

4.9 Homework

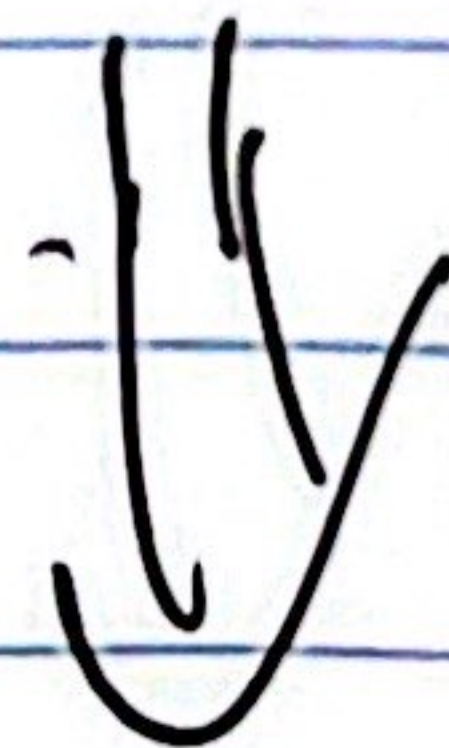
2.

a.

$$M = \begin{bmatrix} .5 & .25 & .25 \\ .25 & .5 & .25 \\ .25 & .25 & .5 \end{bmatrix} \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}$$

b.

$$= \begin{bmatrix} .5 \\ .25 \\ .25 \end{bmatrix}$$



$$= \begin{bmatrix} .375 \\ .3125 \\ .3125 \end{bmatrix}$$

$$.3125$$

3.

a.

$$M = \begin{bmatrix} .95 & .45 \\ .05 & .55 \end{bmatrix}$$

b.

$$\begin{bmatrix} \downarrow \\ \downarrow \end{bmatrix} \begin{bmatrix} .8 \\ .2 \end{bmatrix} = \begin{bmatrix} .85 \\ .05 \end{bmatrix}$$

$$\begin{bmatrix} \downarrow \\ \downarrow \end{bmatrix} \begin{bmatrix} .85 \\ .05 \end{bmatrix} = \begin{bmatrix} .875 \\ .025 \end{bmatrix}$$

$$\text{Tue} = 15\%$$

$$\text{Wed} = 12.5\%$$

c.

$$92.5\%$$

$$5. \quad Px = x; (P - I)x = 0$$

$$\Downarrow = \begin{bmatrix} -.4 & .6 \\ .4 & -.6 \end{bmatrix} x = 0$$

$$\sim \begin{bmatrix} 1 & -2/3 & | & 0 \\ 0 & 0 & | & 0 \end{bmatrix}$$

$$\frac{2}{3}x_2 + x_2 = 1 \Rightarrow \frac{5}{3}x_2 = 1$$

$$\Rightarrow x_2 = \frac{3}{5}$$

$$x = \begin{bmatrix} 2/5 \\ 3/5 \end{bmatrix}$$

9. Yes entries add to 1 for each vector and P^2 has only positive entries

$$12. \quad P - I = \begin{bmatrix} -.4 & .2 & .2 \\ .2 & -.4 & .2 \\ .2 & .2 & -.4 \end{bmatrix}$$

$$\sim \begin{bmatrix} 1 & 0 & -1 & 0 \\ 0 & 1 & -1 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

$$x_1 = x_3$$

$$x_2 = x_3$$

$$x_3 = x_3$$

after many trials each food preferred equally

B. a. $P - I = \begin{bmatrix} .05 & .45 \\ .05 & -.45 \end{bmatrix}$

$$\sim \begin{bmatrix} 1 & -9 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

$$\begin{aligned} x_1 &= 9x_2 \\ x_2 &= x_2 \end{aligned} = \begin{bmatrix} .9 \\ 0 \\ 1/10 \end{bmatrix}$$

b. prob. of $1/10$ and it doesn't matter if person is ill today

S.T 4.9

• Markov Chain = sequence of prob. vectors.

• ~~Steady~~ Steady State Solution = vector q for P ~~that~~ such $Pq = q$