

# Assignment 1

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Download all python codes from

<https://github.com/Nik123-cpp/Assignment-1/blob/main/assignment1.py>

and latex-tikz codes from

<https://github.com/Nik123-cpp/Assignment-1/blob/main/Assignment1.tex>

## 1 PROBLEM 3.4

The probability that a bulb produced by a factory will fuse after 150 days is 0.05. Find the probability that out of 5 such bulbs

- (i) none
  - (ii) not more than one
  - (iii) more than one
  - (iv) atleast one
- will fuse after 150 days of use.

## 2 SOLUTION

Let  $X$  be random variable which denoting number of bulbs fuses after 150 days of use, among the 5 bulbs. Then by Binomial Distribution.

$$\Pr(X = r) = \binom{n}{r} p^r q^{n-r} \quad (2.0.1)$$

$$\Pr(X \geq k) = \sum_{r=k}^n \binom{n}{r} p^r q^{n-r} \quad (2.0.2)$$

$$\Pr(X \leq k) = \sum_{r=0}^k \binom{n}{r} p^r q^{n-r} \quad (2.0.3)$$

$$\Pr(X > k) = \sum_{r=k+1}^n \binom{n}{r} p^r q^{n-r} \quad (2.0.4)$$

$$n = 5, \quad p = 0.05, \quad q = 0.95 \quad (2.0.5)$$

n	5	5	5	5
Condition	$\Pr(X = 0)$	$\Pr(X \leq 1)$	$\Pr(X > 1)$	$\Pr(X \geq 1)$
Value	0.77378	0.97740	0.02259	0.22621
Case	(i)	(ii)	(iii)	(iv)

TABLE 0: Probability Vs Condition