Name:

Quiz 2 – 8/30/2023

Problem	Weight	Score
1a	0.5	
1b	0.5	
2	1	
Total		/ 20

Instructions. You have 15 minutes to complete this quiz. You may use your plebe-issue TI-36X Pro calculator. You may not use any other materials.

Show all your work. To receive full credit, your solutions must be completely correct, sufficiently justified, and easy to follow.

Problem 1. Consider a Markov chain with state space $\mathcal{M} = \{1, 2\}$, and transition probability matrix $\mathbf{P}$ and initial state vector $\mathbf{q}$ as follows:

$$\mathbf{P} = \begin{bmatrix} 0.6 & 0.4 \\ 0.8 & 0.2 \end{bmatrix} \qquad \mathbf{q} = \begin{bmatrix} 0.3 \\ 0.7 \end{bmatrix}$$

a. What is $\Pr\{S_1 = 2 \,|\, S_0 = 1\}$?

b. What is $\Pr\{S_2 = 1 \text{ and } S_1 = 1 \text{ and } S_0 = 2\}$?

Problem 2. An automated guided vehicle (AGV) transports parts between three locations: a release station A, a machining station B, and an output buffer C. The movement of the AGV can be described as making trips from location to location based on requests to move parts. More specifically:

- If the AGV is at the release station A, it moves next to the machining station B.
- If the AGV is at the machining station B, it is equally likely to move next to either of the other two locations.
- If the AGV is at the output buffer C, it is equally likely to move next to either of the other two locations.

Suppose at the beginning of the day, the AGV is equally likely to be at any of the three stations.

Model this setting as a Markov chain. Specify the transition probabilities as a matrix.