

# Solution Set 4/15/02

1.a.  $(I-E)P = \begin{bmatrix} 1/2 & -1/3 \\ -1/2 & 1/3 \end{bmatrix} \begin{bmatrix} P_1 \\ P_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$

.5pt

$$\frac{1}{2}P_1 = \frac{1}{3}P_2$$

$$P = \begin{bmatrix} S \\ \frac{3}{2}S \end{bmatrix} \quad \text{Set } S=2 \quad P = \begin{bmatrix} 2 \\ 3 \end{bmatrix}$$

b

$$(I-E)P = \begin{bmatrix} 1/2 & 0 & -1/2 \\ -1/3 & 1 & -1/2 \\ -1/6 & -1 & 1 \end{bmatrix} \begin{bmatrix} P_1 \\ P_2 \\ P_3 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$$

reducing to row-echelon form yields

.5pt

$$\begin{bmatrix} 1 & 0 & -1 \\ 0 & 1 & -5/6 \\ 0 & 0 & 0 \end{bmatrix} \begin{bmatrix} P_1 \\ P_2 \\ P_3 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$$

$$P = S \begin{bmatrix} 1 \\ 5/6 \\ 1 \end{bmatrix} \quad S=6 \quad P = \begin{bmatrix} 6 \\ 5 \\ 6 \end{bmatrix}$$

c

$$(I-E)P = \begin{bmatrix} .65 & -.5 & -.3 \\ -.25 & .8 & -.3 \\ -.4 & -.3 & .6 \end{bmatrix} \begin{bmatrix} P_1 \\ P_2 \\ P_3 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$$

.5pt

which reduces to

$$\begin{bmatrix} 1 & 3/4 & -3/2 \\ 0 & 1 & -54/19 \\ 0 & 0 & 0 \end{bmatrix} \begin{bmatrix} P_1 \\ P_2 \\ P_3 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$$

$$P = S \begin{bmatrix} 78/19 \\ 54/19 \\ 1 \end{bmatrix} \quad \text{Let } S=19, \quad P = \begin{bmatrix} 78 \\ 54 \\ 19 \end{bmatrix}$$