

Assignment 4

Probability and Random Variables

Swati Mohanty (EE20RESCH11007)

I. PROBLEM

Find the probability distribution of

- (i) number of heads in two tosses of a coin.
- (ii) number of tails in the simultaneous tosses of three coins.
- (iii) number of heads in four tosses of a coin.

II. SOLUTION

(i) Let the event be defined as

X = Number of heads when a coin is tossed twice

Outcomes = {HH, HT, TH, TT}

Hence the probability distribution of X is:

X	0	1	2
$P(X)$	1/4	1/2	1/2

(ii) Let the event be defined as

X = Number of tails in the simultaneous tosses of three coins.

Outcomes = {HHH, HHT, HTH, HTT, THH, TTH, TTT}

Hence the probability distribution of X is:

X	0	1	2	3
$P(X)$	1/8	3/8	3/8	1/8

(iii) Let the event be defined as

X = Number of heads in four tosses of a coin.

Outcomes = {HHHH, HHHT, HHHT, HHTT, HTHH, HTHH, HTTH, HTTH, THHH, THHT, THTH, THTT, TTHH, TTHH, TTTT}

Hence the probability distribution of X is:

X	0	1	2	3	4
$P(X)$	1/16	1/4	3/8	1/4	1/16

The PDF graphs were plotted using the python code.

Download python code from here

https://github.com/Swati-Mohanty/AI5002/blob/main/Assignment_4/codes/cintoss.py

Download latex code from here-

```
val = ((b*d_b)/((b*d_b)+(a*d_a)))
print ("Probability that the defected item was produced by machine B",val)
```

Probability that the defected item was produced by machine B 0.24984653161448744

Figure 1: Result obtained from python code

https://github.com/Swati-Mohanty/AI5002/blob/main/Assignment_4/codes/assignment4.tex