Questions

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Question 1

0.0/1.0 point (graded)

For a discrete Markov chain:

The sum of the elements of a row of the transition matrix is always equal to 1:

- True
- False

The sum of the elements of a column of the transition matrix is always equal to 1:

- True
- False

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You have used 0 of 3 attempts

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Question 2

0.0/2.0 points (graded)

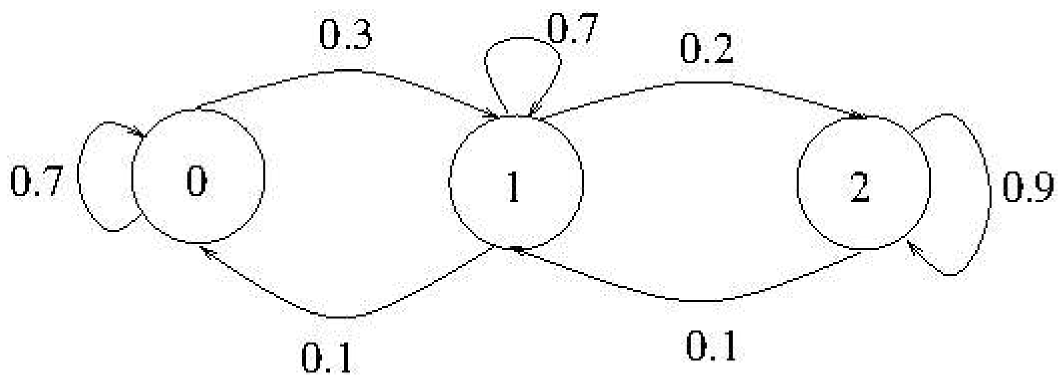

Figure 1

Which of the following balance equations are correct for the Markov chain in Figure 1?

- [ ] Case 1:

$$\begin{cases} \pi(0)0.3 = \pi(1)0.1 \\ \pi(1)0.2 = \pi(2)0.1 \end{cases}$$

- [ ] Case 2:

$$\begin{cases} \pi(0)0.3 = \pi(1)0.1 \\ \pi(1)(0.1 + 0.2) = \pi(0)0.3 + \pi(2)0.1 \end{cases}$$

- [ ] Case 3:

$$\begin{cases} \pi(1)0.3 = \pi(0)0.1 \\ \pi(2)0.2 = \pi(1)0.1 \end{cases}$$

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Question 3

0.0/1.0 point (graded)

Consider again the Markov chain of question 2.

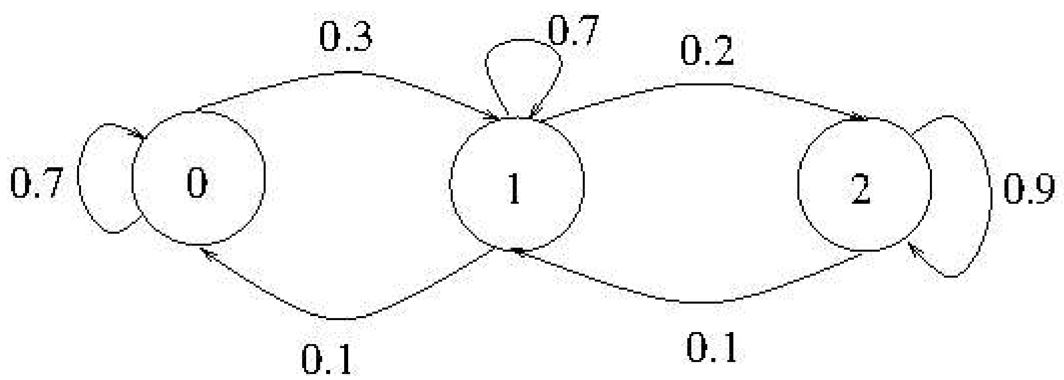

Figure 1

Denote by P its transition matrix. P_{ij} is the element in the j^{th} column of line i(i=0..2, j=0..2). What are the values of $P_{0,0}$, $P_{0,1}$ and $P_{0,2}$?

