



COMSATS University Islamabad

Attock Campus



Department of Mathematics

Assignment # 02

Class: BS(SE)-VIII
Subject: Stochastic Processes
Instructor: Dr. Atiq ur Rehman

Due Date: 21-10-2025 (1330PST)
Course Code: CSC456
Marks: 20

Question # 1: A monitoring system (e.g., a camera, a human observer, or other device) tracks customers entering the local store. At regular intervals, the system records the customer's state as follows:

0: Browsing, 1: Purchasing, 2: Leaving

The data below presents the observed change in state for all 24 customers:

Customer #	Sequence of State	Customer #	Sequence of State
1	$0 \rightarrow 1 \rightarrow 2$	13	$1 \rightarrow 2 \rightarrow 1 \rightarrow 2$
2	$0 \rightarrow 0 \rightarrow 2$	14	$0 \rightarrow 0 \rightarrow 1 \rightarrow 2$
3	$0 \rightarrow 1 \rightarrow 2$	15	$0 \rightarrow 0 \rightarrow 2$
4	$0 \rightarrow 2$	16	$1 \rightarrow 0 \rightarrow 2$
5	$1 \rightarrow 0 \rightarrow 1 \rightarrow 2$	17	$0 \rightarrow 0 \rightarrow 0 \rightarrow 2$
6	$0 \rightarrow 1 \rightarrow 2$	18	$0 \rightarrow 0 \rightarrow 1 \rightarrow 2$
7	$0 \rightarrow 2 \rightarrow 0 \rightarrow 2$	19	$0 \rightarrow 1 \rightarrow 2$
8	$1 \rightarrow 0 \rightarrow 1 \rightarrow 2$	20	$0 \rightarrow 2 \rightarrow 1 \rightarrow 2$
9	$0 \rightarrow 0 \rightarrow 1 \rightarrow 2$	21	$0 \rightarrow 0 \rightarrow 2$
10	$0 \rightarrow 1 \rightarrow 2$	22	$0 \rightarrow 1 \rightarrow 2$
11	$1 \rightarrow 1 \rightarrow 0 \rightarrow 2$	23	$1 \rightarrow 1 \rightarrow 2$
12	$0 \rightarrow 1 \rightarrow 0 \rightarrow 2$	24	$1 \rightarrow 2 \rightarrow 0 \rightarrow 2$

- Find the transition probabilities P_{ij} .
- Write the mathematical model of the above stochastic process.
- Draw the state transition diagram as a weighted directed graph.
- Write the transition probability matrix P .
- What is mean by P_{01}^4 ?
