

TOPIC

Engineering Probability and Statistics – Section II – Question 12

QUESTION

Two cards are randomly selected from a deck of 52 playing cards (excluding the two jokers). The probability that the both selected cards are diamonds most nearly is

- (A) 1/52
- (B) 1/26
- (C) 1/17
- (D) 1/13

HINT

Given M diamonds out of N cards, randomly select $n (\leq M)$ cards from the N cards. Let X be the number of diamonds of the $n (\leq M)$ selected cards. Then X has the hypergeometric distribution.

$$P(X = x) = \frac{\binom{M}{x} \binom{N-M}{n-x}}{\binom{N}{n}}, \quad x = 0, 1, 2, \dots, n.$$

SOLUTION

$$N = 52,$$

$$M = 13,$$

$$n = x = 2.$$

$$\begin{aligned} P(X = 2) &= \frac{\binom{M}{x} \binom{N-M}{n-x}}{\binom{N}{n}} \\ &= \frac{\binom{13}{2} \binom{52-13}{2-2}}{\binom{52}{2}} \\ &= \frac{\binom{13}{2} \binom{39}{0}}{\binom{52}{2}} \\ &= \frac{\frac{13!}{2!(13-2)!} \times \frac{39!}{0!(39-0)!}}{\frac{52!}{2!(52-2)!}} \text{ as } \binom{F}{n} = \frac{F!}{n!(F-n)!} \\ &= 1/17. \end{aligned}$$

ANSWER

(C)

CONTRIBUTOR

Michael Weng