$P_{0,0}$=

$P_{0,1}$=

$P_{0,2}$=

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Question 4

3 points possible (graded)

What is the steady state distribution (if it exists) of the Markov chain presented in the previous questions?

$\pi(0)$=

$\pi(1)$=

$\pi(2)$=

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Question 5

0.0/1.0 point (graded)

Give the steady state distribution (if it exists) of the Markov chain presented in Figure 2.

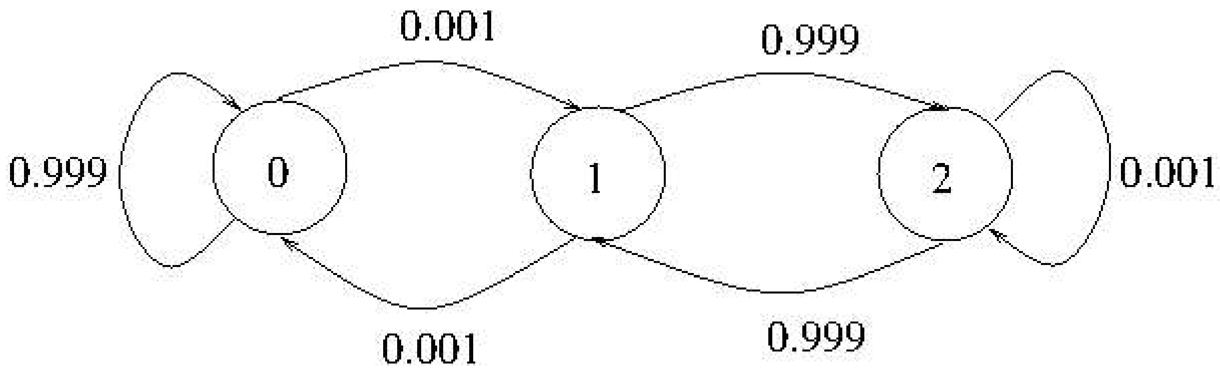

Figure 2

$\pi(0)$=

$\pi(1)$=

$\pi(2)$=

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You have used 0 of 3 attempts

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Question 6

1 point possible (graded)

Assume the following Markov chain (cf. Figure 3):

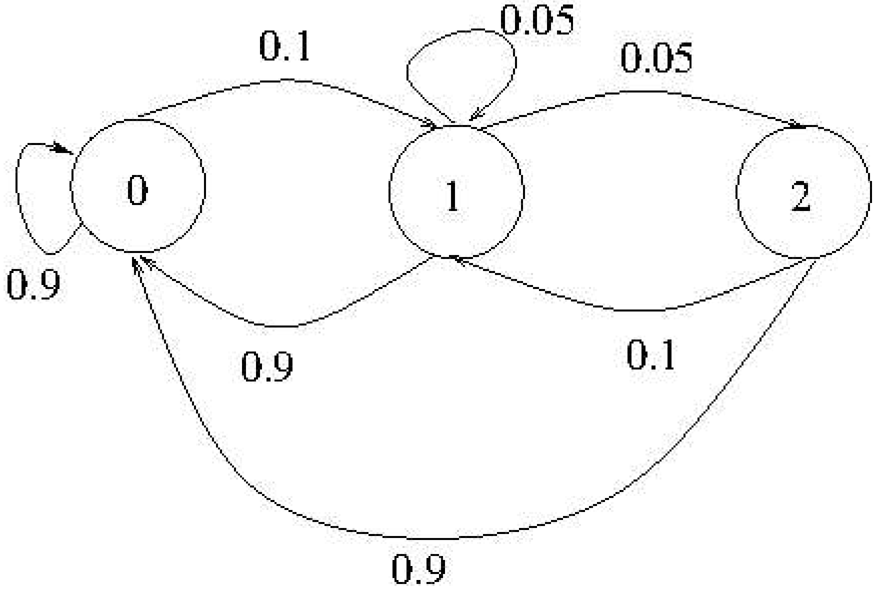

Figure 3

Is the steady state probability of being in state 0 higher when the process is in state 0 at time 0 with probability 0.99 than when it is in state 0 at time 0 with probability 10^{-6} ?

