ASSIGNMENT 2

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CS22BTECH11043

11.16.3.7 - A fair coin is tossed four times, and a person win Rs 1 for each head and lose Rs 1.50 for each tail that turns up. From the sample space calculate how many different amounts of money you can have after four tosses and the probability of having each of these amounts.

Solution:

TABLE 0
DEFINING RANDOM VARIABLE X AND Y

Random Variable	Definition	Value
X	Number of heads achieved in 4 coin tosses	0
		1
		2
		3
		4
Y	Net amount after 4 coin tosses	Net Amount

$X \sim B(4, p)$
p = Probability of head = $\frac{1}{2}$
Profit for each head recieved = Rs 1
Loss for each tail received = Rs 1.5

X	$\Pr(X)$	Y	$\Pr(Y)$
0	$\binom{4}{0}\left(\frac{1}{2}\right)^4$	$0\times1-1.5\times4=-6$	$\frac{1}{16}$
1	$\binom{4}{1}\left(\frac{1}{2}\right)^4$	$1\times1-1.5\times3=-3.5$	$\frac{4}{16}$
2	$\binom{4}{2}\left(\frac{1}{2}\right)^4$	$2\times1-1.5\times2=-1$	$\frac{6}{16}$
3	$\binom{4}{3}\left(\frac{1}{2}\right)^4$	$3\times1-1.5\times1=1.5$	$\frac{4}{16}$
4	$\binom{4}{4}\left(\frac{1}{2}\right)^4$	$4\times1-1.5\times0=4$	$\frac{1}{16}$

So there can be 5 different amounts of money.