

# Assignment 4

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Download all python codes from

<https://github.com/RaghavJuyal/AI1103/blob/main/Assignment4/Codes/Assignment4.py>

and latex-tikz codes from

<https://github.com/RaghavJuyal/AI1103/tree/main/Assignment4/Assignment4.tex>

## 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.

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

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

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

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

Here  $n = 3$

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

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