Octave Labs Semester 4

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Class: BTECH CSE 4B

Roll no: 2K19CSUN01082

Lab: 01

Objective: To find probability of each element of a matrix using programming in OCTAVE/ MATLAB.

Course Outcome CO: *Statement of CO14 from course plan*

Blooms Taxonomy Level*: BT1, BT2 & BT3*

Q1. Introduce Script file, disp and fprintf command and create function file.

Q2. Find probability of each element (column wise) of the following matrices:

(i) $A=\begin{bmatrix}2 & 1 & 1\\ 1 & 2 & 1\\ 3 & 3 & 2\end{bmatrix}$

(ii) $B=\begin{bmatrix}-1 & 1 & 4\\ 1 & -2 & 6\\ 5 & 4 & 3\end{bmatrix}$

(iii) $C=\begin{bmatrix}0 & 1 & 1\\ 1 & 0 & 1\\ 1 & 1 & 0\end{bmatrix}$

(iv) $D=\begin{bmatrix}1 & 0 & 0\\ 0 & 1 & 0\\ 0 & 0 & 1\end{bmatrix}$

Q3. Find probability of each element (column wise) of the following matrices:

(v) $A=\begin{bmatrix}0 & 1 & 1\\ 1 & 2 & 1\\ 3 & 3 & 2\end{bmatrix}$

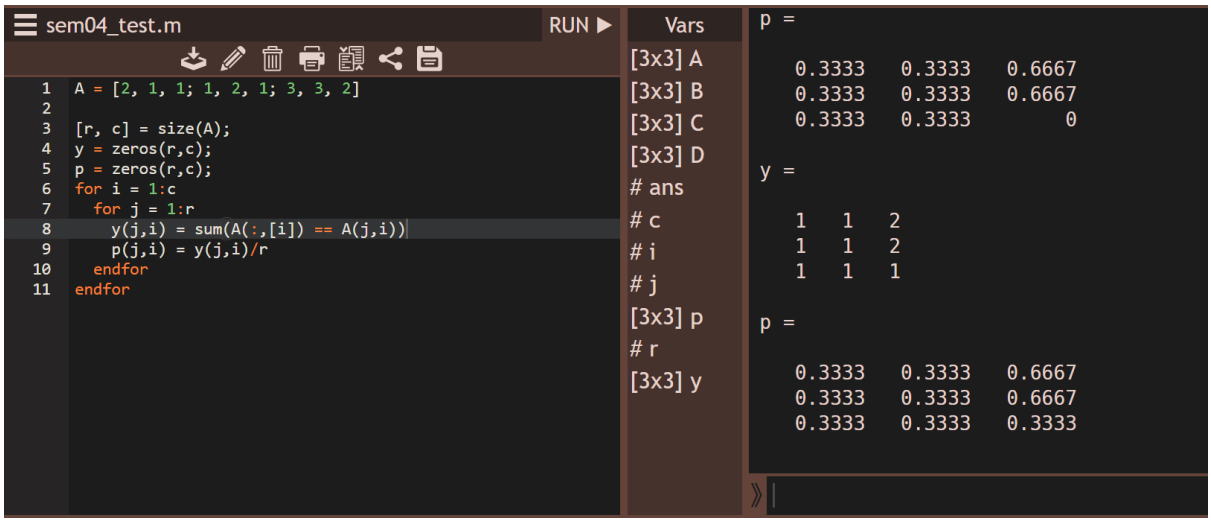
(vi) $B=\begin{bmatrix}3 & 1 & 4\\ 1 & -1 & 2\\ 5 & -4 & 3\end{bmatrix}$

(vii) $C=\begin{bmatrix}0 & 1 & 1\\ 1 & 0 & 1\\ 1 & 1 & 0\end{bmatrix}$

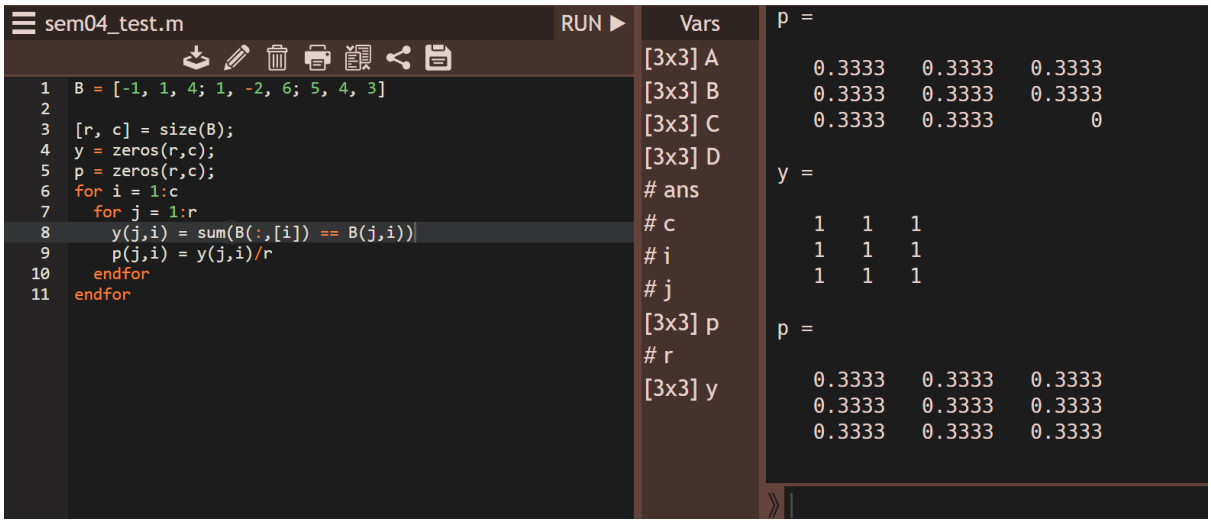
(viii) $D=\begin{bmatrix}0 & 0 & 0\\ 0 & 0 & 0\\ 0 & 0 & 0\end{bmatrix}$

Ans 2.

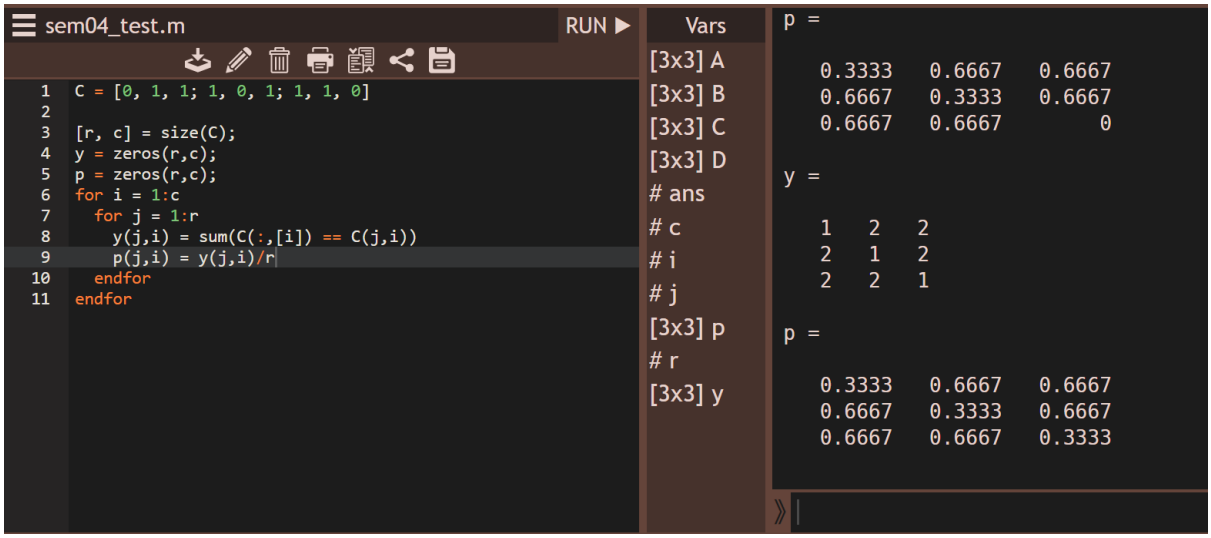
1)


sem04_test.m
RUN
A = [2, 1, 1; 1, 2, 1; 3, 3, 2]
[r, c] = size(A);
y = zeros(r,c);
p = zeros(r,c);
for i = 1:c
for j = 1:r
y(j,i) = sum(A(:,[i]) == A(j,i))
p(j,i) = y(j,i)/r
endfor
endfor
Vars
[3x3] A
[3x3] B
[3x3] C
[3x3] D
ans
c
i
j
[3x3] p
r
[3x3] y
p =
0.3333 0.3333 0.6667
0.3333 0.3333 0.6667
0.3333 0.3333 0
y =
1 1 2
1 1 2
1 1 1
p =
0.3333 0.3333 0.6667
0.3333 0.3333 0.6667
0.3333 0.3333 0.3333

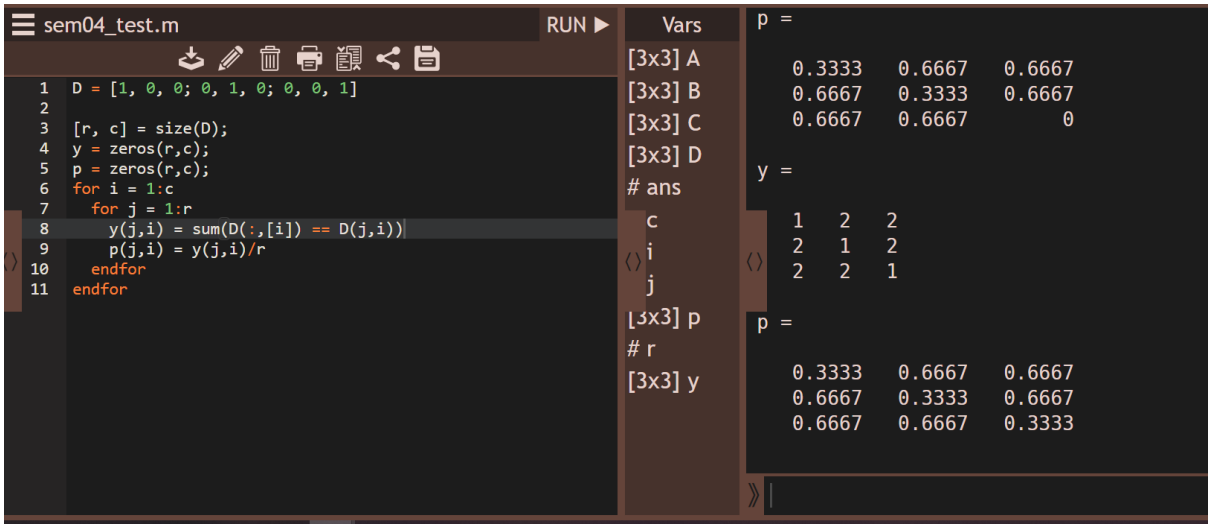
2)


sem04_test.m
RUN
B = [-1, 1, 4; 1, -2, 6; 5, 4, 3]
[r, c] = size(B);
y = zeros(r,c);
p = zeros(r,c);
for i = 1:c
for j = 1:r
y(j,i) = sum(B(:,[i]) == B(j,i))
p(j,i) = y(j,i)/r
endfor
endfor
Vars
[3x3] A
[3x3] B
[3x3] C
[3x3] D
ans
c
i
j
[3x3] p
r
[3x3] y
p =
0.3333 0.3333 0.3333
0.3333 0.3333 0.3333
0.3333 0.3333 0
y =
1 1 1
1 1 1
1 1 1
p =
0.3333 0.3333 0.3333
0.3333 0.3333 0.3333
0.3333 0.3333 0.3333

