Question : Ten playing cards numbered 1, 2, 3, .., 10 are placed face down on a table. One card is drawn at random, its number recorded, and then replaced face down. A card is drawn again at random. The probability that the number on the second draw is greater than the number on the first draw (rounded off to two decimal places) is

Solution:

Let n be the number on the first draw. The favorable outcomes for each n are the numbers $n+1, n+2, \ldots, 10$. Therefore, the total count of favorable outcomes is given by:

$$\text{Favorable Outcomes} = \sum_{n=1}^{10}(10-n) \tag{1}$$

The total number of possible outcomes is $10 \times 10 = 100$. The probability is then given by:

$$\Pr(\text{second draw} > \text{first draw}) = \frac{\text{Favorable Outcomes}}{\text{Total Possible Outcomes}} \tag{2}$$

$$= \frac{\sum_{n=1}^{10}(10-n)}{100} \tag{3}$$

$$\Pr(\text{second draw} > \text{first draw}) \approx \frac{45}{100} = 0.45 \tag{4}$$

Therefore, the probability that the number on the second draw is greater than the number on the first draw is approximately 0.45 or 45%.