Assignment-1

AI1110: Probability and Random Variables
Indian Institute of Technology, Hyderabad

P. Satvik
EE22BTECH11212

Question:

One card is drawn from a well-shuffled deck of 52 cards. Find the probability of getting

(i) a king of red colour (ii) a face card (iii) a red face card

(iv) the jack of hearts (v) a spade (vi) the queen of diamonds

Solution:

Consider a random variable X, which represents the event chosen.

Event	Value of X
Drawing a King of Colour Red	1
Drawing a Face Card	2
Drawing a Red coloured Face Card	3
Drawing the Jack of Hearts	4
Drawing a Spade	5
Drawing the Queen of Diamonds	6

TABLE 0
EVENTS FOR WHICH PROBABILITY IS TO BE FOUND

1) Probability of drawing a King of Red colour (or) X=1:
No. of Red Kings = $2 = K_r$
Total No. of cards in a deck = $52 = N$

$$\Pr(X = 1) = \frac{K_r}{N} = \frac{2}{52} = \frac{1}{26} \tag{1}$$

2) Probability of drawing a Face Card (or) $X = 2$:
No. of Face Cards = $3 \times 4 = 12 = F$

$$\Pr(X = 2) = \frac{F}{N} = \frac{12}{52} = \frac{3}{13} \tag{2}$$

3) Probability of drawing a Red Face Card (or) $X = 3$:
No. of Red Face Cards = $2 \times 3 = 6 = R_f$

$$\Pr(X = 3) = \frac{R_f}{N} = \frac{6}{52} = \frac{3}{26} \tag{3}$$

4) Probability of drawing the Jack of Hearts (or) $X = 4$:
No. of Jack of Hearts = $1 = J_h$

$$\Pr(X = 4) = \frac{J_h}{N} = \frac{1}{52} \tag{4}$$

5) Probability of drawing a Spade (or) $X = 5$:
No. of spades = $13 = s$

$$\Pr(X = 5) = \frac{s}{N} = \frac{13}{52} = \frac{1}{4} \tag{5}$$

6) Probability of drawing the Queen of Diamonds (or) $X = 6$:
No. of Queen of Diamonds = $1 = Q_d$

$$\Pr(X = 6) = \frac{Q_d}{N} = \frac{1}{52} \tag{6}$$

The pmf of X is,

$$\Pr(X = i) = \begin{cases} \frac{1}{26} & i = 1 \\ \frac{3}{13} & i = 2 \\ \frac{3}{26} & i = 3 \\ \frac{1}{52} & i = 4 \\ \frac{1}{4} & i = 5 \\ \frac{1}{52} & i = 6 \end{cases} \tag{7}$$