3)

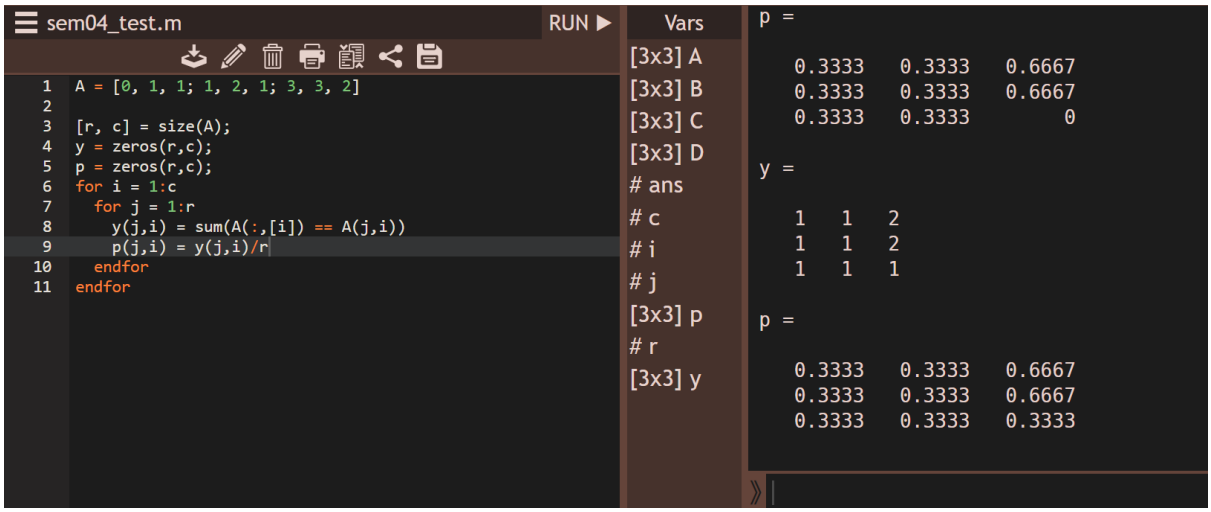

sem04_test.m
RUN
C = [0, 1, 1; 1, 0, 1; 1, 1, 0]
[r, c] = size(C);
y = zeros(r,c);
p = zeros(r,c);
for i = 1:c
for j = 1:r
y(j,i) = sum(C(:,[i]) == C(j,i))
p(j,i) = y(j,i)/r
endfor
endfor
Vars
[3x3] A
[3x3] B
[3x3] C
[3x3] D
ans
c
i
j
[3x3] p
r
[3x3] y
p =
0.3333 0.6667 0.6667
0.6667 0.3333 0.6667
0.6667 0.6667 0
y =
1 2 2
2 1 2
2 2 1
p =
0.3333 0.6667 0.6667
0.6667 0.3333 0.6667
0.6667 0.6667 0.3333

4)

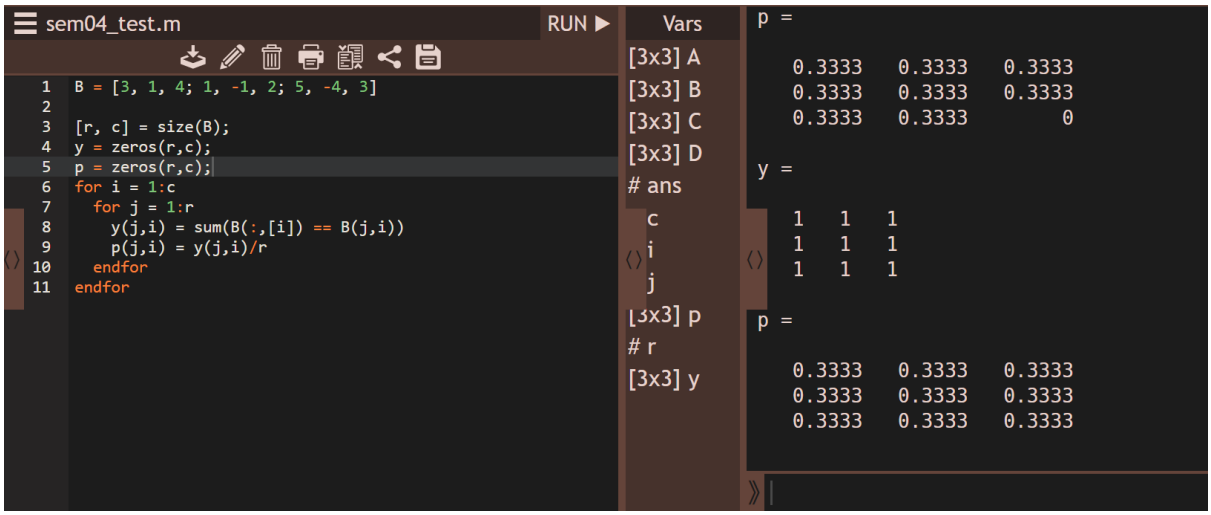

sem04_test.m
RUN
D = [1, 0, 0; 0, 1, 0; 0, 0, 1]
[r, c] = size(D);
y = zeros(r,c);
p = zeros(r,c);
for i = 1:c
for j = 1:r
y(j,i) = sum(D(:,[i]) == D(j,i))
p(j,i) = y(j,i)/r
endfor
endfor
Vars
[3x3] A
[3x3] B
[3x3] C
[3x3] D
ans
c
i
j
[3x3] p
r
[3x3] y
p =
0.3333 0.6667 0.6667
0.6667 0.3333 0.6667
0.6667 0.6667 0
y =
1 2 2
2 1 2
2 2 1
p =
0.3333 0.6667 0.6667
0.6667 0.3333 0.6667
0.6667 0.6667 0.3333

Ans 3.

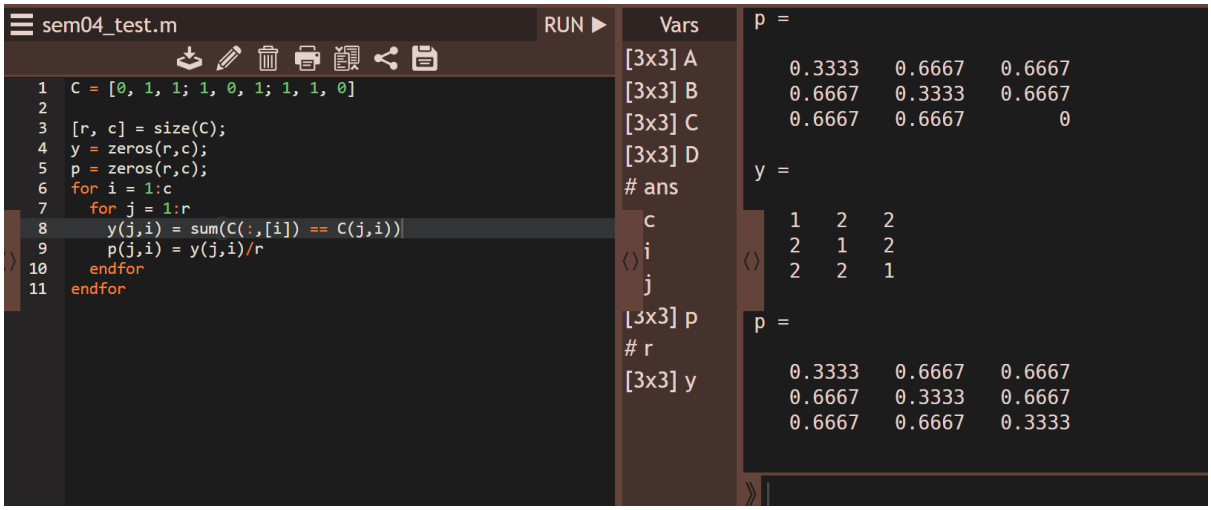
5)


sem04_test.m
RUN
A = [0, 1, 1; 1, 2, 1; 3, 3, 2]
[r, c] = size(A);
y = zeros(r,c);
p = zeros(r,c);
for i = 1:c
for j = 1:r
y(j,i) = sum(A(:,[i]) == A(j,i))
p(j,i) = y(j,i)/r
endfor
endfor
Vars
[3x3] A
[3x3] B
[3x3] C
[3x3] D
ans
c
i
j
[3x3] p
r
[3x3] y
p =
0.3333 0.3333 0.6667
0.3333 0.3333 0.6667
0.3333 0.3333 0
y =
1 1 2
1 1 2
1 1 1
p =
0.3333 0.3333 0.6667
0.3333 0.3333 0.6667
0.3333 0.3333 0.3333