- Yes
- No

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Question 7

1 point possible (graded)

Consider the following infinite state Markov chain (cf. Figure 4):

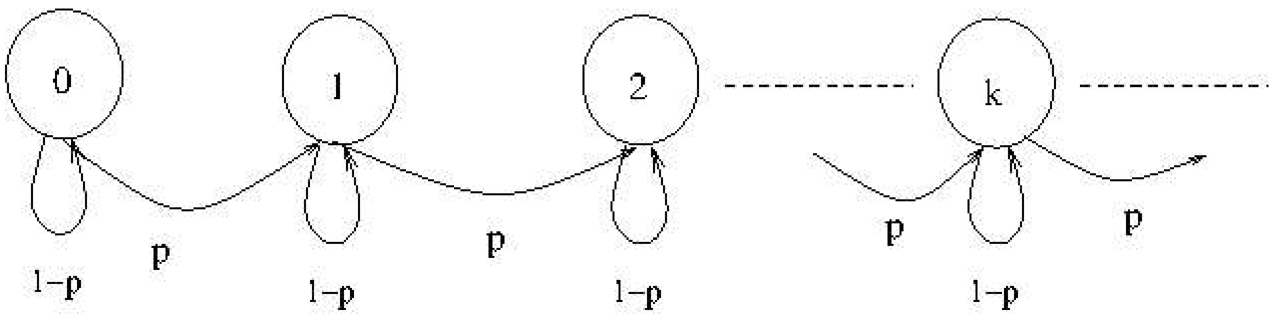

Figure 4

There is a steady state and it does not depend on the initial state.

- True
- False

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Question 8

1 point possible (graded)

Consider the following finite state Markov chain (cf. Figure 5):

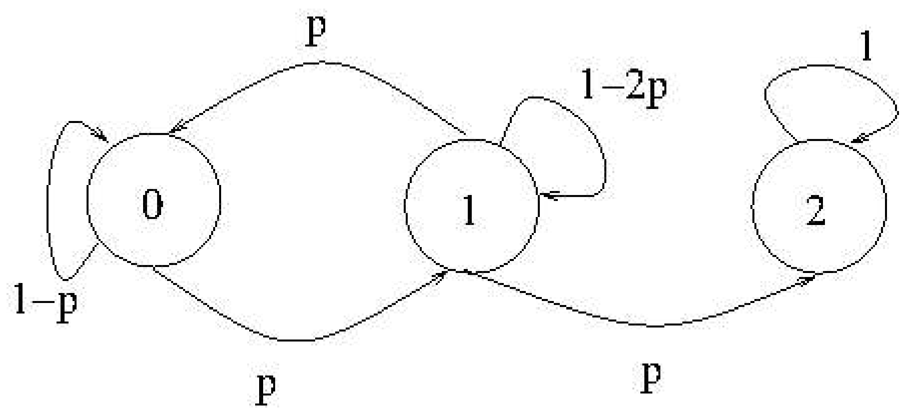

Figure 5

There is a steady state and it does not depend on the initial state.

