Explain your steps. The calculations and answers should be written neatly on paper which is attached as a single pdf. Submits the solution on GoogleClassroom with in dua date.

Problem 1

The discrete random variables x and y have joint probability mass function $f(x, y) = cxy$ for $x = 1, 2, 3, y = 1, 2$, and zero otherwise.

(a) Find the value of the constant c and calculate the marginal distribution functions.

(b) Find $f(y|X = 3)$

Problem 2

A jar contains 30 red marbles, 50 green marbles and 20 blue marbles. A sample of 15 marbles is selected with replacement. Let X be the number of red marbles and Y be the number of blue marbles. What is the joint probability mass function of X and Y ?

Problem 3

Let $f_{x,y}(x, y) = \begin{cases} c(x + y) & \text{for } 0 \leq x \leq 1 \text{ and } 0 \leq y \leq x \\ 0 & \text{otherwise} \end{cases}$

(a) Find the constant c.

(b) What is marginal distribution function of X alone that is $g(x)$.

(c) Find the cumulative distribution function of $g(x)$

Problem 4

Let X denote the number of times a photocopy machine will malfunction: $x = 0, 1, 2$, or 3 times, on any given month. Let Y denote the number of times a technician is called on an emergency call. The joint p.m.f. is presented in the table below:

$f(x, y)$		x = 0	1	2	3	Row sum
y	0	.15	.30	.05	.0	.50
	1	.05	.15	.05	.05	.30
	2	0	.05	.10	.05	.20
Column sum		.20	.50	.20	.10	1.00

(a) Find $P(Y > X)$

(b) Find $Cov(X, Y)$

(c) $E(X, Y)$

(d) Find the cumulative distribution function of the marginal distribution $g(x)$

Problem 5

Let, X has the following probability distribution:

x	1	2	3	4	5
$f(x)$	0.2	0.3	0.2	0.2	0.1

Find $E(X), Var(X)$ and $E(3X - 1)$