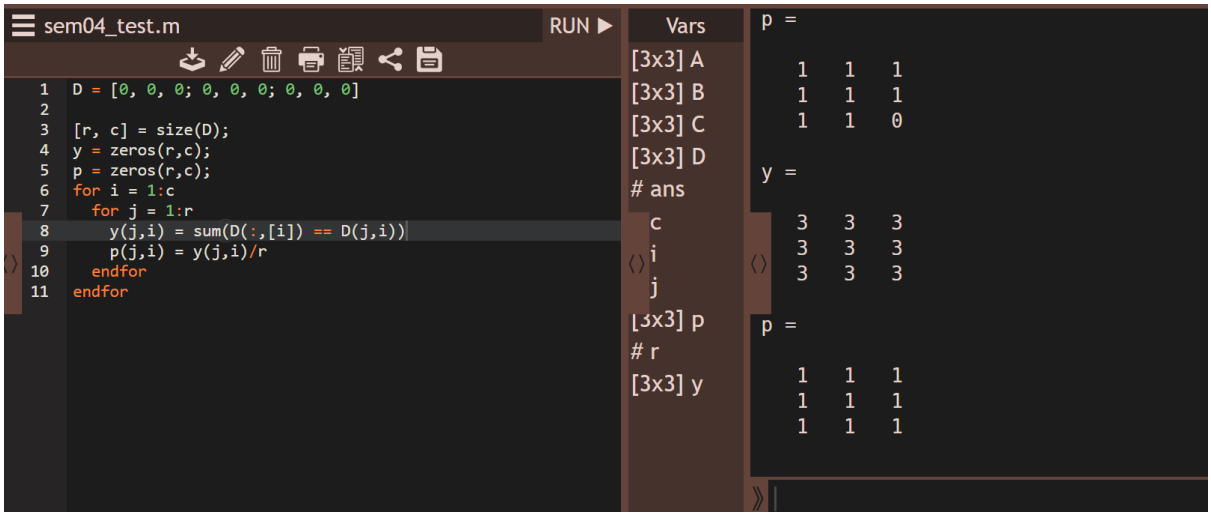
6)


sem04_test.m
RUN
B = [3, 1, 4; 1, -1, 2; 5, -4, 3]
[r, c] = size(B);
y = zeros(r,c);
p = zeros(r,c);
for i = 1:c
for j = 1:r
y(j,i) = sum(B(:,[i]) == B(j,i))
p(j,i) = y(j,i)/r
endfor
endfor
Vars
[3x3] A
[3x3] B
[3x3] C
[3x3] D
ans
c
i
j
[3x3] p
r
[3x3] y
p =
0.3333 0.3333 0.3333
0.3333 0.3333 0.3333
0.3333 0.3333 0
y =
1 1 1
1 1 1
1 1 1
p =
0.3333 0.3333 0.3333
0.3333 0.3333 0.3333
0.3333 0.3333 0.3333

7)


sem04_test.m
RUN
C = [0, 1, 1; 1, 0, 1; 1, 1, 0]
[r, c] = size(C);
y = zeros(r,c);
p = zeros(r,c);
for i = 1:c
for j = 1:r
y(j,i) = sum(C(:,[i]) == C(j,i))
p(j,i) = y(j,i)/r
endfor
endfor
Vars
[3x3] A
[3x3] B
[3x3] C
[3x3] D
ans
c
i
j
[3x3] p
r
[3x3] y
p =
0.3333 0.6667 0.6667
0.6667 0.3333 0.6667
0.6667 0.6667 0
y =
1 2 2
2 1 2
2 2 1
p =
0.3333 0.6667 0.6667
0.6667 0.3333 0.6667
0.6667 0.6667 0.3333

8)


sem04_test.m
RUN
D = [0, 0, 0; 0, 0, 0; 0, 0, 0]
[r, c] = size(D);
y = zeros(r,c);
p = zeros(r,c);
for i = 1:c
for j = 1:r
y(j,i) = sum(D(:,[i]) == D(j,i))
p(j,i) = y(j,i)/r
endfor
endfor
Vars
[3x3] A
[3x3] B
[3x3] C
[3x3] D
ans
c
i
j
[3x3] p
r
[3x3] y
p =
1 1 1
1 1 1
1 1 0
y =
3 3 3
3 3 3
3 3 3
p =
1 1 1
1 1 1
1 1 1

Lab: 02

Objective: To find probability of each element of a matrix using programming in OCTAVE/ MATLAB.

***Course Outcome CO*:** *Statement of CO14 from course plan*

***Blooms Taxonomy Level**: BT1, BT2 & BT3*

Q1. Find probability of each element (row wise) of the following matrices:

(ix) $A=\begin{bmatrix} 2 & 1 & 1 \\ 1 & 2 & 1 \\ 3 & 3 & 2 \end{bmatrix}$

(x) $B=\begin{bmatrix} -1 & 1 & 4 \\ 1 & -2 & 6 \\ 5 & 4 & 3 \end{bmatrix}$

(xi) $C=\begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix}$

(xii) $D=\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

Q2. Find probability of each element (row wise) of the following matrices:

(xiii) $A=\begin{bmatrix} 0 & 1 & 1 \\ 1 & 2 & 1 \\ 3 & 3 & 2 \end{bmatrix}$

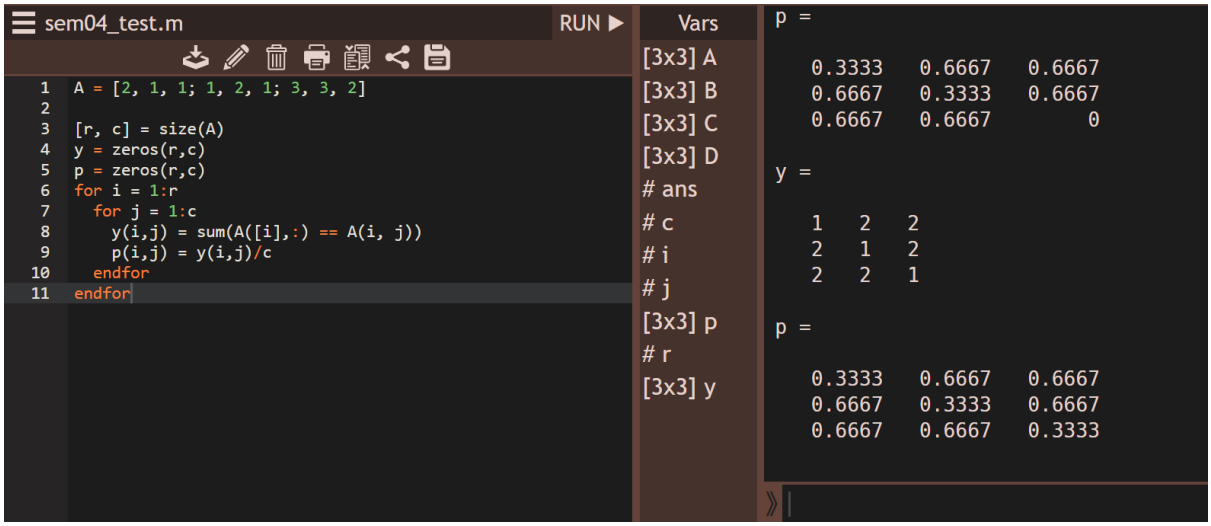
(xiv) $B=\begin{bmatrix} 3 & 1 & 4 \\ 1 & -1 & 2 \\ 5 & -4 & 3 \end{bmatrix}$

(xv) $C=\begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix}$

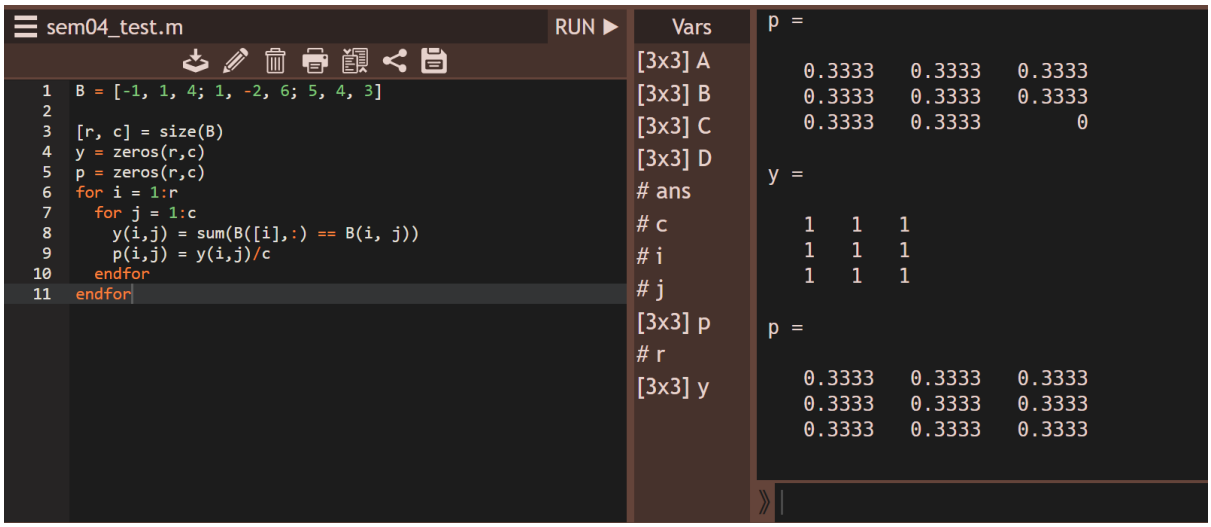
(xvi) $D=\begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$

Ans 1.

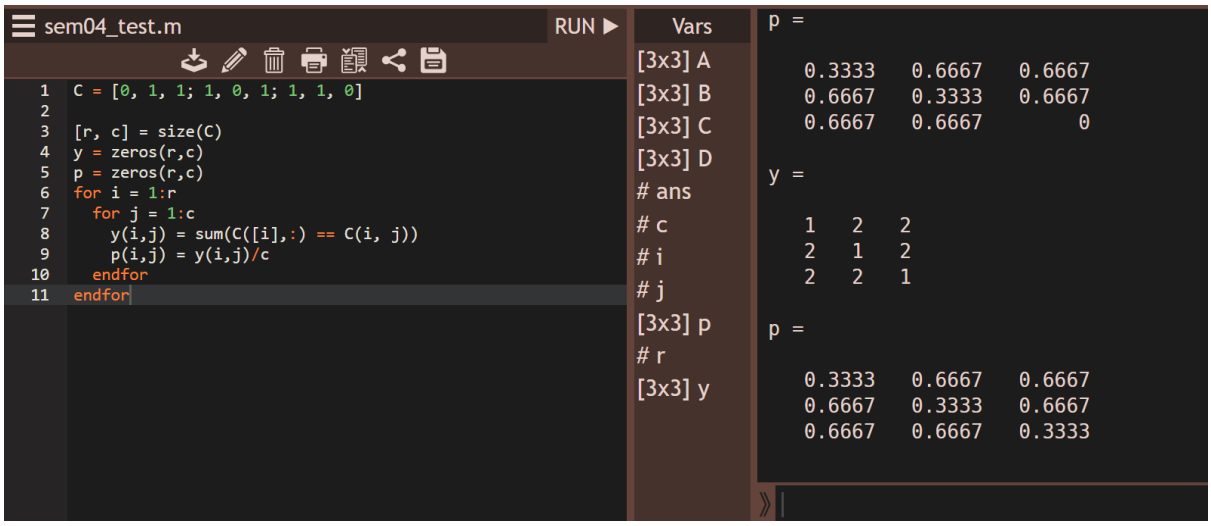
9)


sem04_test.m
RUN
A = [2, 1, 1; 1, 2, 1; 3, 3, 2]
[r, c] = size(A)
y = zeros(r,c)
p = zeros(r,c)
for i = 1:r
for j = 1:c
y(i,j) = sum(A([i],:) == A(i, j))
p(i,j) = y(i,j)/c
endfor
endfor
Vars
[3x3] A
[3x3] B
[3x3] C
[3x3] D
ans
c
i
j
[3x3] p
r
[3x3] y
p =
0.3333 0.6667 0.6667
0.6667 0.3333 0.6667
0.6667 0.6667 0
y =
1 2 2
2 1 2
2 2 1
p =
0.3333 0.6667 0.6667
0.6667 0.3333 0.6667
0.6667 0.6667 0.3333

