



جمهورية العراق
وزارة التعليم العالي والبحث العلمي
جامعة البصرة
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ملاحظة : الأسئلة صفحتان وتكون الإجابة عن خمسة أسئلة فقط

Q1) a) A students study habits are as follows , if he studies one night he is 20% sure to study the next night , on the other hand , if he does not study one night , he is 10% sure not to study the next night as well , find the transition probability matrix in 7 step ? (5 degree)

b) classify the stochastic process with examples ? (5 degree)

Q2) Classify the states of the markov chain with the following transition matrix ?

$$P = \begin{matrix} & \begin{matrix} a1 & a2 & a3 & a4 & a5 \end{matrix} \\ \begin{matrix} a1 \\ a2 \\ a3 \\ a4 \\ a5 \end{matrix} & \begin{pmatrix} 0 & 0 & 0.4 & 0.6 & 0 \\ 0 & 0.2 & 0 & 0.5 & 0.3 \\ 0.5 & 0 & 0.5 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0.3 & 0 & 0.5 & 0 & 0.2 \end{pmatrix} \end{matrix}$$

(10 degree)

Q3) P is a markov chain with state space S=(1,2,3,4)

$$P = \begin{pmatrix} 0.8 & 0 & 0.2 & 0 \\ 0 & 0 & 1 & 0 \\ 1 & 0 & 0 & 0 \\ 0.3 & 0.4 & 0 & 0.3 \end{pmatrix}$$

, and the initial probability distribution is :

$\pi_0 = (0 , 0 , 0 , 1)$ compute :

1 . Pr(X2=1 , X0=4) ?

2. Pr(X2=2 , X3=3) ?

(10 degree)

Q4) Let the markov chain with state space (1 , 2 , 3 , 4 , 5) is

$$P = \begin{matrix} & \begin{matrix} a1 & a2 & a3 & a4 & a5 \end{matrix} \\ \begin{matrix} a1 \\ a2 \\ a3 \\ a4 \\ a5 \end{matrix} & \begin{pmatrix} 1/4 & 3/4 & 0 & 0 & 0 \\ 0 & 1/3 & 2/3 & 0 & 0 \\ 1/3 & 1/3 & 1/3 & 0 & 0 \\ 0 & 0 & 0 & 1/2 & 1/2 \\ 1/2 & 0 & 0 & 1/4 & 1/4 \end{pmatrix} \end{matrix}$$

compute the percentages matrix $f(i, j)$ and the conditional expectations

matrix $H^*(i, j) = [\mu_{ij}]$? (10 degree)

Q5) Suppose that the customers arrive to the market according to the Poisson process with arrival rate (8) customers every half hour , the probability that the customer is a man ($p=2 \setminus 5$) , and the probability that the customer is a woman ($q=3 \setminus 5$) find :

- i) What is The probability that (4) men and (5) women entered the market at period (11:00 11 :15) ?
- ii) What is The probability that (9) customers entered the market at period (11:00 11 :15) ?
- iii) What is The expected waiting time until arrive the ninth customer ? (10 degree)

Q6) consider the number of individuals in the generate K_i , $i= 0,1,2,3$ with probability $P_1 =3/8$ and $p_2 =3/8$, $p_3 =1/8$, compute the probability extinction of this generate ?

(10 degree)

مع دعائني لكم بالنجاح .

رئيس

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