

# AI1103 : Assignment 2

Savarana Datta - AI20BTECH11008

Download all python codes from

<https://github.com/SavaranaDatta/AI1103/tree/main/Assignment2/codes>

and latex codes from

<https://github.com/SavaranaDatta/AI1103/blob/main/Assignment2/Assignment2.tex>

## PROBLEM(GATE 8)

Consider a dice with the property that the probability of a face with  $n$  dots showing up is proportional to  $n$ . The probability of the face with three dots showing up is....

## SOLUTION(GATE 8)

Given that the probability of a face with  $n$  dots is proportional to  $n$ ,  
Let  $\Pr(n)$  denote the probability of showing up  $n$ .  
As  $\Pr(n)$  is proportional to  $n$ , we have

$$\Pr(n) = kn \quad (8.1)$$

Where  $k$  is some real constant.

n	1	2	3	4	5	6
$\Pr(n)$	k	2k	3k	4k	5k	6k

We know that,

$$\sum_{n=1}^6 \Pr(n) = 1 \quad (8.2)$$

By substituting the values in 8.2, we have

$$k + 2k + 3k + 4k + 5k + 6k = 1 \quad (8.3)$$

$$\Rightarrow 21k = 1 \quad (8.4)$$

$$\Rightarrow k = \frac{1}{21} \quad (8.5)$$

Probability of the face with three dots showing up

$$\Rightarrow \Pr(n = 3) = 3k \quad (8.6)$$

$$\Rightarrow \Pr(n = 3) = 3 \left( \frac{1}{21} \right) \quad (8.7)$$

$$\Rightarrow \Pr(n = 3) = \frac{1}{7} \quad (8.8)$$

Therefore the probability of the face with three dots showing up is 0.143.

The below figure shows the probability distribution of the dice.

