EXTRA Review Day 10

Unit 2 - Matrices & Game Theory

Warm-Up

Phones OFF & in the pockets!!

There are 20 students in student council and every week they bring snacks to their meeting. This week 8 brought chips, 7 brought drinks and 5 brought dessert. 18% of those who brought chips to the first meeting brought chips again and 42% brought drinks. Of those that brought drinks, 35% brought drinks again and the rest brought dessert to the next meeting. And of those that brought dessert to the first meeting, 26% brought dessert again and 48% brought chips.

a. What is the initial matrix for the student council?

b. What is the transition matrix for the student council?

c. Approximately how many students will bring drinks to the 4^{th} meeting??

d. In the long run, how many of these students will bring each item to a meeting?

Warm-Up Answers

There are 20 students in student council and every week they bring snacks to their meeting. This week 8 brought chips, 7 brought drinks and 5 brought dessert. 18% of those who brought chips to the first meeting brought chips again and 42% brought drinks. Of those that brought drinks, 35% brought drinks again and the rest brought dessert to the next meeting. And of those that brought dessert to the first meeting, 26% brought dessert again and 49% brought drinks.

a. What is the initial matrix for the student council?

$$D_0 = \begin{bmatrix} 8 & 7 & 5 \end{bmatrix}$$

b. What is the transition matrix for the student council?

$$T = \begin{array}{c} \\ Drinks \\ Chips \\ Dessert \end{array} \begin{array}{c} \begin{array}{ccc} Drinks & Chips & Dessert \end{array} \\ \begin{bmatrix} 0.35 & 0 & 0.65 \\ 0.42 & 0.18 & 0.40 \\ 0.49 & 0.25 & 0.26 \end{bmatrix} \end{array}$$

c. Approximately how many students will bring desserts to the 4th meeting?

~8.86 students (Find $D_4 = D_0 \bullet T^4$, then its dessert column.)

d. In the long run, how many of these students will bring each item to a meeting?

~8.43 will bring drinks, ~2.70 will bring chips, and ~8.86 will bring desserts (Find $D_{20} = D_0 \bullet T^{20}$, then $D_{30} = D_0 \bullet T^{30}$ and see they're the same)

Tonight's Homework

- Packet p.12
- Complete ALL 6 stations

- Complete Quiz Corrections (follow proper format)

Unit 2 Matrix Test Topics

1. Strictly Determined Games: Find **maximin**, **minimax** and **saddle points -** be able to interpret each based on the context.
2. Non-Strictly Determined Games: Find **payoff matrix**, **best strategy** for row and column player, and **expected value** for row player.
3. Markov Chains: Create **transition matrix** and **initial-state matrix** and interpret values after a certain number of cycles.
4. Leslie Matrix: Create Leslie matrix to find **population distribution, total population, long term growth rate,** and time when a **maximum population** or **future minimum population** is reached.
5. Matrix Operations: Perform calculations and interpret properly, especially **Matrix multiplication** and **Scalar multiplication.**
6. Matrix Applications: Be able to use matrix operations to solve **word problem applications** and **systems of equations**.

Classwork = Finish Review Stations & Corrections!

1st) Finish Quiz Corrections

- Staple Correction paper on TOP of Quiz
- Use proper format (see side board)
- Ask questions

2nd) Finish Review Stations

- You will turn in ALL 6 of them tomorrow STAPLED to Packet p.12
- Show your work on Notebook paper

3rd) Work on Unit 1 Test Corrections

Practice

Suppose that Sol and Tina change their game. Now, Sol will win 3 cents if both players show Heads, Sol will win 1 cent if both players show Tails, and Sol will pay 2 cents if one shows Heads and the other shows Tails.

a. Write a payoff matrix for this scenario.

b. Use the row matrix $\begin{bmatrix} p & 1-p \end{bmatrix}$ to find Sol's best strategy for this game.

c. Use the column matrix $\begin{bmatrix} q \\ 1-q \end{bmatrix}$ to find Tina's best strategy for this game.

d. Set up a tree diagram to compute the probabilities of each of the four outcomes for this game.

e. Prepare a probability distribution chart for Sol's winnings.

f. Find Sol's expectation for this game.

Practice Answers

a. $\begin{bmatrix} 3 & -2 \\ -2 & 1 \end{bmatrix}$

$$\begin{bmatrix} \frac{3}{8} & \frac{5}{8} \end{bmatrix} \begin{bmatrix} 3 & -2 \\ -2 & 1 \end{bmatrix} \begin{bmatrix} \frac{3}{8} \\ \frac{5}{8} \end{bmatrix} = \begin{bmatrix} -\frac{1}{8} \end{bmatrix} \approx [-.125]$$

e. Sol should play heads 3 of the 8 times and tails 5 of the 8 times.
Tina should play heads 3 of the 8 times and tails 5 of the 8 times.

f. Sol is expected to lose 1 penny for every 8 games he plays.