

AI1103: Assignment 1

Tanmay Garg

CS20BTECH11063 EE20BTECH11048

Download all python codes from

<https://github.com/tanmaygar/AI-Course/blob/main/Assignment1/codes/Assignment1.py>

and latex-tikz codes from

<https://github.com/tanmaygar/AI-Course/blob/main/Assignment1/Assignment1.tex>

PROBLEM STATEMENT:

An urn contains 25 balls of which 10 balls bear a mark 'X' and the remaining 15 bear a mark 'Y'. A ball is drawn at random from the urn, its mark is noted down and it is replaced. If 6 balls are drawn in this way, find the probability that:

- 1) all will bear 'X' mark.
- 2) not more than 2 will bear 'Y' mark.
- 3) at least one ball will bear 'Y' mark.
- 4) the number of balls with 'X' mark and 'Y' mark will be equal.

SOLUTION:

Let X be the number of balls which have 'X' mark on them

Using the expression of binomial distribution

$$P(X = r) = \binom{n}{r} p^r q^{n-r} \quad (0.0.1)$$

$$P(X \geq k) = \sum_{r=k}^n \binom{n}{r} p^r q^{n-r} \quad (0.0.2)$$

$$P(X \leq k) = \sum_{r=0}^k \binom{n}{r} p^r q^{n-r} \quad (0.0.3)$$

$$n = 6, \quad p = 0.4, \quad q = 0.6 \quad (0.0.4)$$

n	6	6	6	6
Condition	$P(X = 6)$	$P(X \geq 4)$	$P(X \leq 5)$	$P(X = 3)$
Value	0.004096	0.1792	0.995904	0.27648
Case	(i)	(ii)	(iii)	(iv)

