

IME625: Stochastic Processes

**2021-22 Sem-II**

Homework-10

In the class today, we said that  $j$  is recurrent if  $f_{jj} = P(T_{jj} < \infty) = \sum_{n=1}^{\infty} P(T_{jj} = n) = 1$ , else if  $f_{jj} < 1$ , then  $j$  is transient.  $T_{jj} = \min\{n \geq 1: X_n = j | X_0 = j\}$  is the time of first return to  $j$ . Consider the Markov chain to the right. Determine nature of each state.

$p_{ij}$	1	2	3	4	5
1	1	0	0	0	0
2	0.1	0.5	0.4	0	0
3	0	0.2	0.6	0.2	0
4	0	0	0	0.5	0.5
5	0	0	0	0.3	0.7