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_i be random variable such that,

$$p_X(k) = {}^3C_k p^{3-k} q^k \qquad , k \in 0,1,2,3 \tag{1}$$

Parameter	value	description
X_0	$\frac{1}{8}$	0 head
X_1	$\frac{3}{8}$	1 head
X_2	$\frac{3}{8}$	2 heads
X_3	$\frac{1}{8}$	3 heads
n	3	total number of trials
p,q	$\frac{1}{2}$	toss result in heads/tails

TABLE 3
Random Variables

From table (3) 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),

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