



SRM Institute of Science and Technology
Department of Mathematics
18MAB204T- Probability and Queueing Theory
Module – V
Tutorial Sheet – 14

Questions

1	If the tpm of a Markov Chain is $\begin{bmatrix} 0 & 1 \\ 1/2 & 1/2 \end{bmatrix}$ find the steady-state distribution of the chain.
2	Let $P = \begin{bmatrix} 3/4 & 1/4 \\ 1/2 & 1/2 \end{bmatrix}$ be the tpm of a two state Markov chain. Find the invariant probabilities of the chain.
3	A man is at an integral point on the x-axis between the origin and the point 3. He takes a unit step to the right with probability $1/3$ or to the left with probability $2/3$, unless he is at the origin, where he takes a step to the right to reach the point 1 or is at the point 3, where he takes a step to the left to reach the point 2. What is the probability that he is at the point 1 in the long run?
4	A salesman's territory consists of 3 cities A, B and C. He never sells in the same city on successive days. If he sells in city A, then the next day he is twice as likely to sell in city A as in the other city. How often does he sell in each of the cities in the steady state?
5	A student's study habits are as follows: If he studies one night, he is 70% sure not to study the next night. On the other hand, if he does not study one night, he is 60% sure not to study the next night as well. In the long run, how often does he study?
6	A housewife buys 3 kinds of cereals, A, B and C. She never buys the same cereal in successive weeks. If she buys cereal A, the next week she buys cereal B. However, if she buys B or C, the next week she is 3 times as likely to buy A as the other cereal. In the long run, how often she buys each of the three cereals?
7	Two boys B_1, B_2 and two girls G_1, G_2 are throwing a ball from one to another. Each boy throws the ball to the other boy with probability $1/2$ and to each girl with probability $1/4$. On the other hand, each girl throws the ball to each boy with probability $1/2$ and never to the other girl. In the long run, how often does each receive the ball?
8	If a student is late to the class on a day, he is 95% sure to be on time next day. If he is on time to the class on a day, 15% chance for him to be late to the class next day. Find the steady state behaviour of the student.