**Q1) Answer the following question with reference to the Audio**

<https://drive.google.com/file/d/1R0VeDicQeEaGsKqMYTP5mBxf8XRH0R03/view?usp=share_link>

**Type: Audio**

**What is a matrix?**

a) A set of linear equations

b) A rectangular array of numbers

c) A polynomial function

d) A sequence of real numbers

Correct Answer: Option (b)

Explanation: A matrix is a rectangular array of numbers or symbols, arranged in rows and columns. Matrices are used to represent systems of linear equations, transformations in geometry, and many other mathematical concepts. Matrices can be added and subtracted element-wise if they have the same dimensions.

Thus, the correct answer is Option (b)

Difficulty Level- Easy

Bloom’s Taxonomy- Remember

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**Q2) Which of the following is not a matrix operation?**

a) Multiplication

b) Addition

c) Differentiation

d) Subtraction

Correct Answer: Option (c)

Explanation: Matrix operations involve manipulating and performing calculations with matrices. The most common matrix operations are multiplication and addition, and subtraction is also a matrix operation. Differentiation is a calculus operation that involves finding the rate of change of a function with respect to one or more of its variables.

Thus, the correct answer is Option (c)

Difficulty Level- Easy

Bloom’s Taxonomy- Analyze

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**Q3) Answer the following question with reference to the Audio**

<https://drive.google.com/file/d/1s08By6Ls4YQwp6cEvdykNtfQLW89vZEg/view?usp=share_link>

**Type: Audio**

**What is the identity matrix?**

a) A matrix with ones along the main diagonal and zeros elsewhere

b) A matrix with zeros along the main diagonal and ones elsewhere

c) A matrix with all elements equal to zero

d) A matrix with all elements equal to one

Correct Answer: Option (a)

Explanation: The identity matrix is a special type of matrix that behaves like the number 1 does in regular arithmetic. When the identity matrix is multiplied by another matrix, the result is the same as the original matrix. The identity matrix is denoted by I. The diagonal elements of the identity matrix are always equal to 1, and the off-diagonal elements are equal to 0.

Thus, the correct answer is Option (a)

Difficulty Level- Easy

Bloom’s Taxonomy- Understand

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**Q4) What is the order of a matrix?**

a) The number of rows and columns in the matrix

b) The sum of the elements in the matrix

c) The determinant of the matrix

d) None of the above

Correct Answer: Option (a)

Explanation: In linear algebra, matrices are represented as rectangular arrays of numbers. The size of a matrix is described by its order, which is given by t`he number of rows and columns in the matrix. For example, a matrix with m rows and n columns is said to have order , denoted as (m x n). The order of a matrix can also be used to calculate the total number of elements in the matrix

Thus, the correct answer is Option (a)

Difficulty Level- Easy

Bloom’s Taxonomy- Understand

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.**Q5) Answer the following question with reference to the Audio**

<https://drive.google.com/file/d/1H_qCvqetVkKYZ7ioc2Gf5jPjtHn5NmXm/view?usp=share_link>

Type: Audio

**What is a square matrix?**

a) A matrix with only one row

b) A matrix with only one column

c) A matrix with an equal number of rows and columns

d) None of the above

Correct Answer: Option (c)

Explanation: A matrix is said to be square if it has the same number of rows as columns. For example, a matrix or a matrix are both square matrices, while a matrix or a matrix are not square matrices. The size of a square matrix is given by the order of the matrix, which is of the form n x n, where n is the number of rows (or columns) in the matrix.

Thus, the correct answer is Option (c)

Difficulty Level- Easy

Bloom’s Taxonomy- Remember

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**Q6) What is a diagonal matrix?**

a) A matrix with all elements equal to zero

b) A matrix with all elements equal to one

c) A square matrix with non-zero elements only on the diagonal

d) None of the above

Correct Answer: Option (c)

Explanation: A diagonal matrix is a special type of square matrix in which all of the elements outside of the main diagonal are zero. The main diagonal of a matrix refers to the set of elements that are located from the top left to the bottom right of the matrix. Diagonal matrices can have any number of non-zero elements on the diagonal, and they can also have repeated values on the diagonal.

Thus, the correct answer is Option (c)

Difficulty Level- Easy

Bloom’s Taxonomy- Understand

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**Q7) What is a symmetric matrix?**

a) A matrix with all elements equal to zero

b) A square matrix with elements equal to their transpose

c) A matrix with elements equal to their inverse

d) None of the above

Correct Answer: Option (b)

Explanation: A square matrix is said to be symmetric if it is equal to its own transpose. Symmetric matrices are always diagonalizable, which means that they can be expressed as a product of a diagonal matrix and a matrix of eigenvectors.

Thus, the correct answer is Option (b)

Difficulty Level- Easy

Bloom’s Taxonomy- Remember

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**Q8) What is a skew-symmetric matrix?**

a) A matrix with all elements equal to zero

b) A square matrix with elements equal to the negative of their transpose

c) A matrix with elements equal to their inverse

d) None of the above

Correct Answer: Option (b)

Explanation: A square matrix A is said to be skew-symmetric if it satisfies the condition , where is the transpose of A. Equivalently, an n x n matrix A is skew-symmetric if for all and . The eigenvalues of a skew-symmetric matrix are always pure imaginary or zero.