- True
- False

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Question 9

1 point possible (graded)

Consider the following Markov chain (cf. Figure 6):

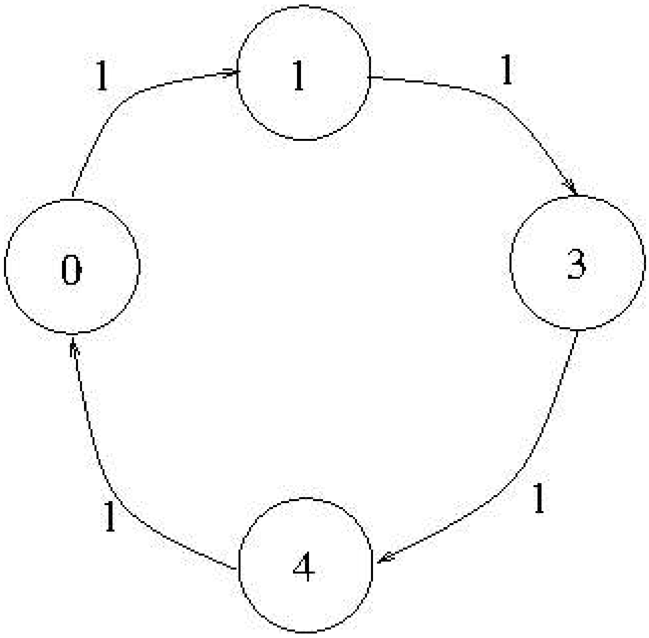

Figure 6

There is a steady state and it does not depend on the initial state.

- True
- False

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Question 10

1 point possible (graded)

Consider the following finite state Markov chain (cf. Figure 7):

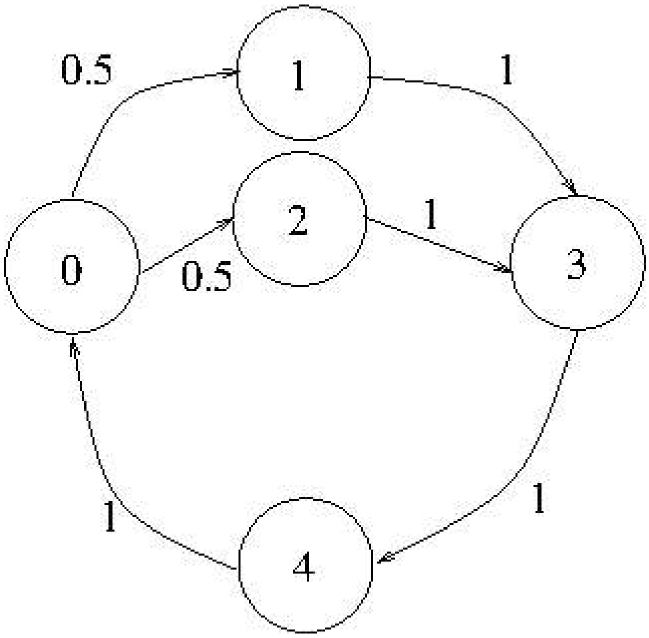

Figure 7

There is a steady state and it does not depend on the initial state.

- True
- False

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Question 11

1 point possible (graded)

If P denotes the transition matrix of a discrete time Markov chain, the probability of arriving in state j from state i in n time units is:

- $(P^n)_{i,j}$
- $(P_{i,j})^n$
- $n \times P_{i,j}$

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Question 12

1 point possible (graded)

Consider an infinite FIFO queue in discrete time with one single server. At each time, there is a single packet arrival with probability p_1, two packet arrivals with probability p_2 and no arrival with probability $1 - p_1 - p_2$. The service time is constant, equal to 1 time unit. The number of clients at time n, denoted $N(n)$ is a discrete time Markov Chain:

- True
- False

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Question 13

1 point possible (graded)

Consider the following meteorological model:

- If the weather is bad at day n, then it remains bad at day $n + 1$ with probability 0.5;
- If the weather is beautiful at day n, then it remains beautiful at day $n + 1$ with probability 0.8 if it was beautiful at day $n - 1$;
- If the weather is beautiful at day n, then it remains beautiful at day $n + 1$ with probability 0.3 if it was bad at day $n - 1$.

Let us denote by $X(n)$ the weather at day n. $X(n)$takes values in $\{Be; Ba\}$(for "Beautiful" or "Bad"). Is $X(n)$ a Markov chain?

- Yes
- No

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