University of Asia Pacific

Admit Card

Final-Term Examination of Spring, 2020

Financial Clearance	PAID

Registration No : 17101007

Student Name : Mahnaz Rafia Islam

Program : Bachelor of Science in Computer Science and Engineering

SI.NO.	COURSE CODE	COURSE TITLE	CR.HR.	EXAM. SCHEDULE
1	CSE 400	Project / Thesis	3.00	
2	CSE 401	Mathematics for computer Science	3.00	
3	CSE 403	Artificial Intelligence and Expert Systems	3.00	
4	CSE 404	Artificial Intelligence and Expert Systems Lab	1.50	
5	CSE 405	Operating Systems	3.00	
6	CSE 406	Operating Systems Lab	1.50	
7	CSE 407	ICTLaw, Policy and Ethics	2.00	
8	CSE 410	Software Development	1.50	
9	CSE 427	Topics of Current Interest	3.00	

Total Credit: 21.50

1. Examinees are not allowed to enter the examination hall after 30 minutes of commencement of examination for mid semester examinations and 60 minutes for semester final examinations.

2. No examinees shall be allowed to submit their answer scripts before 50% of the allocated time of examination has elapsed.

3. No examinees would be allowed to go to washroom within the first 60 minutes of final examinations.

**4. No student will be allowed to carry any books, bags, extra paper or cellular phone or objectionable items/incriminating paper in the examination hall.
Violators will be subjects to disciplinary action.**

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University of Asia Pacific
Department of Computer Science and Engineering

Final Term Examination: Spring-2020

Name: Mahnaz Rafia Isam			Registration No: 17101007
Roll No: 07	Year: 4th	Semester: 1st	Course Code: CSE 401
Course Title: Mathematics for Computer Science			Date: 01.11.2020

Answer to the question no: 1(a)

Here,

$$i = (007 \% 5) + 2$$

$$= 2+2$$

$$= 4$$

The type of random variable is Geometric RV.

The probability to get a 6 $= \frac{1}{6}$

The probability not to get a 6 $= 1 - \frac{1}{6}$

$$= \frac{6-1}{6} = \frac{5}{6}$$

$$P\{X=4\} = (1-p)^{n-1} \cdot p$$

$$= \left(\frac{5}{6}\right)^{4-1} \cdot \left(\frac{1}{6}\right)$$

$$= 0.096$$

So, the probability that I will need to roll the dice 4 times to get the first "6" is 0.096.

$$E[X] = \frac{1}{p} = \frac{1}{\frac{1}{6}} = 6$$

Expected value is 6 to roll the dice in

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order to get the first "6".

Answer to the question no: 1(b)

Here,

$N = (007 \% 6) + 5 = 1 + 5 = 6$

$i = (007 \% 4) + 3 = 3 + 3 = 6$

The type of random variable Y is Binomial RV.

The probability of if I roll the dice 6 times the probability of ~~6~~ 6 number of times is I will get a 6,

$$^6C_6 \cdot \left(\frac{1}{6}\right)^6 \cdot \left(1 - \frac{1}{6}\right)^{6-6}$$

$$= 1 \cdot \left(\frac{1}{6}\right)^6 \cdot \left(\frac{5}{6}\right)^0$$

$$= 0.000021$$

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$$E[X] = np$$
$$= 6 \cdot \frac{1}{6}$$
$$= 1$$

Expected value is 1 time to get a "6" if I roll a dice 6 times.

Answer to the question no: 2(a)

The transition matrix is-

$$\begin{array}{c} \\ A \\ M \\ C \end{array}\begin{array}{c} \begin{array}{ccc} A & M & C \end{array} \\ \begin{bmatrix} 0.74 & 0.24 & 0.02 \\ 0.58 & 0.29 & 0.13 \\ 0.46 & 0.37 & 0.17 \end{bmatrix} \end{array}$$

Answer to the question no: 2(b)

Here,

$i = 007 \% 3 = 1$

$j = (007 + 2) \% 3 = 9 \% 3 = 0$

$N = (007 \% 4) + 3 = 3 + 3 = 6$

If the patient is in state 1 today (i.e Moderate). I have to find out the probability that he will be in state Asymptomic after 6 days.