Thus, the correct answer is Option (b)

Difficulty Level- Easy

Bloom’s Taxonomy- Understand

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**Q9) What is a trace of a matrix?**

a) The sum of the elements in the matrix

b) The product of the elements in the matrix

c) The sum of the elements on the diagonal of the matrix

d) None of the above

Correct Answer: Option (c)

Explanation: The trace of a square matrix A, denoted as , is the sum of the elements on the diagonal of the matrix. In other words, where is the diagonal element of A. The trace is also useful in calculating the matrix exponential and matrix logarithm

Thus, the correct answer is Option (c)

Difficulty Level- Medium

Bloom’s Taxonomy- Understand

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**Q10) What is the order of the matrix [4 5 6]?**

a) 3x1

b) 1x3

c) 2x2

d) None of the above

Correct Answer: Option (b)

Explanation: The order of a matrix refers to the number of rows and columns in the matrix, written as " where " is the number of rows and " is the number of columns. In the given matrix [4 5 6], there is only one row and three columns. Therefore, the order of the matrix is .

Thus, the correct answer is Option (b)

Difficulty Level- Easy

Bloom’s Taxonomy- Analyze

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**Q11) Which of the following is an identity matrix of order ?**

a)

b)

c)

d) None of the above

Correct Answer: Option (b)

Explanation: An identity matrix is a square matrix with ones along the main diagonal and zeros elsewhere. It is denoted by I. The order of an identity matrix refers to the number of rows and columns in the matrix.

Thus, the correct answer is Option (b)

Difficulty Level- Easy

Bloom’s Taxonomy- Evaluate

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**Q12) What is the sum of the matrices and**

a)

b)

c)

d) None of the above

Correct Answer: Option (a)

Explanation: The sum of two matrices is obtained by adding the corresponding elements of the two matrices.

Let's add the two given matrices:

Therefore sum of two matrices is

Thus, the correct answer is Option (a)

Difficulty Level- Easy

Bloom’s Taxonomy- Evaluate

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**Q13) What is the product of the matrices and**

a)

b)

c)

d) None of the above

Correct Answer: Option (b)

Explanation: To multiply two matrices, we need to multiply each element of each row of the first matrix by each element of each column of the second matrix, and then sum the products.

Let's multiply the matrices,

The product of the two matrices is

Thus, the correct answer is Option (b)

Difficulty Level- Easy

Bloom’s Taxonomy- Evaluate

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**Q14) Which of the following is the transpose of the matrix**

a)

b)

c)

d) None of the above

Correct Answer: Option (a)

Explanation: The transpose of a matrix involves interchanging its rows and columns.

Given matrix is its transpose is obtained by writing its rows as columns and its columns as rows. As a result we get the matrix is .

Thus, the correct answer is Option (a)

Difficulty Level- Medium

Bloom’s Taxonomy- Evaluate

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**Q15) Which of the following is a diagonal matrix?**

a)

b)

c)

d) None of the above

Correct Answer: Option (b)

Explanation: The matrix is said to be a diagonal matrix if all the elements outside the main diagonal are equal to zero. The main diagonal of a matrix is the set of elements that lies on the diagonal line from the top left to the bottom right of the matrix. The matix is a diagonal matrix.The elements on the main diagonal are 1, 5, and 9.

Thus, the correct answer is Option (b)

Difficulty Level- Easy

Bloom’s Taxonomy- Evaluate

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**Q16) Answer the following question with reference to the Audio**

[**https://drive.google.com/file/d/1c98Ox5Ak5nVHPjNhbMvNNMBiu6pGfTU\_/view?usp=share\_link**](https://drive.google.com/file/d/1c98Ox5Ak5nVHPjNhbMvNNMBiu6pGfTU_/view?usp=share_link)

**Type: Audio**

**What is the transpose of a matrix?**

a) The matrix with all elements equal to 1

b) The matrix with all elements equal to 0

c) The matrix obtained by interchanging its rows and columns

d) None of the above

Correct Answer: Option (c)

Explanation: The transpose of a matrix is a new matrix that is obtained by interchanging the rows and columns of the original matrix. If the original matrix is denoted by A, then the transpose of A is denoted by . If A is an matrix, then its transpose Aᵀ is an n x m matrix, where the entry of Aᵀ is equal to the entry of A.

Thus, the correct answer is Option (c)

Difficulty Level- Medium

Bloom’s Taxonomy- Understand

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**Q17) What is an antisymmetric matrix?**

a) A matrix with only upper triangular elements

b) A matrix with only lower triangular elements

c) A matrix with elements that change sign when reflected across the main diagonal

d) None of the above

Correct Answer: Option (c)

Explanation: An antisymmetric matrix is a square matrix A such that for all and . An antisymmetric matrix is a matrix whose elements change sign when reflected across the main diagonal.

