

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.

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

Given that the probability of a face with n dots is proportional to n , Let $P_x(n)$ denote the 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

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

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

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

Probability of the face with three dots showing up

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

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

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

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

The below figure shows the probability distribution of the dice.

