Assignment 4

Raghav Juyal - EP20BTECH11018

Download all python codes from

and latex-tikz codes from

QUESTION 15, GATE CS 2018

Two people, P and Q decide to independently roll two identical dice, each with 6 faces, numbered 1 to 6. The person with the lower number wins. In case of a tie, they roll the dice repeatedly until there is no tie. Define a trial as a throw of the dice by P and Q. Assume that all 6 numbers on each dice are equi-probable and that all trials are independent. The probability that one of them wins on the third trial is?

SOLUTION

Let p represent probability of a tie and q represent probability that one of them wins.

$$p = 1 \times \frac{1}{6} = \frac{1}{6} \qquad (0.0.1)$$

$$q = 1 - p = \frac{5}{6} \qquad (0.0.2)$$

Markov Diagram where A represents a tie and B represents that one of P and Q wins

Let $X \in \mathbb{N}$ represent a random variable where $X = n$ represents that one of the two people win on the nth trial.

$$\Pr(X = n) = p^{n-1} \times q \qquad (0.0.3)$$

Here $n = 3$

$$\Pr(X = 3) = p^2 \times q \qquad (0.0.4)$$

$$\therefore \Pr(X = 3) = \frac{5}{216} \qquad (0.0.5)$$