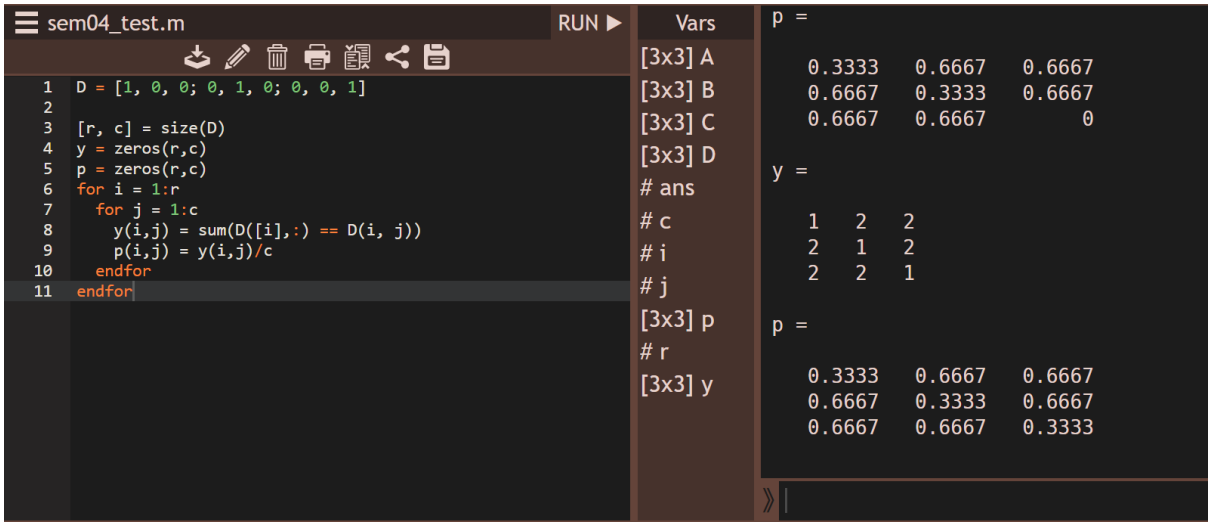
10)


sem04_test.m
RUN
B = [-1, 1, 4; 1, -2, 6; 5, 4, 3]
[r, c] = size(B)
y = zeros(r,c)
p = zeros(r,c)
for i = 1:r
for j = 1:c
y(i,j) = sum(B([i],:) == B(i, j))
p(i,j) = y(i,j)/c
endfor
endfor
Vars
[3x3] A
[3x3] B
[3x3] C
[3x3] D
ans
c
i
j
[3x3] p
r
[3x3] y
p =
0.3333 0.3333 0.3333
0.3333 0.3333 0.3333
0.3333 0.3333 0
y =
1 1 1
1 1 1
1 1 1
p =
0.3333 0.3333 0.3333
0.3333 0.3333 0.3333
0.3333 0.3333 0.3333

11)

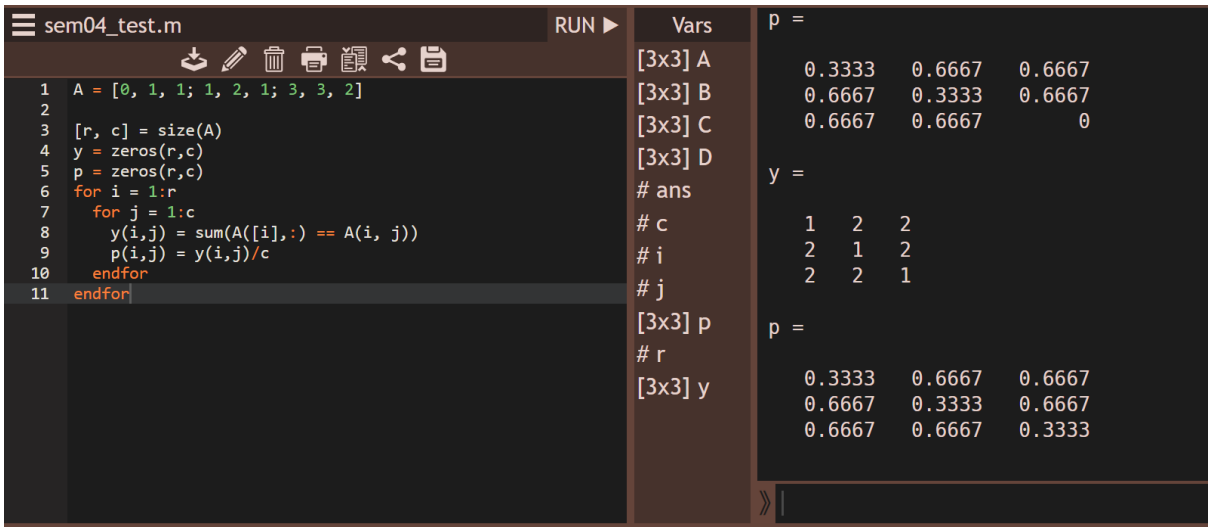

sem04_test.m
RUN
C = [0, 1, 1; 1, 0, 1; 1, 1, 0]
[r, c] = size(C)
y = zeros(r,c)
p = zeros(r,c)
for i = 1:r
for j = 1:c
y(i,j) = sum(C([i],:) == C(i, j))
p(i,j) = y(i,j)/c
endfor
endfor
Vars
[3x3] A
[3x3] B
[3x3] C
[3x3] D
ans
c
i
j
[3x3] p
r
[3x3] y
p =
0.3333 0.6667 0.6667
0.6667 0.3333 0.6667
0.6667 0.6667 0
y =
1 2 2
2 1 2
2 2 1
p =
0.3333 0.6667 0.6667
0.6667 0.3333 0.6667
0.6667 0.6667 0.3333

12)

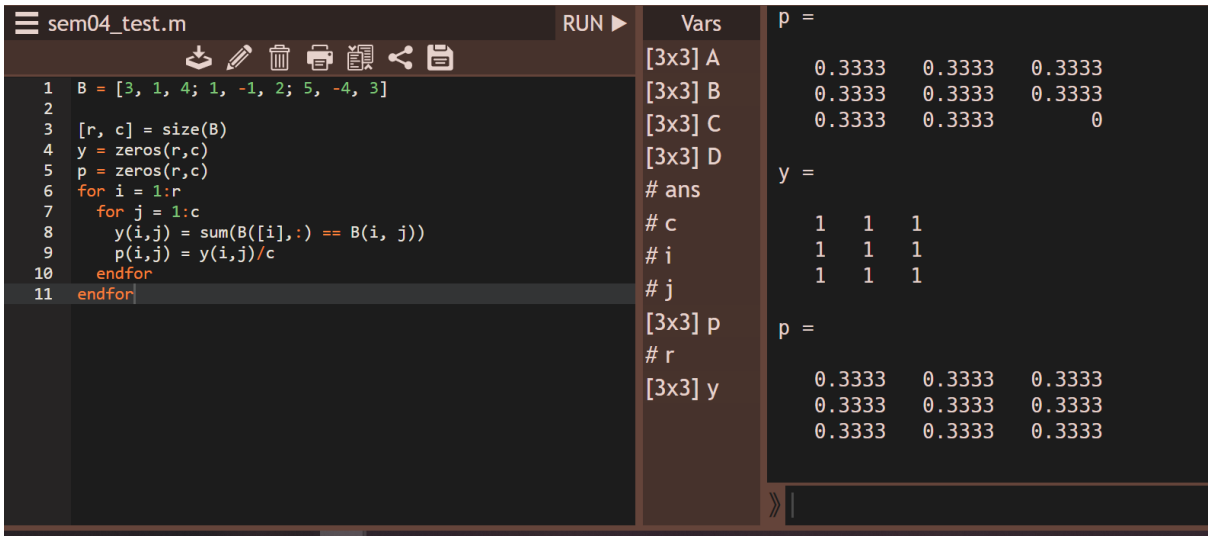

sem04_test.m
RUN
D = [1, 0, 0; 0, 1, 0; 0, 0, 1]
[r, c] = size(D)
y = zeros(r,c)
p = zeros(r,c)
for i = 1:r
for j = 1:c
y(i,j) = sum(D([i],:) == D(i, j))
p(i,j) = y(i,j)/c
endfor
endfor
Vars
[3x3] A
[3x3] B
[3x3] C
[3x3] D
ans
c
i
j
[3x3] p
r
[3x3] y
p =
0.3333 0.6667 0.6667
0.6667 0.3333 0.6667
0.6667 0.6667 0
y =
1 2 2
2 1 2
2 2 1
p =
0.3333 0.6667 0.6667
0.6667 0.3333 0.6667
0.6667 0.6667 0.3333

Ans 2.

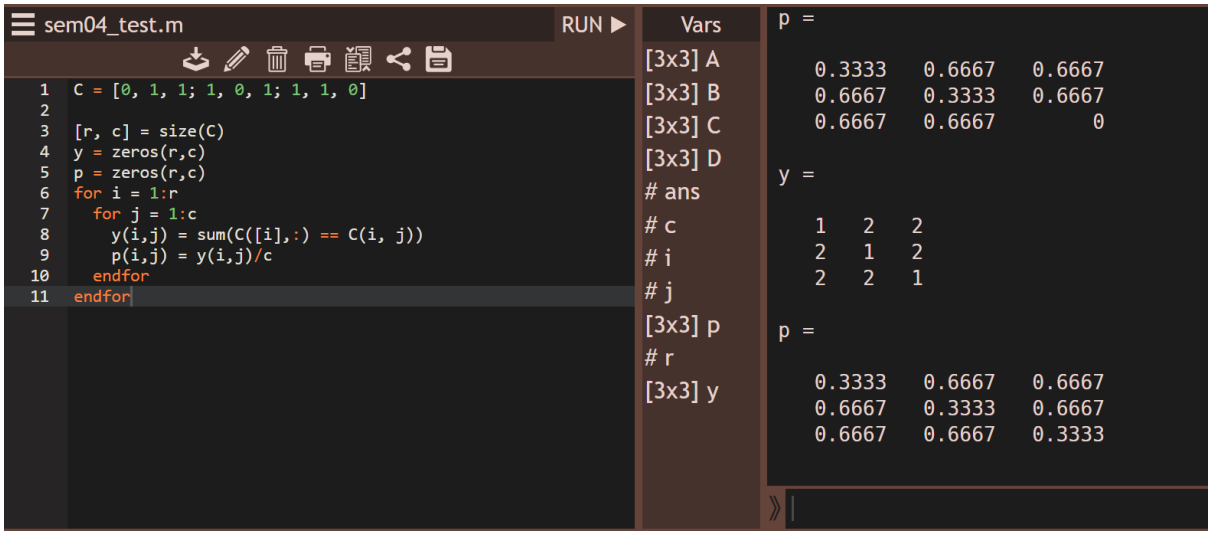
13)


sem04_test.m
RUN
A = [0, 1, 1; 1, 2, 1; 3, 3, 2]
[r, c] = size(A)
y = zeros(r,c)
p = zeros(r,c)
for i = 1:r
for j = 1:c
y(i,j) = sum(A([i],:) == A(i, j))
p(i,j) = y(i,j)/c
endfor
endfor
Vars
[3x3] A
[3x3] B
[3x3] C
[3x3] D
ans
c
i
j
[3x3] p
r
[3x3] y
p =
0.3333 0.6667 0.6667
0.6667 0.3333 0.6667
0.6667 0.6667 0
y =
1 2 2
2 1 2
2 2 1
p =
0.3333 0.6667 0.6667
0.6667 0.3333 0.6667
0.6667 0.6667 0.3333

