

1. Probability

A fair six-sided die is rolled twice. What is the probability that the sum is equal to 7?

→ Answer:

Possible outcomes for sum 7: (1,6), (2,5), (3,4), (4,3), (5,2), (6,1) → 6 outcomes.

Total outcomes = $6 \times 6 = 36$.

Probability = $6/36 = 1/6$.

2. Statistics

The mean of 10 numbers is 20. If one number is removed and the mean becomes 18, what is the value of the removed number?

→ Answer:

Sum of 10 numbers = $10 \times 20 = 200$.

Sum of 9 numbers = $9 \times 18 = 162$.

Removed number = $200 - 162 = 38$.

3. Linear Algebra

If A is a 2×3 matrix and B is a 3×4 matrix, what is the dimension of AB?

→ Answer:

Matrix multiplication rule: (rows of A) \times (columns of B)

Answer = 2×4 .

4. Machine Learning

Which algorithm is used for **classification**?

- a) K-Means
- b) PCA
- c) Logistic Regression
- d) Apriori

→ Answer:

c) Logistic Regression

5. Artificial Intelligence

Which search algorithm is **complete and optimal** in a graph with uniform cost?

→ Answer:

Uniform Cost Search.

6. Data Structures

In a **binary search tree (BST)**, what is the time complexity for search operation in the worst case?

→ Answer:

$O(n)$ (when the tree becomes skewed).

7. Probability Distributions

The variance of a constant random variable is?

→ Answer:

0 (Since there is no spread in a constant value).

8. Neural Networks

Which activation function outputs values between 0 and 1?

→ Answer:

Sigmoid Function.

9. Programming Logic

What will be the output of the following code?

```
python

def func(x):
    return x * func(x-1) if x > 1 else 1
print(func(4))
```

→ Answer:

This is a factorial function:

$4 \times 3 \times 2 \times 1 = \mathbf{24}$.

10. Big-O Notation

Which of the following functions grows faster as n approaches infinity?

- a) $n \log n$
- b) n^2
- c) n^3
- d) 2^n

→ Answer:

d) 2^n (Exponential grows faster than polynomial).
