

# AI1103 : Assignment 2

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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)

Let  $X$  be random variable.

$X \in \{1,2,3,4,5,6\}$

$p_X(n) \rightarrow$  Probability of showing up  $n$ .

As  $p_X(n)$  is proportional to  $n$ . We have,

$$p_X(n) = \begin{cases} kn & 1 \leq n \leq 6 \\ 0 & \text{otherwise} \end{cases} \quad (8.1)$$

Where  $k$  is some real constant.

$n$	1	2	3	4	5	6
$p_X(n)$	$k$	$2k$	$3k$	$4k$	$5k$	$6k$

We know that,

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

By substituting the values in 8.2, we have

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

$$\Rightarrow k = \frac{1}{21} \quad (8.4)$$

Probability of the face with three dots showing up

$$\Rightarrow p_X(3) = 3k \quad (8.5)$$

Substituting the value of  $k$  from 8.4

$$\Rightarrow p_X(3) = \frac{1}{7} \quad (8.6)$$

The below figure shows the probability distribution of the dice.

