

# Assignment-3

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Download all latex codes from:

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

and python codes from

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

required probability =  $P(1\text{head}) + P(2\text{heads}) + P(3\text{heads})$   
let  $j$  = no. of heads, then

$$\sum_{j=1}^3 \Pr(X = j) = {}^4C_1(1/2)^1(1/2)^3 + {}^4C_2(1/2)^2(1/2)^2 \quad (0.0.2)$$

$$+ {}^4C_3(1/2)^3(1/2)^1 \quad (0.0.3)$$

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)  $\frac{15}{16}$

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

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

SOLUTION

Let discrete random variable  $x$  is following bernoulli distribution with parameters  $n, p$  where  $n = 4, p = P(\text{head}) = \frac{1}{2}$  and  $q = P(\text{tail}) = \frac{1}{2}$   
PMF of  $x$  successes in  $n$  trials is given by

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

TABLE I: Cases for atleast one head or one tail

no. of heads	no. of tails
1	3
2	2
3	1