

Assignment#MarkovChain

No#1:

The pattern of sunny and rainy days on the planet Rainbow is a homogeneous Markov chain with two states. Every sunny day is followed by another sunny day with probability 0.7. Every rainy day is followed by another rainy day with probability 0.4.

- Today is sunny on Rainbow. What is the chance of rain the day after tomorrow?
- Compute the probability that April 1 next year is rainy on Rainbow.

Ans: [0.67 0.33]

No#2:

Consider the following state diagram:



- Find the transition probability matrix.
- Find the three-step transition probability matrix.
- Find the steady-state distribution of the Markov chain.

Ans: [0.33 0.67]

No#3:

At the end of a given day, the price of a stock is recorded. If the stock has gone up, the probability that it will go down tomorrow is 0.25. If the stock has gone down, the probability it will go down tomorrow is only 0.4.

- Draw the state diagram and determine its transition probability matrix.
- Obtain the steady state probability vector, if it exists.

Ans: b) [0.71 0.29]

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No#4:

Consider the following transition matrix:

	DAC	CGP	CXB
DAC	0.9	0.075	0.025
CGP	0.15	0.8	0.05
CXB	0.25	0.25	0.5

- a) Draw the state diagram and determine its steady state vector.

For example, consider an MC with three states and the following transition probability matrix:

$$A = \begin{bmatrix} 0.9 & 0.075 & 0.025 \\ 0.15 & 0.8 & 0.05 \\ 0.25 & 0.25 & 0.5 \end{bmatrix}$$

It can be shown that in this case the steady-state probabilities converge to $P = \{0.625, 0.3125, 0.0625\}$.