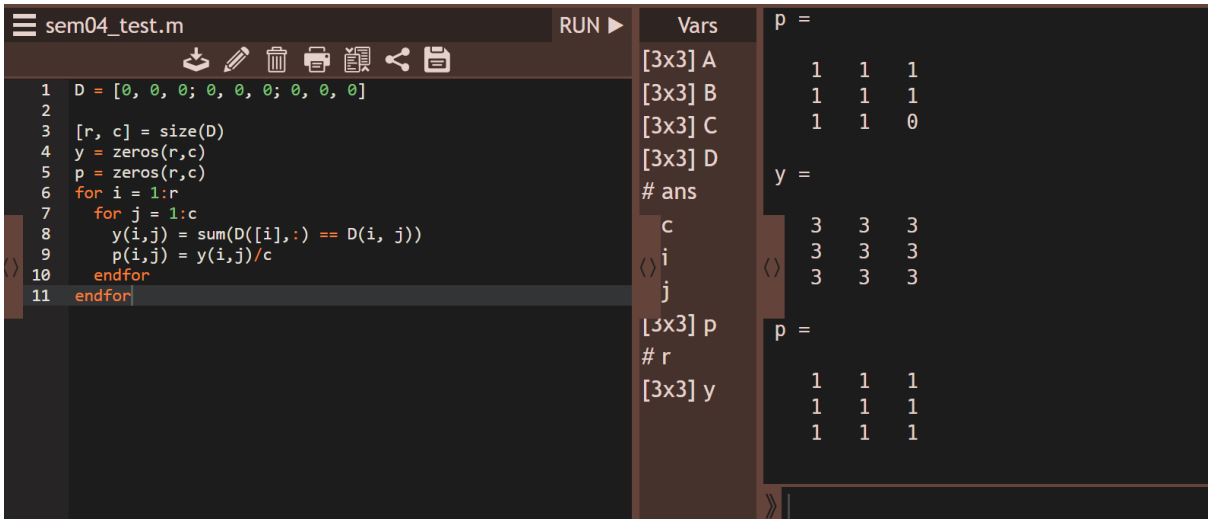
14)


sem04_test.m
RUN
B = [3, 1, 4; 1, -1, 2; 5, -4, 3]
[r, c] = size(B)
y = zeros(r,c)
p = zeros(r,c)
for i = 1:r
for j = 1:c
y(i,j) = sum(B([i],:) == B(i, j))
p(i,j) = y(i,j)/c
endfor
endfor
Vars
[3x3] A
[3x3] B
[3x3] C
[3x3] D
ans
c
i
j
[3x3] p
r
[3x3] y
p =
0.3333 0.3333 0.3333
0.3333 0.3333 0.3333
0.3333 0.3333 0
y =
1 1 1
1 1 1
1 1 1
p =
0.3333 0.3333 0.3333
0.3333 0.3333 0.3333
0.3333 0.3333 0.3333

15)


sem04_test.m
RUN
C = [0, 1, 1; 1, 0, 1; 1, 1, 0]
[r, c] = size(C)
y = zeros(r,c)
p = zeros(r,c)
for i = 1:r
for j = 1:c
y(i,j) = sum(C([i],:) == C(i, j))
p(i,j) = y(i,j)/c
endfor
endfor
Vars
[3x3] A
[3x3] B
[3x3] C
[3x3] D
ans
c
i
j
[3x3] p
r
[3x3] y
p =
0.3333 0.6667 0.6667
0.6667 0.3333 0.6667
0.6667 0.6667 0
y =
1 2 2
2 1 2
2 2 1
p =
0.3333 0.6667 0.6667
0.6667 0.3333 0.6667
0.6667 0.6667 0.3333

16)


sem04_test.m
RUN
D = [0, 0, 0; 0, 0, 0; 0, 0, 0]
[r, c] = size(D)
y = zeros(r,c)
p = zeros(r,c)
for i = 1:r
for j = 1:c
y(i,j) = sum(D([i],:) == D(i, j))
p(i,j) = y(i,j)/c
endfor
endfor
Vars
[3x3] A
[3x3] B
[3x3] C
[3x3] D
ans
c
i
j
[3x3] p
r
[3x3] y
p =
1 1 1
1 1 1
1 1 0
y =
3 3 3
3 3 3
3 3 3
p =
1 1 1
1 1 1
1 1 1

Lab: 03

Objective: To find probability of each element of a matrix using programming in OCTAVE/ MATLAB.

Course Outcome CO: *Statement of CO from course plan*

Blooms Taxonomy Level: *BT1, BT2 & BT3*

Q1. How many permutations and combinations are there if 5 subgroups are to be formed out of 26 groups?

Q2. Determine the number of handshakes if 20 people in a party shake hand with each other.

Q3. A question paper has two parts A & B. Part A has 5 questions and part B has 6 questions. In how many ways a student can attempt 4 questions in all by selecting at least 2 from each part?

Q4. A photograph is to be taken of a class consisting of 10 students including a head girl and a head boy. In how many ways can they be arranged for a photograph so that head boy and head girl do not sit together in a row?

Q5. In how many ways can a cricket eleven be chosen out of a batch of 15 players if

(i) a particular player is always chosen?
(ii) a particular player is never chosen?

Q6. What is the number of ways of choosing 4 cards from a pack of 52 playing cards? In how many of these

(i) four cards are of same suit
(ii) four cards belong to four different suits
(iii) four cards are face cards
(iv) two are red and two are black cards
(v) cards are of same colour

Q7. How many diagonals are there in a polygon with 20 sides?

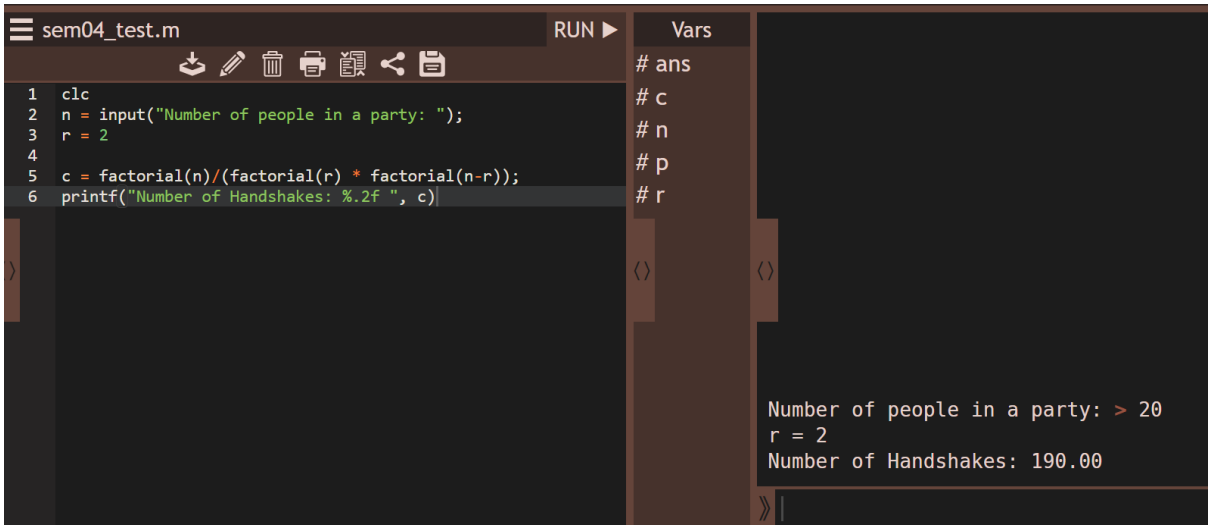
Q8. How many chords can be drawn through 21 points on a circle?

Q9. If 23 parallel lines in a plane are intersected by a family of 28 parallel lines. Find the number of parallelograms formed.

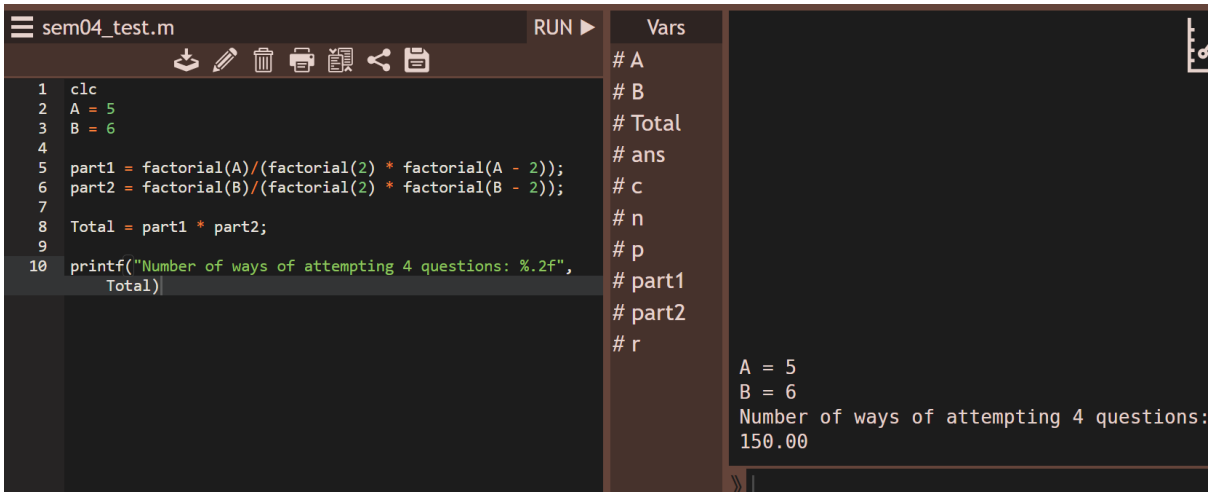
Q10. A committee of 3 persons is to be formed from a group of 2 men and 3 women. In how many ways can this be done? how many of these committees would consist of 1 man and 2 women?

