Week 6: Assignment 6

The due date for submitting this assignment has passed.

Due on 2021-10-06, 23:59 IST.

As per our records you have not submitted this assignment.

1) If P is a transition matrix with all entries non zero, and π is a probability distribution vector, then the $\lim_{n\to\infty} \pi^T P^n$ *1 point*

- Exists and depends on π
- Exists and is independent of π
- Exists depending on the actual values of entries of P
- Does not exist for any P or π

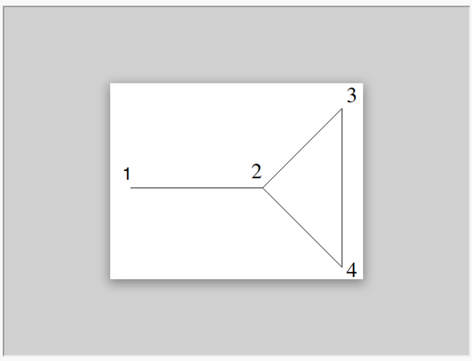
No, the answer is incorrect.
Score: 0
Accepted Answers:
Exists and is independent of π

2) Let M be the transition matrix of a regular Markov chain with 2021 states. Suppose that the vector $[1/2, 1/2^2, 1/2^3, \ldots, 1/2^{2020}, 1/2^{2020}]$ is the stationary distribution of this Markov Chain. Denote by $M' := \lim_{n\to\infty} \pi^T M^n$ the limit of applying M repeatedly on some initial distribution π, What is the sum of the first 1024 entries in the 1024-th column of M'? *1 point*

- $1/2^{1023}$
- 1
- $1/2^{1014}$
- $1/2^{2021}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$1/2^{1014}$

3) A wandering mathematician travels between four coffee shops that are located as follows: *1 point*

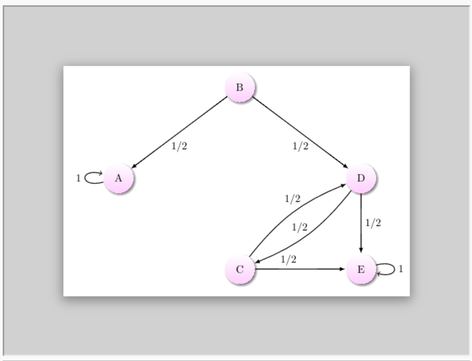


Assume that he/she chooses among the paths departing from a shop by treating each path as equally likely. If we model the mathematician's journey as a Markov chain (with states $S = \{1, 2, 3, 4\}$), the chain is

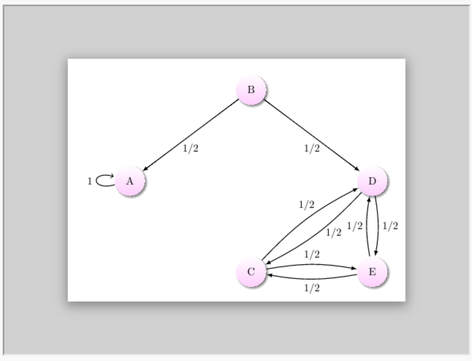
- Only Ergodic
- Only Regular
- Both Ergodic and Regular
- Neither Ergodic nor Regular

No, the answer is incorrect.
Score: 0
Accepted Answers:
Both Ergodic and Regular

4) A state in a Markov chain is called "absorbing" if it is impossible to leave it. A Markov Chain is "absorbing" if there is at least one absorbing state and it is possible to go from any state to at least one of the absorbing states in a finite number of steps. Consider the following two Markov chains shown in the diagram: *1 point*



Chain I



Chain II

- Only Chain I is absorbing
- Only Chain II is absorbing
- Both Chain I and Chain II are absorbing
- Neither of Chain I nor Chain II are absorbing

No, the answer is incorrect.
Score: 0
Accepted Answers:
Only Chain I is absorbing

5) Consider a Markov Chain with the following transition matrix: *1 point*

$$P = \begin{bmatrix} 3/10 & 1/5 & 2/5 & 1/10 \\ 1/10 & 1/10 & 2/5 & 2/5 \\ 1/2 & 1/10 & 1/10 & 3/10 \\ 1/10 & 3/5 & 1/10 & 1/5 \end{bmatrix}$$

What is the stationary distribution for the Markov Chain?

- $[1/3, 1/3, 1/4, 1/2]$
- $[0, 1/3, 1/3, 1/3]$
- $[1/3, 1/3, 2/3, 0]$
- $[1/4, 1/4, 1/4, 1/4]$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$[1/4, 1/4, 1/4, 1/4]$