Chapter 13 Probability

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Q10.13.3.38: In a game, the entry fee is Rs 5.The game consists of a tossing a coin 3 times.If one or two heads show, Sweta gets her entry fee back.If she throws 3 heads, she receives double the entry fees.Otherwise she will lose. For tossing a coin three times, find the probability that she

1) loses the entry fee.
2) gets double entry fee.
3) just gets her entry fee.

Solution: Let, X be the random variable that represent the number of heads appearing on dices.

Parameter	value	description
X	$\sum_{i=0}^{3} X_i$	Random vairable
X_i	0	no heads occurs
	1	one heads occurs
	2	two heads occurs
	3	three heads occurs
n	3	total number of dices
p,q	$\frac{1}{2}$	toss result in heads/tails

TABLE 3
Random Variables

$$\Pr(X_i) = \begin{cases} \frac{1}{8} & \text{,i=0 heads comes in 3 tosses} \\ \frac{3}{8} & \text{,i=1 heads comes in 3 tosses} \\ \frac{3}{8} & \text{,i=2 heads comes in 3 tosses} \\ \frac{1}{8} & \text{,i=3 heads comes in 3 tosses} \end{cases} \tag{1}$$

From above equations (1) we can say,
Probability that she loss the fees (0 heads),

$$\Pr(X_0) = \frac{1}{8} \tag{2}$$
$$= 0.125 \tag{3}$$

Probability that she gets double entry fees(3 heads),

$$\Pr(X_3) = \frac{1}{8} \tag{4}$$
$$= 0.125 \tag{5}$$

Probability that she just gets the entry fees(1 heads + 2 heads),

$$\Pr(X_1 + X_2) = \Pr(X_1) + \Pr(X_2) \tag{6}$$
$$= \frac{3}{8} + \frac{3}{8} \tag{7}$$
$$= 0.750 \tag{8}$$