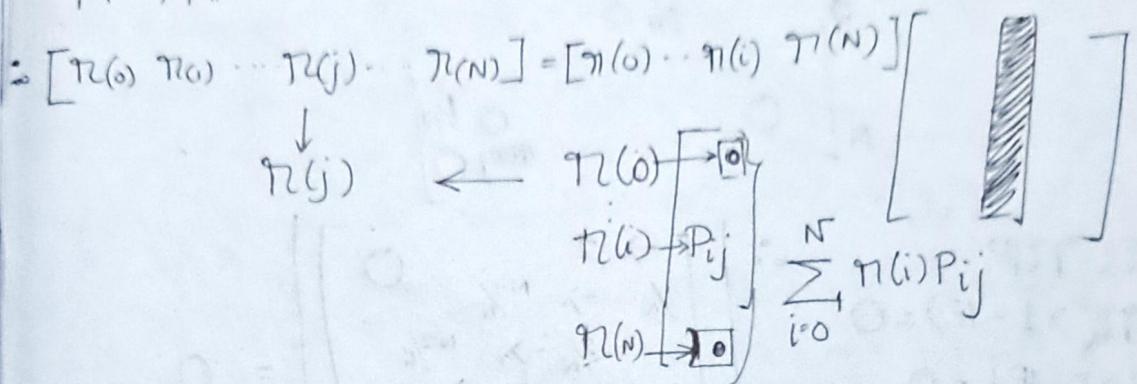


$$a) \Pi = \Pi P$$



$$\therefore \pi(j) = \sum_{i=0}^N \pi(i) p_{ij}$$

Just change vari. from i to j and j to i .

$$\therefore \pi(i) = \sum_{j=0}^N \pi(j) p_{ji} = \sum_{j \neq i} \pi(j) p_{ji} + p_{ii} \pi(i)$$

$$\Rightarrow (1 - p_{ii}) \pi(i) = \sum_{j \neq i} \pi(j) p_{ji}$$

$$\Rightarrow (\sum_{j \neq i} p_{ij}) \pi(i) = \sum_{j \neq i} \pi(j) p_{ji}$$

flux out

(except one going out into itself
ie self loop)

prob. of j (any other)

to i (state considered)

except one from itself
(self loop).

b)

$$P_x(x+1) = 1 - \frac{x}{N}$$

$$P_x(x-1) = \frac{x}{N}$$