$P^6 = P^{4+2} = P^4 \times P^2$

$$P^2 = P^{1+1} = P^1 \times P^1 = \begin{bmatrix} 0.74 & 0.24 & 0.02 \\ 0.58 & 0.29 & 0.13 \\ 0.46 & 0.37 & 0.17 \end{bmatrix} \times \begin{bmatrix} 0.74 & 0.24 & 0.02 \\ 0.58 & 0.29 & 0.13 \\ 0.46 & 0.37 & 0.17 \end{bmatrix}$$

$$= \begin{bmatrix} 0.696 & 0.255 & 0.0494 \\ 0.657 & 0.271 & 0.0714 \\ 0.653 & 0.281 & 0.0862 \end{bmatrix}$$

Now,

$$P^4 = P^{2+2} = P^2 \times P^2 = \begin{bmatrix} 0.696 & 0.255 & 0.0494 \\ 0.657 & 0.271 & 0.0714 \\ 0.653 & 0.281 & 0.0862 \end{bmatrix} \times \begin{bmatrix} 0.696 & 0.255 & 0.0494 \\ 0.657 & 0.271 & 0.0714 \\ 0.653 & 0.281 & 0.0862 \end{bmatrix}$$

$$= \begin{bmatrix} 0.683 & 0.260 & 0.0568 \\ 0.681 & 0.261 & 0.0580 \\ 0.680 & 0.262 & 0.0587 \end{bmatrix}$$

Now,

$$P^6 = P^4 \times P^2 = \begin{bmatrix} 0.683 & 0.260 & 0.0568 \\ 0.681 & 0.261 & 0.0580 \\ 0.680 & 0.262 & 0.0587 \end{bmatrix} \times \begin{bmatrix} 0.696 & 0.255 & 0.0494 \\ 0.657 & 0.271 & 0.0714 \\ 0.653 & 0.281 & 0.0862 \end{bmatrix}$$

$$= \begin{bmatrix} 0.696 & 0.255 & 0.0494 \\ 0.657 & 0.271 & 0.0714 \\ 0.653 & 0.281 & 0.0862 \end{bmatrix}$$

$$= \begin{array}{cc} & \begin{array}{ccc} A & M & C \end{array} \\ \begin{array}{c} A \\ M \\ C \end{array} & \begin{bmatrix} 0.683 & 0.261 & 0.0572 \\ 0.683 & 0.261 & 0.0573 \\ 0.684 & 0.261 & 0.0574 \end{bmatrix} \end{array}$$

The probability of a patient Moderate today, will be Asymptotic tommorrow is 0.683

(Ans)

Answer to the question no: 2(c)

Here,

$i = (07 \% 3) = 1$

Given,

$$
\begin{array}{ccc}
 & & x_0 & x_1 & x_2 \\
 & & A & M & C \\
x_0 \leftarrow & A & 0.74 & 0.24 & 0.02 \\
x_1 \leftarrow & M & 0.58 & 0.29 & 0.13 \\
x_2 \leftarrow & C & 0.46 & 0.37 & 0.17
\end{array}
$$

Here, $x_0 + x_1 + x_2 = 1$ — (i)

$x_0 = 0.74x_0 + 0.58x_1 + 0.46x_2$ — (ii)

$x_1 = 0.24x_0 + 0.29x_1 + 0.37x_2$ — (iii)

Solving equation (i), (ii) and (iii) we get,

$x_0 \approx 0.6823$, $x_1 \approx 0.2605$, $x_2 \approx 0.0572$

So, the probability that a patient will be in state 1 (ie. Moderate) after 100 days is 0.2605.

(Ans)

Answer to the question no: 3(a)

Here,

~~i = 006~~ $i = (007 \% 3) + 1 = 1 + 1 = 2$

$D \rightarrow$ Being defective.

$C_2 \rightarrow$ Came from company 2

Here, $P(D|C_1) = 0.20$

$P(D|C_2) = 0.12$ and $P(C_1) = P(C_2) = P(C_3) = \frac{1}{3}$

$P(D|C_3) = 0.18$

$$\therefore P(C_2|D) = \frac{P(D|C_2) \cdot P(C_2)}{P(D|C_2) \cdot P(C_2) + P(D|C_1) \cdot P(C_1) + P(D|C_3) \cdot P(C_3)}$$

$$= \frac{0.12 \times \frac{1}{3}}{\left(0.12 \times \frac{1}{3}\right) + \left(0.2 \times \frac{1}{3}\right) + \left(0.18 \times \frac{1}{3}\right)}$$

$$= \frac{0.04}{0.1667}$$

$$= 0.2399$$

The probability that the PPE I brought is defect is 0.2399.

