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Week9-template

Math 468, Spring 2022

- Q 1.** (Durrett, Problem 4.1) A salesman flies around between Atlanta, Boston, and Chicago as the following rates (the units are trips per month):

F T	A	B	C
A	-4	2	2
B	3	-4	1
C	5	0	-5

- Q 1.1.** What is the transition rate matrix Q for this process?

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- Q 1.2.** List the eigenvalues of Q as a comma-separated list.

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Q 1.3. Find the (right) diagonalizing matrix S of Q , so that $S^{-1}QS$ is diagonal. Scale the columns so that the first entry in each column (counting from the top) is 1.

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Q 1.4. Find the left diagonalizing matrix $L = S^{-1}$ of Q , so that LQL^{-1} is diagonal.

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- Q 1.5.** What is the stationary distribution π for this Markov process? **Hint: Use one of the rows of the matrix found in the previous part. Make sure it is a row vector.**

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- Q 1.6.** (Durrett 4.1, part (a)) Find the limiting fraction of time she spends in each city. **Only the exact answer yields credit. List the numbers in the order “A, B, C”.**

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- Q 1.7.** Find the routing matrix \mathbf{R} for \mathbf{Q} .

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Q 1.8. If she is in Boston now, what is the probability that the first city she will visit next is Chicago?

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Q 1.9. (Durrett 4.1, part (b)) What is her average number of trips each year from Boston to Atlanta?

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Q 1.10. Find the matrix $\mathbf{P}(t) = e^{t\mathbf{Q}}$.

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Q 1.11. If she is in Boston now, what is the probability that she will be in Atlanta two months from now?
Your answer must have at least 6 digits of precision.

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