Fair Assg 1

a) $\Pi = \Pi P$

$\therefore [\pi(0)\ \pi(1) \cdots \pi(j) \cdots \pi(N)] = [\pi(0) \cdots \pi(i) \cdots \pi(N)] \begin{bmatrix} & & \\ & & \\ & & \end{bmatrix}$

$\pi(j) \leftarrow \pi(0) \to [0]$

$\pi(i) \to P_{ij} \to \sum_{i=0}^{N} \pi(i) P_{ij}$

$\pi(N) \to [0]$

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

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

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

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

$\Rightarrow \left(\sum_{y \neq i} P_{iy}\right) \pi_i = \sum_{j \neq i} \pi(j) P_{ji}$

flux out (except one going out into itself ie self loop)

flux in: prob of j (any other) to i (state considered) except one from itself (self loop).

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

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