include the calculations)

$f_{X,Y}(x,y) = \{cy^3 + 2x^2 + 1, \quad 0 \leq x, y \leq 1$ (when x, y are between 0 - 1, this is their joint PDF and it is 0 otherwise)

1. Find the constant C (5 points)
2. Find the marginal PDF for x and y (9 points)
3. Find $P(0 \leq X, Y \leq 0.25)$ (5 points)
4. Find $E[X^2Y]$ (9 points)