

Assignment 2

AI1110: Probability and Random Variables

INDIAN INSTITUTE OF TECHNOLOGY, HYDERABAD

Ladva Umanshiva
AI22BTECH11016

11.16.3.4: A card is selected from a pack of 52 cards.

- (a) How many points are there in the sample space?
- (b) Calculate the probability that the card is an ace of spades.
- (c) Calculate the probability that the card is
 - i) an ace
 - ii) black card

Solution: Let $n(A)$ denote the number of possible outcomes for any event A .

- (a) Let S be the sample space

Clearly, the number of possible outcomes are 52 as there are 52 cards.

\therefore There are 52 points in sample space.

$$\therefore n(S) = 52 \quad (1)$$

Event	Description
E	Selected card is an ace of spades.
A	Selected card is an ace.
B	Selected card is a black card.

- (b) Clearly,

$$n(E) = 1 \quad (2)$$

$$\therefore \Pr(E) = \frac{n(E)}{n(S)} = \frac{1}{52} \quad (3)$$

$$\therefore \Pr(E) = \frac{1}{52} \quad (4)$$

- (c) i) There are 4 aces in a deck of 52 cards.

$$\therefore n(A) = 4 \quad (5)$$

$$\therefore \Pr(A) = \frac{n(A)}{n(S)} = \frac{4}{52} = \frac{1}{13} \quad (6)$$

$$\therefore \Pr(A) = \frac{1}{13} \quad (7)$$

- ii) There are 26 black card in a deck of 52 cards.

$$\therefore n(B) = 26 \quad (8)$$

$$\therefore \Pr(B) = \frac{n(B)}{n(S)} = \frac{26}{52} = \frac{1}{2} \quad (9)$$

$$\therefore \Pr(B) = \frac{1}{2} \quad (10)$$