

Problems #1-6: Identify the best answer from the given choices.

1) Find the values of a , b , c , and d that would make T a transition matrix.

$$T = \begin{bmatrix} a & 0.35 & b \\ 0.30 & 0.60 & c \\ 0.45 & d & 0.25 \end{bmatrix}$$

A. $a = 0.25$ $b = 0.40$ $c = 0.10$ $d = 0.30$

B. $a = 0.25$ $b = 0.45$ $c = 0.30$ $d = 0.05$

C. $a = 0.40$ $b = 0.45$ $c = 0.10$ $d = 0.30$

D. $a = 0.25$ $b = 0.30$ $c = 0.10$ $d = 0.30$

E. $a = -0.25$ $b = -0.10$ $c = -0.90$ $d = -0.70$

2) For the transition matrix T find the probability of moving from state C to state A after 1 transition.

$$T = \begin{array}{c} \text{A} \quad \text{B} \quad \text{C} \\ \text{A} \begin{bmatrix} 0.30 & 0.10 & 0.60 \end{bmatrix} \\ \text{B} \begin{bmatrix} 0.50 & 0.20 & 0.30 \end{bmatrix} \\ \text{C} \begin{bmatrix} 0.20 & 0.10 & 0.70 \end{bmatrix} \end{array}$$

A. 0.20

B. 0.25

C. 0.63

D. 0.26

E. 0.60

3) For the transition matrix T find the probability of moving from state C to state A after 2 transitions.

$$T = \begin{array}{c} \text{A} \quad \text{B} \quad \text{C} \\ \text{A} \begin{bmatrix} 0.30 & 0.10 & 0.60 \end{bmatrix} \\ \text{B} \begin{bmatrix} 0.50 & 0.20 & 0.30 \end{bmatrix} \\ \text{C} \begin{bmatrix} 0.20 & 0.10 & 0.70 \end{bmatrix} \end{array}$$

A. 0.20

B. 0.25

C. 0.63

D. 0.26

E. 0.60

4) Sammy the slugger's performance on the baseball diamond is influenced by his state of mind. If Sammy did not get a base hit last time, he has a 40% chance of getting a hit next time; whereas, if he got a base hit last time, he has a 50% chance of getting a base hit next time. If Sammy just got a base hit, what is the probability that he will get a base hit two at bats from now?

A. 0.46

B. 0.56

C. 0.54

D. 0.55

E. 0.45

5) Given the initial state vector and transition matrix below, find P_2

$$P_0 = [0.35 \quad 0.65] ; T = \begin{bmatrix} 0.51 & 0.49 \\ 0.67 & 0.33 \end{bmatrix}$$

A. $P_2 = [0.6140 \quad 0.3860]$

B. $P_2 = [0.3828 \quad 0.6172]$

C. $P_2 = [0.4970 \quad 0.5030]$

D. $P_2 = [0.5718 \quad 0.4282]$

E. $P_2 = [0.4735 \quad 0.5265]$

6) A student has the following attendance pattern. If he is present in class one day, the probability he will be present the next day is 0.65. If he is absent from class one day, the probability he will be present the next day is 0.32. If he attended class today and it's Monday, what is the probability that he will be absent on Tuesday?

A. 0.123

B. 0.35

C. 0.65

D. 0.535

E. 0.466

Problems #7-9: Open Response

7) Given that $P_0 = [0.90 \quad 0.10]$ and $T = \begin{bmatrix} 0.36 & 0.64 \\ 0.78 & 0.22 \end{bmatrix}$, find P_2 .

Show all calculations to 4 decimal places.

8) Sharpe's and Blue City are two window repair companies. Neither company has achieved 100% customer loyalty in their town: 15% of Sharpe's customers call Blue City for their next repair and 35% of Blue City's customers take their next job to Sharpe's. What is the probability that a customer who currently uses Blue City will use Sharpe's three transitions from now? Round your answer to 4 decimal places.

9) A university consists of three colleges: business (B), science (S) and fine arts (F). Each year, there is a 15% probability of a student in the college of business changing to science and a 10% probability of changing to fine arts. There is a 5% probability of a student in the college of science changing to business and a 20% probability of changing to fine arts. A fine arts major has a 5% probability of changing to science and a 15% probability of changing to business.

a) Set up the transition matrix using the letters B, S, and F.

$$T = \begin{matrix} & \begin{matrix} B & S & F \end{matrix} \\ \begin{matrix} B \\ S \\ F \end{matrix} & \left[\begin{array}{ccc} & & \\ & & \\ & & \end{array} \right] \end{matrix}$$

b) Currently, the breakdown of the university is 40% business, 50% science, and 10% fine arts. What will the breakdown be after 1 year?