

# PROBABILITY

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**16.4.2** <sup>1</sup>Four cards are drawn from a well-shuffled deck of 52 cards. What is the probability of obtaining 3 diamonds and one spade?.

**Solution:**

Let the cards drawn from the deck be  $X = \{0, 1, 2, 3\}$  and  $Y = \{0, 1\}$ , where **0** denotes the card is from diamonds and **1** denotes the card is from spades. The desired set of selecting diamonds  $\{00, 01, 02\}$  and selecting one spade is  $\{13\}$

Number of ways of selecting 3 diamonds  $P(00, 01, 02) = {}^{13}C_3$

Number of ways of selecting 1 spade  $P(13) = {}^{13}C_1$

selecting four cards from deck  $P(x) = {}^{52}C_4$

$$\begin{aligned} \therefore P_{req} &= \frac{P(00, 01, 02)P(13)}{P(X)} \\ &= \frac{{}^{13}C_3 \times {}^{13}C_1}{{}^{52}C_4} \\ &= \frac{\frac{13!}{3!(13-3)!} \times \frac{13!}{1!(13-1)!}}{\frac{52!}{4!(52-4)!}} \\ &= \frac{\frac{13 \times 12 \times 11 \times 10!}{3! \times 10!} \times \frac{13 \times 12!}{1! \times 12!}}{\frac{52 \times 51 \times 50 \times 49 \times 48!}{4! \times 48!}} \\ &= \frac{\frac{89232}{312}}{\frac{649700}{312}} \\ \therefore P_{req} &= \boxed{\frac{286}{20285}} \end{aligned}$$

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<sup>1</sup>Read question numbers as (CHAPTER NUMBER).(EXERCISE NUMBER).(QUESTION NUMBER)