

So,

$$\begin{aligned} A + B + C + D + E + F &= 1 \\ -1A + \frac{1}{3}B + \frac{1}{3}C + 0 + D + \frac{1}{3}F &= 0 \\ \textcircled{1} \rightarrow 1B + \frac{1}{4}C + \frac{1}{4}D + \frac{1}{4}E + \frac{1}{4}F &= 0 \\ 0 + 0 + 1C + \frac{1}{2}D + \frac{1}{2}E + 0 &= 0 \\ \frac{1}{4}A + 0 + \frac{1}{4}C - 1D + \frac{1}{4}E + \frac{1}{4}F &= 0 \\ \frac{1}{3}A + \frac{1}{3}B + 0 + 0 + \frac{1}{3}E - F &= 0 \end{aligned}$$

$$\left(\begin{array}{cccccc|c} 1 & 1 & 1 & 1 & 1 & 1 & A \\ -1 & \frac{1}{3} & \frac{1}{3} & 0 & 0 & \frac{1}{3} & B \\ 0 & -1 & \frac{1}{4} & \frac{1}{4} & \frac{1}{4} & \frac{1}{4} & C \\ 0 & 0 & -1 & \frac{1}{2} & \frac{1}{2} & 0 & D \\ \frac{1}{4} & 0 & \frac{1}{4} & -1 & \frac{1}{4} & \frac{1}{4} & E \\ \frac{1}{3} & \frac{1}{3} & 0 & 0 & \frac{1}{3} & -1 & F \end{array} \right) = \begin{pmatrix} 1 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix}$$

↳ Transition matrix for part (a)

$$A^{-1} = B$$

$$T_1 = A^{-1}B \quad (\text{Solving in excel, attached})$$

$$\pi = \begin{pmatrix} 0.17 \\ 0.17 \\ 0.17 \\ 0.17 \\ 0.17 \\ 0.17 \end{pmatrix}$$

Part (c) alone in python notebook, attached.

ASSIGNMENT H 3.

(ABDUL SABOOR | 20L-1113)

QUESTION # 1

a) State transition matrix for Markov Chain

$$P = \begin{bmatrix} & A & B & C & D & E & F \\ A & 0 & 0 & 0 & \frac{1}{4} & 1 & \frac{1}{3} \\ B & \frac{1}{3} & 0 & 0 & 0 & 0 & \frac{1}{3} \\ C & \frac{1}{3} & \frac{1}{4} & 0 & \frac{1}{4} & 0 & 0 \\ D & 0 & \frac{1}{4} & \frac{1}{2} & 0 & 0 & 0 \\ E & 0 & \frac{1}{4} & \frac{1}{2} & \frac{1}{4} & 0 & \frac{1}{3} \\ F & \frac{1}{3} & \frac{1}{4} & 0 & \frac{1}{4} & 0 & 0 \end{bmatrix}$$

b) Compute Stationary distribution by solving 6 equations.

$$\pi = \pi P$$

$$\begin{bmatrix} A & B & C & D & E & F \end{bmatrix} \begin{bmatrix} 0 & 0 & 0 & \frac{1}{4} & 1 & \frac{1}{3} \\ \frac{1}{3} & 0 & 0 & 0 & 0 & \frac{1}{3} \\ \frac{1}{3} & \frac{1}{4} & 0 & \frac{1}{4} & 0 & 0 \\ 0 & \frac{1}{4} & \frac{1}{2} & 0 & 0 & 0 \\ 0 & \frac{1}{4} & \frac{1}{2} & \frac{1}{4} & 0 & \frac{1}{3} \\ \frac{1}{3} & \frac{1}{4} & 0 & \frac{1}{4} & 0 & 0 \end{bmatrix} = [ABCDEF]$$

$$\frac{1}{3}B + \frac{1}{3}C + \frac{1}{3}F = A$$

$$\frac{1}{4}C + \frac{1}{4}D + \frac{1}{4}E + \frac{1}{4}F = B$$

$$\frac{1}{2}D + \frac{1}{2}E = C$$

$$\frac{1}{4}A + \frac{1}{4}C + \frac{1}{4}E + \frac{1}{4}F = D$$

$$1A = E \quad \text{--- Eliminating this.}$$

$$\frac{1}{3}A + \frac{1}{3}B + \frac{1}{3}E = F$$