Question

1. A die has four of its faces coloured white and the remaining two coloured black. What is the probability that when the die is thrown two consecutive times, the top face will be white in both cases?

Solution

The probability that when the die is thrown the top face will be white is

$$P(w) = \frac{4}{4+2} = \frac{2}{3}$$

Thus, the probability that when the die is thrown two consecutive times, the top face will be white in both cases is

$$P(w, w) = \frac{2}{3} \cdot \frac{2}{3} = \frac{4}{9}.$$

Answer: $\frac{4}{9}$.

Question

2. Three balls are drawn from a box containing 6 red marbles, 4 white marbles and 5 blue marbles. Find the probability that they are drawn in the order: red, white, and blue if each ball is drawn with replacement.

8/225
1/225
4/225
6/225

Solution

Total amount of balls: 6 + 4 + 5 = 15
The probability that the first one will be red: 6/15.
Each ball is drawn with replacement, hence the probability that the second ball will be white is 4/15.
Probability that the Last one will be blue is 5/15.
The probability that they are drawn in the order: red, white, and blue will be 6/15 · 4/15 · 5/15 = 8/225.

Answer: $\frac{8}{225}$.

Question

3. When a die is thrown, what is the probability that the number is greater than 1, given that it is odd?
2/3
3/5
4/5
1/3

Solution

Let $A =$ 'the number is greater than 1'$= \{2, 3, 4, 5, 6\}$,
$B =$ 'the number is odd'$= \{1, 3, 5\}$,
$A \text{ and } B =$ ' the number is greater than 1 and the number is odd' $= \{3, 5\}$
$P(A|B) = \frac{P(A \text{ and } B)}{P(B)} = \frac{2/6}{3/6} = \frac{2}{6} \cdot \frac{6}{3} = \frac{2}{3}.$

Answer: $\frac{2}{3}$.

Question

4. Giving that mean=34, median= 32 and standard deviation as 12. Calculate the Pearson's coefficient of skewness.
0.5
0.4
0.3
1.6

Solution

Skewness is a measure of the asymmetry of the probability distribution. Skewness value can be positive or negative. Pearson coefficient of skewness is based on arithmetic mean, mode, median and standard deviation.
Pearson's median or second skewness coefficient is

$$S = \frac{3(mean - mediam)}{standard\ deviation}$$

$$S = \frac{3(34 - 32)}{12} = 0.5$$

Answer: 0.5.

Question

5. Calculate the standard deviation of the marks:
2, 3, 6, 2, 5, 0, 4, 2.
1.5
1.7
1.8
1.9

Solution

The standard deviation is the most common measure of variability, measuring the spread of the data set and the relationship of the mean to the rest of the data. If the data points are close to the mean, indicating that the responses are fairly uniform, then the standard deviation will be small. Conversely, if many data points are far from the mean, indicating that there is a wide variance in the responses, then the standard deviation will be large. If all the data values are equal, then the standard deviation will be zero. The sample standard deviation is calculated by the following formula:

$$\sigma = \sqrt{\frac{1}{N-1} \sum_{i=1}^{N} (x_i - \overline{x})^2}$$

where
σ is the sample standard deviation;
$x_1, x_2, \ldots, x_N$ is the sample data set;
$\overline{x}$ is the mean value of the sample data set;
N is size of the sample data set.

$$\overline{x} = \frac{2 + 3 + 6 + 2 + 5 + 0 + 4 + 2}{8} = 3.$$

x_i	$\overline{x}$	$(x_i - \overline{x})^2$
2	3	1
3	3	0
6	3	9
2	3	1
5	3	4
0	3	9
4	3	1
2	3	1
$\sum x_i = 24$	$\sum \overline{x} = 24$	$\sum (x_i - \overline{x})^2 = 26$

We can determine the value of the standard deviation:

$$\sigma = \sqrt{\frac{1}{8-1} \cdot 26} = \sqrt{\frac{26}{7}} \approx 1.9$$

Answer: 1.9.