Answer to the question no:3(b)

$n = (007 \% 3) + 4 = 5$

Let,

$D \rightarrow$ event that the tested person has corona virus.

$E \rightarrow$ event that his test result is positive.

Here,

$$P(D|E) = \frac{P(E|D) \cdot P(D)}{P(E|D) \cdot P(D) + P(E|D') \cdot P(D')}$$

$$= \frac{(0.70)(0.05)}{(0.70 \times 0.05) + (0.05 \times 0.95)}$$

$$= \frac{0.035}{0.0825}$$

$$= 0.4242$$

Thus, Only 42 percent of those pesons whose test results are positive actually has Corona Virus.

Answer to the question no: 4(b)

OR

Here,

$N = (007 \% 6) + 20 = 1 + 20 = 21$

$\cancel{K = (007\%1)+}$ $K = (007+1) \% 2 + 1$

$= (8 \% 2) + 1$

$= 1$

~~The probability that~~

Answer to the question no: 4(a)

$N = (007 \% 4) + 10 = 3 + 10 = 13$

$k = (007 \% 5) + 4 = 2 + 4 = 6$

The probability that exactly 6 people will get their own hat among 13 people is —

$$^{13}C_6 \times \frac{1}{13} \times \frac{1}{12} \times \frac{1}{11} \times \frac{1}{10} \times \frac{1}{9} \times \frac{1}{8} \times P_7$$

Here,

$\cancel{P_7 - P_6 = \frac{1}{13}(P}$

$\cancel{P_7 - P_6 = \frac{1}{7}(P_5 - P_6)}$

$\cancel{P_7 = P_6 + \frac{1}{7}(P_5 - P_6)}$

Here, $P_1 = 0$ and $P_2 = \frac{1}{2}$

$$= 1716 \times \frac{1}{1235520} \times P_7 \quad \text{---(i)}$$

For findin P_7 (no. of missmatch probability),

$$P_n - P_{n-1} = \frac{1}{n}\left(P_{n-2} - P_{n-1}\right)$$

$$P_7 - P_6 = \frac{1}{7}\left(P_5 - P_6\right)$$

$$P_7 = P_6 + \frac{1}{7}\left(P_5 - P_6\right)$$

$$P_7 = \frac{1}{2!} - \frac{1}{3!} + \frac{1}{4!} - \frac{1}{5!} + \frac{1}{6!} - \frac{1}{7!}$$

From (i),

$$1716 \times \frac{1}{1235520} \times \left(\frac{1}{2!} - \frac{1}{3!} + \frac{1}{4!} - \frac{1}{5!} + \frac{1}{6!} - \frac{1}{7!}\right)$$

$$= 0.005$$

(Ans)

Answer to the question no: 4(b)

$i = 007 \% 3 = 1$

$x = (007 \% 3) + 3 = 1 + 3 = 4$

$y = (007 \% 5) + 5 = 7$

$z = (007 \% 7) + 7 = 7$

Here,

$P \to$ time needed to find answer.

$Q \to$ # of book.

$P\{Q=1\} = P\{Q=2\} = P\{Q=3\} = \frac{1}{3}$

$E[P|Q=1] = 4$

$E[P|Q=2] = 7 + E[P]$

$E[P|Q=3] = 7 + E[P]$

Here, the answer is in the 1st text book.

$\therefore \cancel{E[P] = E[X|Y=}$

$$\therefore E[P] = E[P|Q=1] \cdot P\{Q=1\} + E[P|Q=2] \cdot P\{Q=2\} + E[P|Q=3] \cdot P\{Q=3\}.$$

$$= 4 \times \frac{1}{3} + (7+E(P)) \times \frac{1}{3} + (7+E(P)) \times \frac{1}{3}$$

$$3E[P] = 4 + 7 + E[P] + 7 + E[P]$$

$$E[P] = 18$$

This is the expected time the student will need to find the answer.