Benjamin Walter **math210**

Assignment Markov_I due 12/24/2021 at 02:08pm EET

Problem 1. **(1 point)** `Library/WHFreeman/Holt_linear_algebra/Chaps_1-4/3.5.6.pg`

Fill in the missing values to make the following matrix a stochastic matrix.

$$\begin{bmatrix} \_\_ & 0.86 & 0.46 \\ 0.93 & \_\_ & 0.06 \\ 0.07 & 0.12 & \_\_ \end{bmatrix}$$

Problem 2. **(1 point)** `METUNCC/Applied_Math/markov/trans_matrix.pg`

- If you get 0 pages of homework this week, then with probability 0.9 you get 4 pages of homework next week, and with probability 0.1 you get 25 pages of homework next week.
- If you get 4 pages of homework this week, then with probability 0.2 you get 0 pages of homework next week, and with probability 0.4 you get 25 pages of homework next week.
- If you get 25 pages of homework this week, then with probability 0.4 you get 0 pages of homework next week, and with probability 0.3 you get 25 pages of homework next week.

Write the transition matrix for this system using the state vector $v = \begin{bmatrix} \text{0 pages} \\ \text{4 pages} \\ \text{25 pages} \end{bmatrix}$.

$$\mathrm{T} = \begin{bmatrix} \_\_ & \_\_ & \_\_ \\ \_\_ & \_\_ & \_\_ \\ \_\_ & \_\_ & \_\_ \end{bmatrix}$$

Problem 3. **(1 point)** `METUNCC/Applied_Math/markov/state_vect.pg`

A Markov system with two states satisfies the following rule.

- If you are in state 1 then $\frac{2}{10}$ of the time you change to state 2.
- If you are in state 2 then $\frac{4}{10}$ of the time you remain in state 2.

At time $t = 0$, there are 100 people in state 2 and no people in the other state.

Write the transition matrix for this system using the state vector $v = \begin{bmatrix} \text{state 1} \\ \text{state 2} \end{bmatrix}$.

$$\mathrm{T} = \begin{bmatrix} \_\_ & \_\_ \\ \_\_ & \_\_ \end{bmatrix}$$

Write the state vector for time $t = 0$.

$$\mathbf{v}_0 = \begin{bmatrix} \_\_ \\ \_\_ \end{bmatrix}$$

Compute the state vectors for time $t = 1$ and $t = 2$.

$$\mathbf{v}_1 = \begin{bmatrix} \_\_ \\ \_\_ \end{bmatrix}$$

$$\mathbf{v}_2 = \begin{bmatrix} \_\_ \\ \_\_ \end{bmatrix}$$

Problem 4. **(1 point)** `METUNCC/Applied_Math/markov/stable_prob.pg`

A Markov system with two states satisfies the following rule.

- If you are in state 1 then $\frac{8}{10}$ of the time you remain in state 1.
- If you are in state 2 then $\frac{6}{10}$ of the time you remain in state 2.

Write the transition matrix for this system using the state vector $v = \begin{bmatrix} \text{state 1} \\ \text{state 2} \end{bmatrix}$.

$$T = \begin{bmatrix} \_\_ & \_\_ \\ \_\_ & \_\_ \end{bmatrix}$$

Find the long term probability (stable state vector).

$$\mathbf{v}_s = \begin{bmatrix} \_\_ \\ \_\_ \end{bmatrix}$$