

# AI1103-Assignment 1

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Download all python codes from

<https://github.com/Shambhu-K/Assignment-1/blob/main/assignment-1.py>

and latex-tikz codes from

<https://github.com/Shambhu-K/Assignment-1/blob/main/Assignment-1.tex>

## QUESTION

(4.6) Find the probability of throwing at most 2 sixes in 6 throws of a single die.

## SOLUTION

Let  $X$  represent the number of sixes in six throws of a dice

$X \in \{0, 1, 2, 3, 4, 5, 6\}$

By Binomial distribution formula,

$$P(X = k) = {}^nC_k p^k (1 - p)^{n-k}$$

Here,

Symbol	Meaning
k	no. of sixes in six throws of a dice
n	no. of throws = 6
p	Pr of getting 6 in single throw = $\frac{1}{6}$

TABLE 0: This table gives the meaning of each symbol used in the formula

To find the probability of getting atmost two sixes in six throws of a single dice:

$$\Pr(X \leq 2) = \Pr(X = 0) + \Pr(X = 1) + \Pr(X = 2) \quad (0.0.1)$$

$$\Pr(X = 0) = {}^6C_0 \times \left(\frac{1}{6}\right)^0 \times \left(\frac{5}{6}\right)^{6-0} \quad (0.0.2)$$

$$\Pr(X = 1) = {}^6C_1 \times \left(\frac{1}{6}\right)^1 \times \left(\frac{5}{6}\right)^{6-1} \quad (0.0.3)$$

$$\Pr(X = 2) = {}^6C_2 \times \left(\frac{1}{6}\right)^2 \times \left(\frac{5}{6}\right)^{6-2} \quad (0.0.4)$$

$$\Pr(X \leq 2) = \left(\frac{5^6}{6^6}\right) \times 1 + \left(\frac{5^5}{6^6}\right) \times 6 + \left(\frac{5^4}{6^6}\right) \times 15 \quad (0.0.5)$$

$$= 0.937714$$

$$(0.0.6)$$