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Solution 12.13.3.22

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Question 22 Eight coins are tossed together. The probability of getting exactly 3 heads is

- (A) $\frac{1}{256}$
- (B) $\frac{7}{32}$
- (C) $\frac{5}{32}$
- (D) $\frac{3}{32}$

Solution: The probability or getting a head is

TABLE 4
RANDOM VARIABLE AND PROBABILITY TABLE

Random independent variable	value of R.V	Description
n	8	Total no. of coin toss
X	$0 \le X \le 8$	no. of heads

$$p = \frac{1}{2} \tag{1}$$

The pmf for the binomial distribution is

$$p_X(k) = \binom{n}{k} p^k (1 - p)^{n-k}$$
 k = 0, 1, 2, ..8 (2)

(3)

For exactly 3 heads

$$p_X(3) = \binom{8}{3} p^3 (1-p)^5 \tag{4}$$

$$=56\left(\frac{1}{2}\right)^3\left(\frac{1}{2}\right)^5\tag{5}$$

$$=\frac{7}{32}\tag{6}$$

Hence, the probability of getting 3 heads is 0.21875

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