a)

Determine P_1, P_2 & P_3

$$T = \begin{pmatrix} \frac{1}{8} & \frac{7}{8} \\ \frac{2}{3} & \frac{1}{3} \end{pmatrix} \qquad P_0 = \left(\frac{2}{5}, \frac{3}{5}\right)$$

$$\underline{P_1} = P_0 T = \left(\frac{2}{5}, \frac{3}{5}\right)\begin{pmatrix} \frac{1}{8} & \frac{7}{8} \\ \frac{2}{3} & \frac{1}{3} \end{pmatrix}$$

$$= (2/5)(1/8) + (3/5)(2/3), \; (2/5)(7/8) + (3/5)(1/3)$$

$$= (9/20, \; 11/20)$$

$$\underline{P_2} = P_1 T = (9/20, 11/20)\begin{pmatrix} 1/8 & 7/8 \\ 2/3 & 1/3 \end{pmatrix}$$

$$= (9/20)(1/8) + (11/20)(23), \; (9/20)(7/8) + (11/20)(1/3)$$

$$= (203/408, \; 277/480)$$

$$\underline{P_3} = P_2 T = (203/408, \; 277/480)\begin{pmatrix} 1/8 & 7/8 \\ 2/3 & 1/3 \end{pmatrix}$$

$$= (203/408)(1/8) + (277/480)(2/3), \; (203/407)(7/8) + (277/480)(1/3)$$

$$= \left(5041/11520, \; 6479/11520\right)$$