

Assignment-3

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Download all latex codes from:

<https://github.com/PrasannaLanka/Assignment3/blob/main/Assignment1/main.tex>

and python codes from

<https://github.com/PrasannaLanka/Assignment3/blob/main/Assignment2/codes/main.tex>

$$\sum_{j=1}^3 \Pr(X = j) = \binom{4}{1}(1/2)^1(1/2)^3 + \binom{4}{2}(1/2)^2(1/2)^2 \quad (0.0.2)$$

$$+ \binom{4}{3}(1/2)^3(1/2)^1 \quad (0.0.3)$$

$$\sum_{j=1}^3 \Pr(X = j) = \frac{7}{8} \quad (0.0.4)$$

PROBLEM: GATE 2002(CS)-Q.41

Four fair coins are tossed simultaneously. The probability that at least one head and one tail turn up is

- a) $\frac{1}{16}$
- b) $\frac{1}{8}$
- c) $\frac{7}{8}$
- d) $\frac{15}{16}$

The required probability is $\boxed{\frac{7}{8}}$
 \therefore **Option C is true**

SOLUTION

Let $Y \in \{0, 1\}$ be the random variable such that 1 represents occurrence of tail, 0 represents occurrence of head when coin is tossed.

TABLE I: Probability distribution for values of Y

Y	P(Y)
1	$\frac{1}{2}$
0	$\frac{1}{2}$

Let the discrete random variable x is following bernoulli distribution with parameters n, p where $n = 4, p = \Pr(Y = 0) = \frac{1}{2}$ and $q = \Pr(Y = 1) = \frac{1}{2}$
 Probability mass function of x successes in n trials is given by

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