Ans 1.

Ans 2.

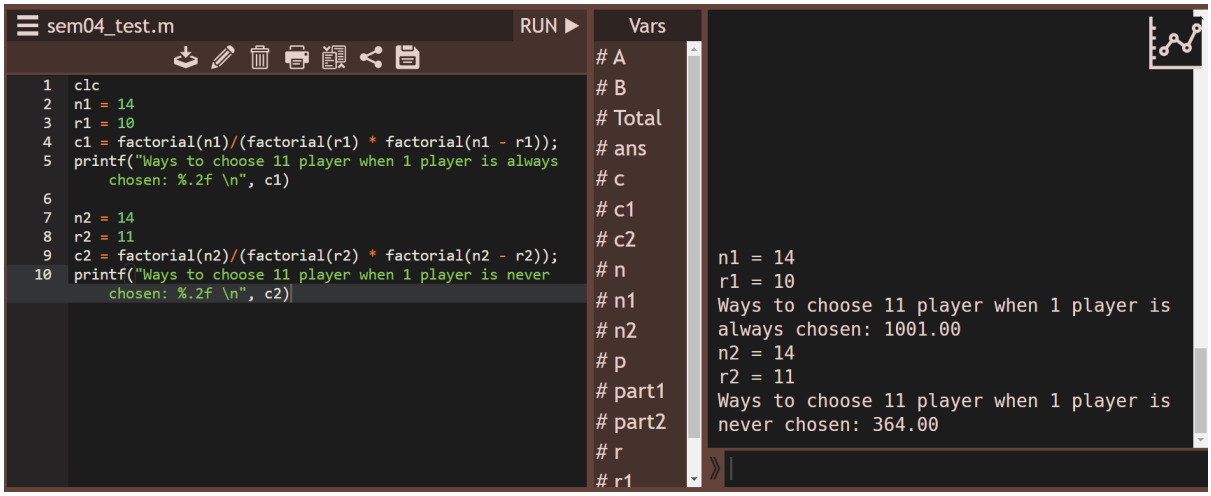


Ans 3.

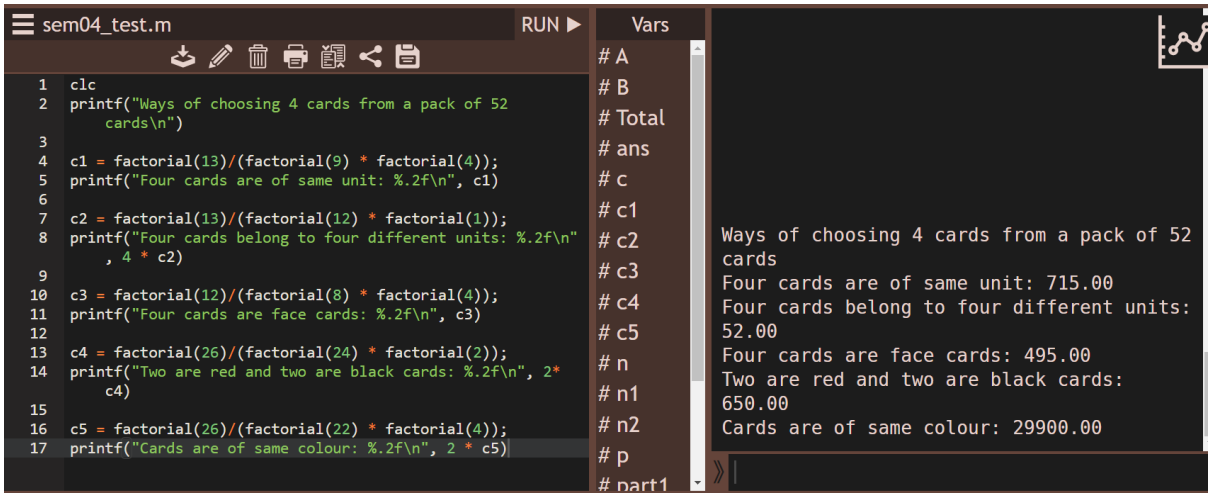


Ans 4.

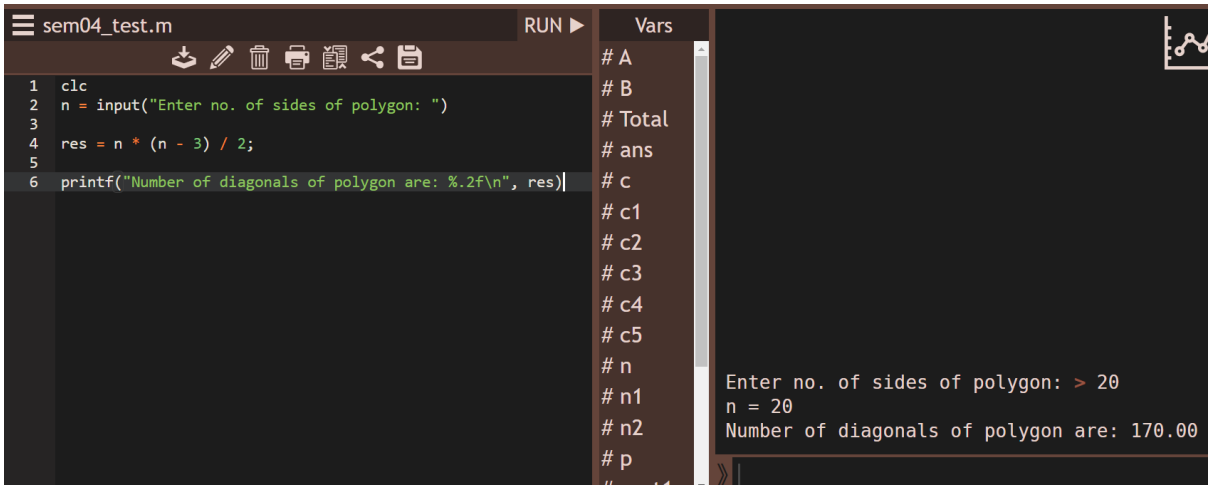
Ans 5.



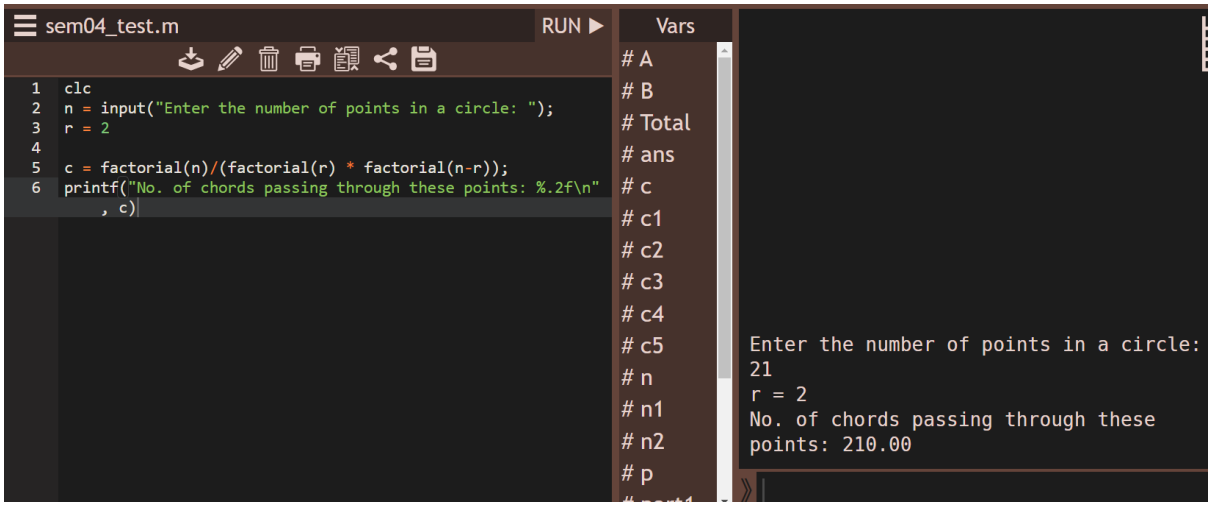
Ans 6.



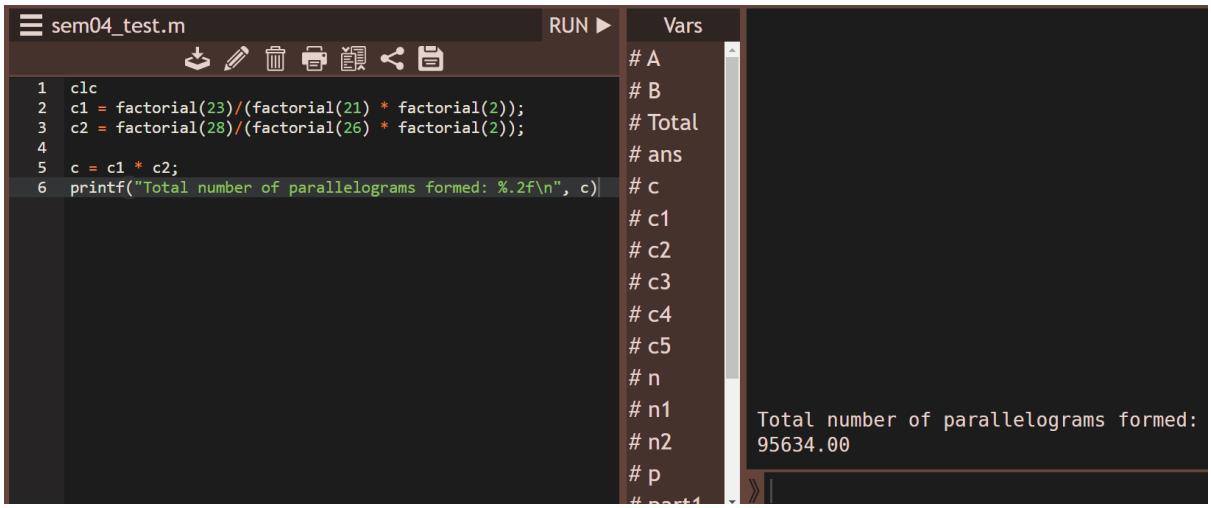
Ans 7.



