

# Assignment 2

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Download all python codes from

<https://github.com/GauthamBellamkonda/AI1103/tree/main/Assignment2/Codes>

and latex-tikz codes from

<https://github.com/GauthamBellamkonda/AI1103/tree/main/Assignment2>

## PROBLEM

(Prob, 5.24) One card is drawn from a well-shuffled deck of 52 cards. Calculate the probability that the card will

- (i) be an ace.
- (ii) not be an ace.

## SOLUTION

For convinience, let's denote the cards Ace, J, Q, K by the numbers {1, 11, 12, 13} respectively. Let  $X \in \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13\}$  denote the outcome of the experiment. We know that there exist exactly 4 cards with the same number in a deck of 52 cards. Assuming that the deck of cards is well-shuffled, the probability mass function for this experiment is expressed as

$$\Pr(X = i) = \begin{cases} \frac{4}{52} = \frac{1}{13} & 1 \leq i \leq 13, i \in \mathbb{N} \\ 0 & \text{otherwise} \end{cases}$$

- (i) Hence, the probability of getting an Ace is

$$\Pr(X = 1) = \frac{1}{13}$$

- (ii) Hence, the probability of not getting an Ace is

$$\begin{aligned} \Pr(X \neq 1) &= \sum_{i=2}^{13} \Pr(X = i) \\ &= 1 - \Pr(X = 1) \\ &= 1 - \frac{1}{13} \\ &= \frac{12}{13} \end{aligned}$$