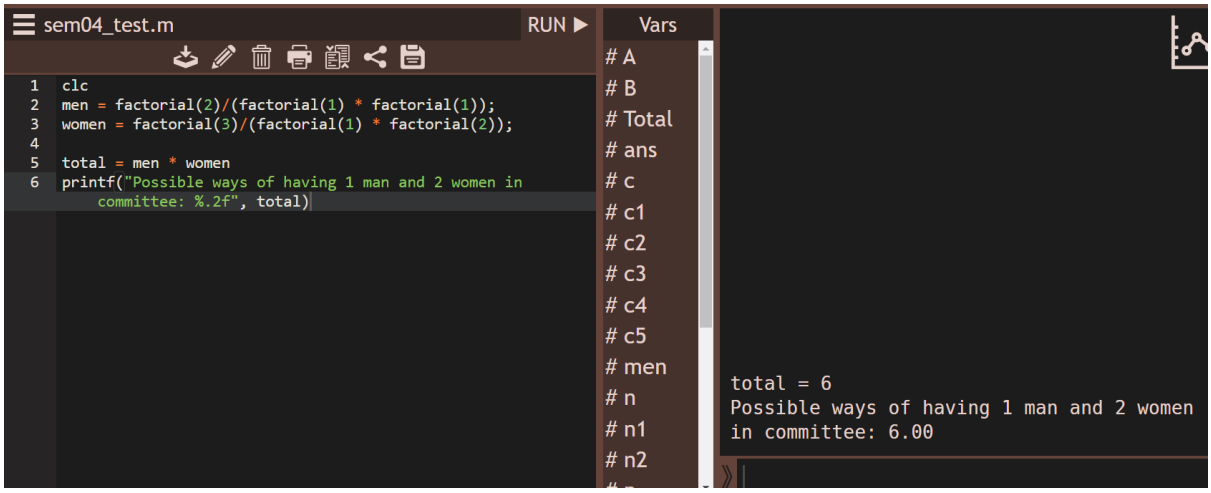
Ans 8.



Ans 9.



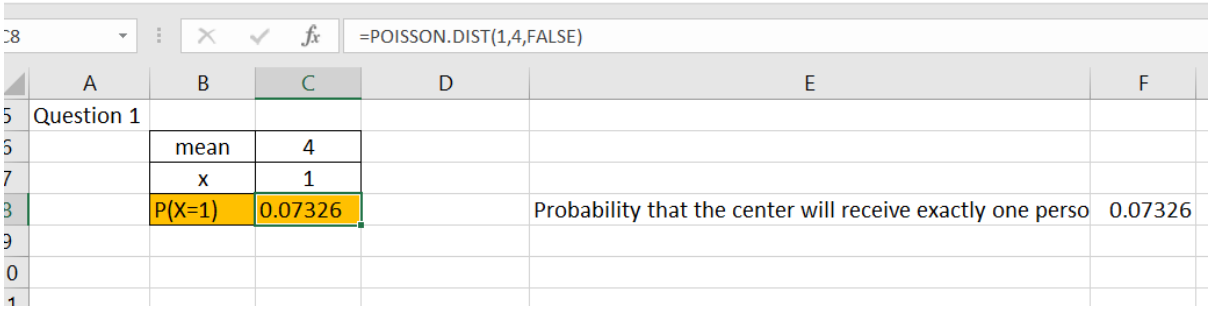
Ans10.



Lab – 4

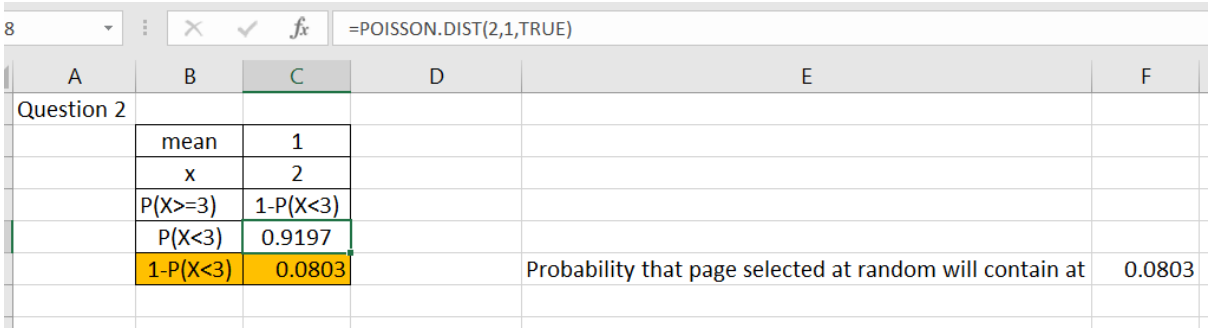
Q.1 Delhi Trauma Centre receives on an average 4 seriously injured persons involved in road accidents every day. It is found that arrival of such persons follows a Poisson distribution. Calculate the probability that the Centre will receive exactly on person in a day.

[0.07328]



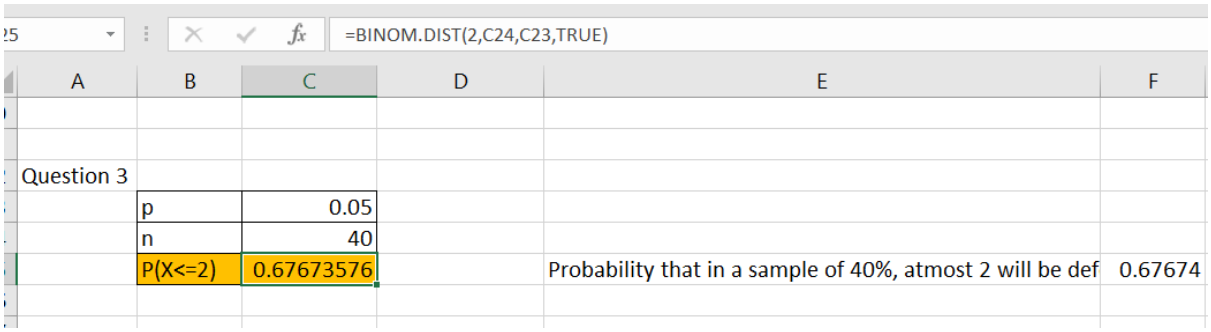
Q.2 Which probability distribution is appropriate to describe the situation where 100 misprints are distributed randomly throughout the 100 pages of a book? For this distribution, find the probability that a page selected at random will contain at least three misprints.

[0.0803]



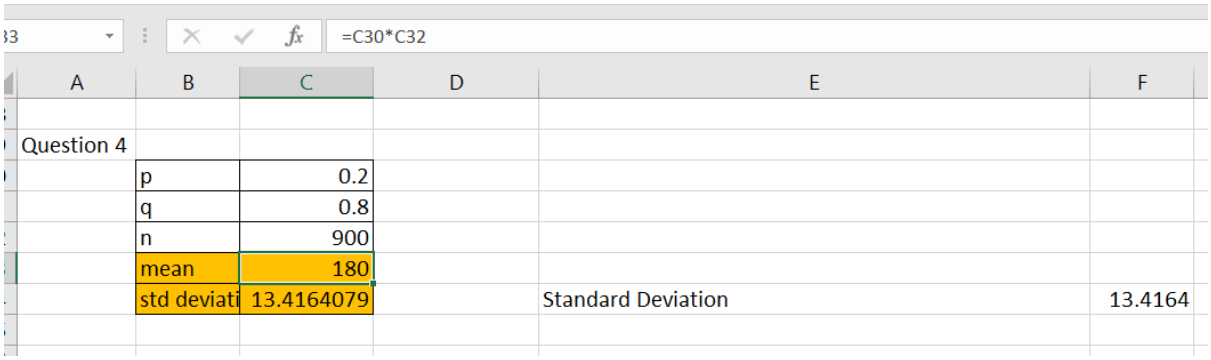
Q.3 In a certain manufacturing process, 5% of the tools produced turn out to be defective. Find the probability that in a sample of 40%, at most 2 will be defective.

[0.675]



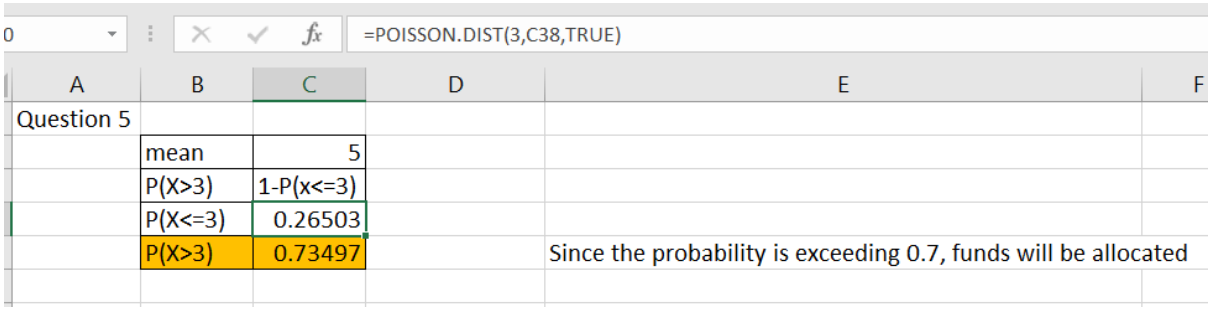
Q.4 If the probability of a defective bolt is 0.2 find (i) the mean and (ii) the standard deviation of the defective bolts in a total of 900 bolts.

[180; 13.4]



Q.5 On an average, five birds hit the Washington Monuments and are killed each week. Bill Garcy, an official of the National Park Service, has requested that Congress allocate funds for equipment to scare birds away from the monument. A congressional sub committee has replied that fund can not be allocated unless the probability of than three birds being killed in any week exceeds 0.7. Will the funds be allocated?

[0.7491]

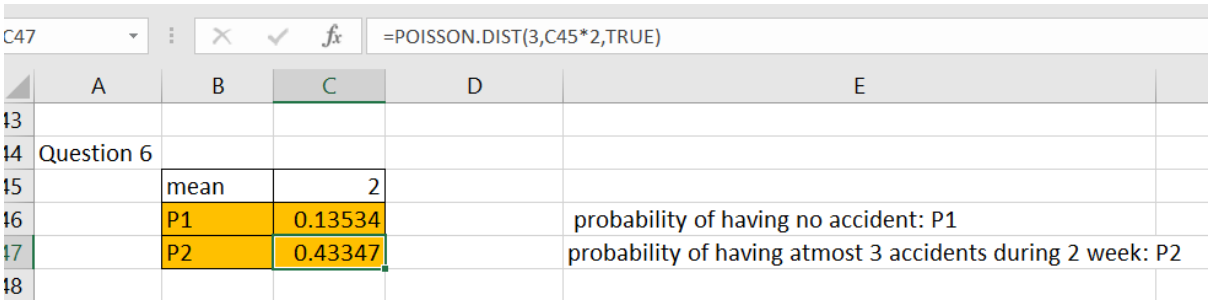


Q.6 It has been observed by the National Highway Authority of India that the average number of accidents of NH -8 Gurgaon – Delhi section is 2 per week. Assuming that the number of accidents follows Poisson Distribution, calculate:

(i) the probability of no accident on this section of NH-8 during a one-week period;

(ii) the probability of at most three accidents on this section of NH – 8 during a two-week period.

[0.1353, 0.4332]

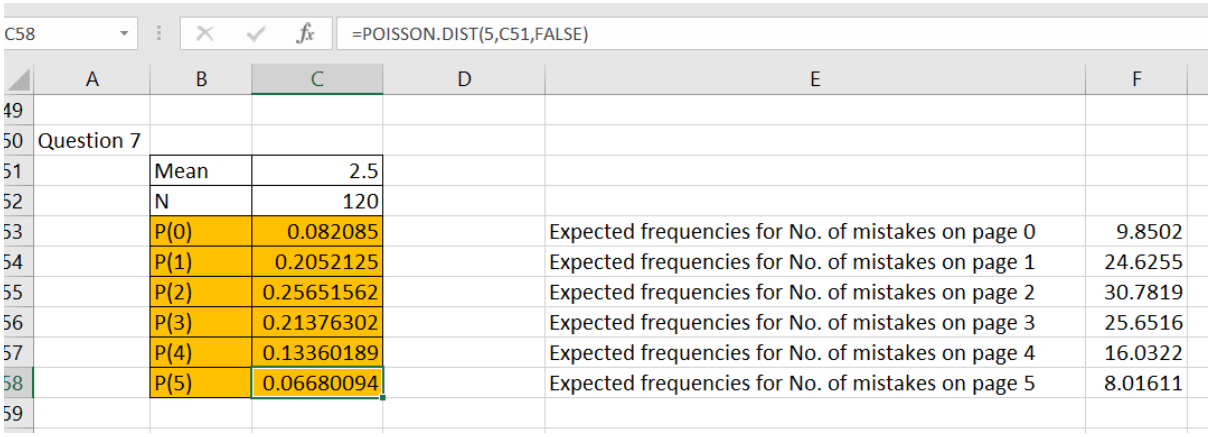


C47 | =POISSON.DIST(3,C45*2,TRUE)

	A	B	C	D	E
43					
44	Question 6				
45		mean	2		
46		P1	0.13534		probability of having no accident: P1
47		P2	0.43347		probability of having atmost 3 accidents during 2 week: P2
48					

Q.7 Assuming that the typing mistakes per page committed by a typist follows a Poisson Distribution, find the expected frequencies for the following distribution of typing mistakes:

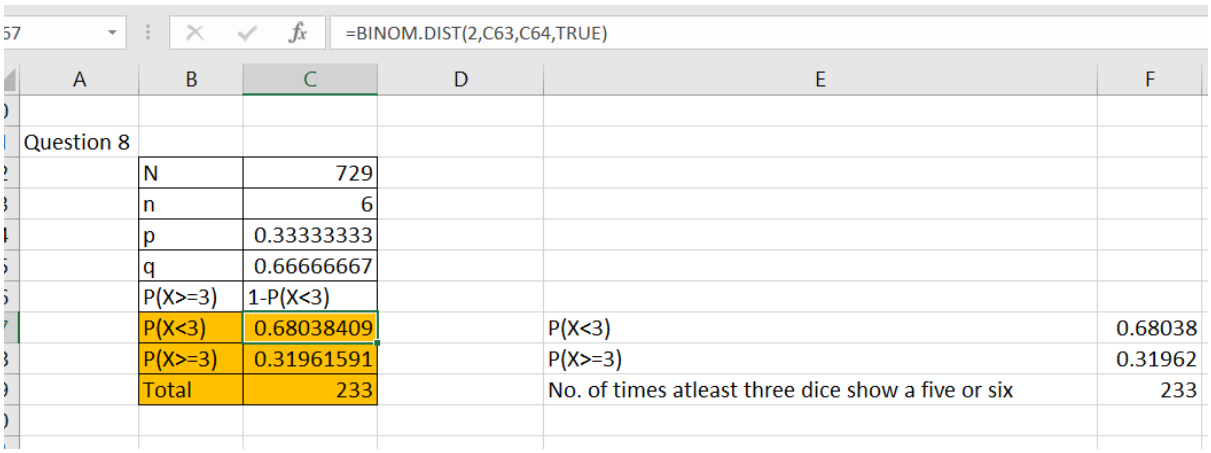
No. of Mistakes per page	0	1	2	3	4	5
No. of Pages	40	30	20	15	10	5



C58 | =POISSON.DIST(5,C51,FALSE)

	A	B	C	D	E	F
49						
50	Question 7					
51		Mean	2.5			
52		N	120			
53		P(0)	0.082085		Expected frequencies for No. of mistakes on page 0	9.8502
54		P(1)	0.2052125		Expected frequencies for No. of mistakes on page 1	24.6255
55		P(2)	0.25651562		Expected frequencies for No. of mistakes on page 2	30.7819
56		P(3)	0.21376302		Expected frequencies for No. of mistakes on page 3	25.6516
57		P(4)	0.13360189		Expected frequencies for No. of mistakes on page 4	16.0322
58		P(5)	0.06680094		Expected frequencies for No. of mistakes on page 5	8.01611
59						

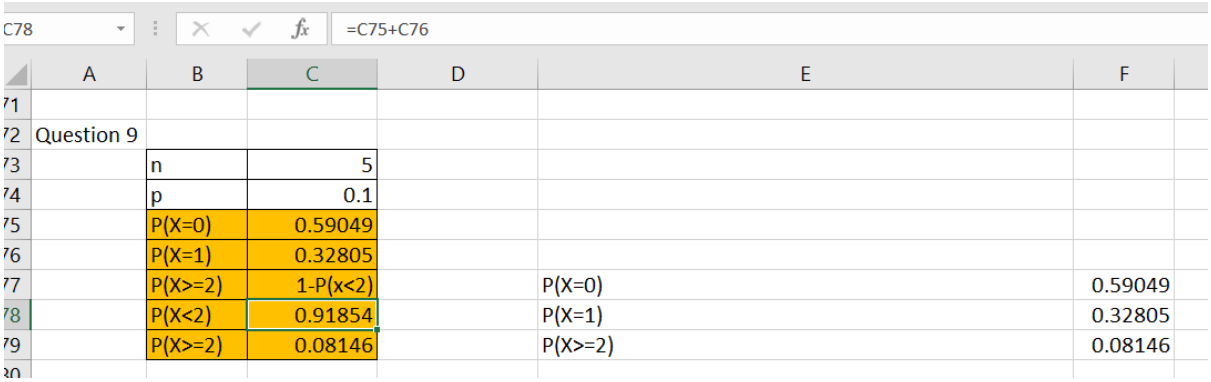
Q8.Six dice are thrown 729 times How many times do you expect atleast three dice to show a five or six. (Ans 233)



57 | =BINOM.DIST(2,C63,C64,TRUE)

	A	B	C	D	E	F
)						
	Question 8					
2		N	729			
3		n	6			
4		p	0.33333333			
5		q	0.66666667			
6		P(X>=3)	1-P(X<3)			
7		P(X<3)	0.68038409		P(X<3)	0.68038
8		P(X>=3)	0.31961591		P(X>=3)	0.31962
9		Total	233		No. of times atleast three dice show a five or six	233
)						

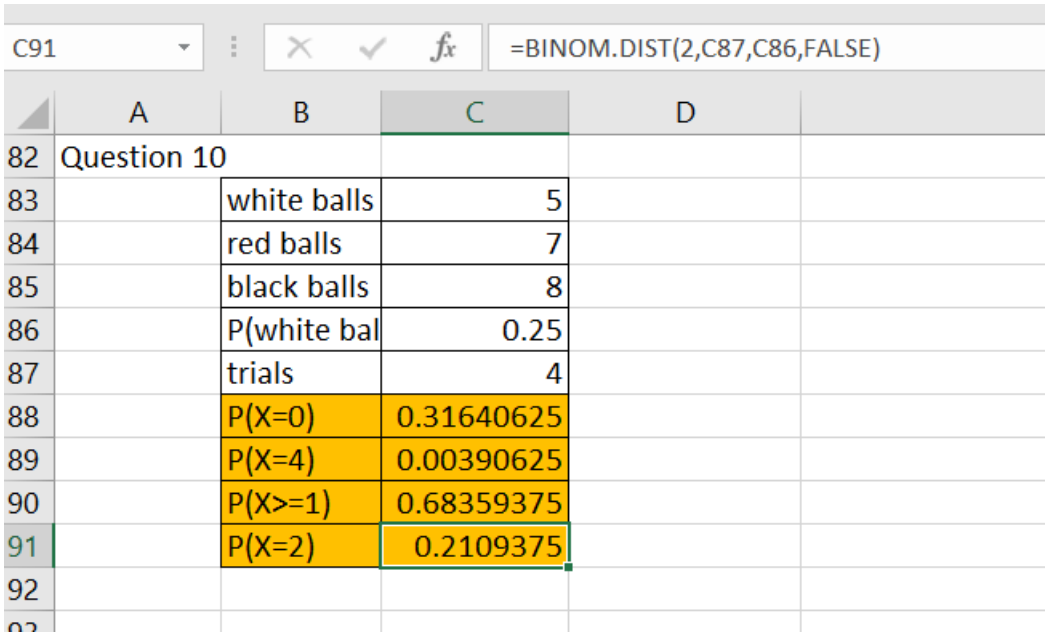
Q9.If 10 percent of the rivets produced by a machine are defective, find the probabilty that out of 5 rivets chosen at random (i) none will be defective (ii) one will be defective (iii) atleast two will be defective.



C78 | =C75+C76

	A	B	C	D	E	F
71						
72	Question 9					
73		n	5			
74		p	0.1			
75		P(X=0)	0.59049			
76		P(X=1)	0.32805			
77		P(X>=2)	1-P(x<2)		P(X=0)	0.59049
78		P(X<2)	0.91854		P(X=1)	0.32805
79		P(X>=2)	0.08146		P(X>=2)	0.08146
80						

Q10. A bag contains 5 white ,7red,and 8 black balls . If four balls are drawn at random,one by one, with replacement ,what is the probability that (i) none is white (ii) all are white (iii) atleast one is white (iv) only two are white ?



C91 | =BINOM.DIST(2,C87,C86,FALSE)

	A	B	C	D
82	Question 10			
83		white balls	5	
84		red balls	7	
85		black balls	8	
86		P(white bal	0.25	
87		trials	4	
88		P(X=0)	0.31640625	
89		P(X=4)	0.00390625	
90		P(X>=1)	0.68359375	
91		P(X=2)	0.2109375	
92				