The diagonal elements of an antisymmetric matrix are always zero, because the transpose of a matrix does not change its diagonal elements.

Thus, the correct answer is Option (c)

Difficulty Level- Medium

Bloom’s Taxonomy- Remember

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**Q18) What is the dimension of a matrix with m rows and n columns?**

a)

b)

c)

d)

Correct Answer: Option ((d)

Explanation: The dimension of a matrix refers to the number of rows and columns that the matrix has. It is usually expressed as the number of rows by the number of columns. A matrix with m rows and n columns is said to have dimensions m x n.

Thus, the correct answer is Option (d)

Difficulty Level- Easy

Bloom’s Taxonomy- Evaluate

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**Q19) What is a lower triangular matrix?**

a) A matrix with only upper triangular elements

b) A matrix with only lower triangular elements

c) A matrix with only diagonal elements

d) None of the above

Correct Answer: Option (b)

Explanation: A lower triangular matrix is a square matrix where all the elements above the main diagonal are zero. A lower triangular matrix has only non-zero elements in the lower part of the matrix, including the diagonal.

Thus, the correct answer is Option (b)

Difficulty Level- Medium

Bloom’s Taxonomy- Understand

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**Q20) Answer the following questions with reference to the audio**

[**https://drive.google.com/file/d/1YIUayeirV5do9YT9KwEdKNP87GAoRalj/view?usp=share\_link**](https://drive.google.com/file/d/1YIUayeirV5do9YT9KwEdKNP87GAoRalj/view?usp=share_link)

**Type: Audio**

**What is a vector?**

a) A matrix with only one row or one column

b) A matrix with more than one row and one column

c) A matrix with more than one row or one column

d) A type of diagonal matrix

Correct Answer: Option (a)

Explanation: A vector is a mathematical object that represents a quantity that has both magnitude and direction. It is typically denoted as a column matrix with one column and multiple rows, or as a row matrix with one row and multiple columns.

Thus, the correct answer is Option (a)

Difficulty Level- Easy

Bloom’s Taxonomy- Remember

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**Q21) Answer the following question with reference to the Audio**

[**https://drive.google.com/file/d/1yOwauXnO\_bdVKqGsY\_Dx8P0vNHOqYy0g/view?usp=share\_link**](https://drive.google.com/file/d/1yOwauXnO_bdVKqGsY_Dx8P0vNHOqYy0g/view?usp=share_link)

**Type: Audio**

**What is a scalar?**

a) A number that multiplies a matrix

b) A matrix that multiplies a vector

c) A type of matrix

d) A number that adds to a matrix

Correct Answer: Option (a)

Explanation: A scalar is a single numerical value, typically from the set of real numbers or complex numbers, that can be used to scale other mathematical objects such as vectors and matrices. A scalar matrix is a diagonal matrix where all the diagonal elements are equal to the same scalar value, and all the non-diagonal elements are zero.

Thus, the correct answer is Option (a)

Difficulty Level- Easy

Bloom’s Taxonomy- Remember

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**Q22) Which of the following matrices is a row matrix?**

a)

b)

c)

d)

Correct Answer: Option (b)

Explanation: A row matrix is a matrix with only one row and multiple columns. It is sometimes called a "row vector" because it can be thought of as a vector that is oriented horizontally instead of vertically.

Thus, the correct answer is Option (b)

Difficulty Level- Easy

Bloom’s Taxonomy- Understand

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**Q23) Which of the following is the transpose of the matrix**

a)

b)

c)

d)

Correct Answer: Option (b)

Explanation: The transpose of a matrix is obtained by interchanging the rows and columns. If A is a matrix with m rows and n columns, then the transpose of A is denoted by and is a new matrix with n rows and m columns.

The given matrix is

After transpose the interchanging rows and column, we get the matrix is

Thus, the correct answer is Option (b)

Difficulty Level- Easy

Bloom’s Taxonomy- Evaluate

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**Q24) Which of the following is the determinant of the matrix**

a) 2

b) 4

c) -2

d) -4

Correct Answer: Option (c)

Explanation: The determinant of a 2x2 matrix is ad - bc.

The determinant matrix of is

The determinant of the given matrix is

Thus, the correct answer is Option (c)

Difficulty Level- Easy

Bloom’s Taxonomy- Evaluate

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**Q25) Answer the following question with reference to the Audio**

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**Type: Audio**

**What is a singular matrix?**

a) A matrix with no inverse

b) A matrix with determinant equal to 1

c) A matrix with determinant equal to 0

d) None of the above

Correct answer: Option (a)

Explanation: A singular matrix is a square matrix that does not have an inverse. This means that if you try to find the inverse of a singular matrix, you will not be able to. A singular matrix is a non-invertible matrix. If the determinant of a matrix is equal to 0, then the matrix is singular.

Thus, the correct answer is Option (a)

Difficulty Level- Easy

Bloom’s Taxonomy- Understand

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**Q26) Answer the following questions with reference to the audio.**

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**Type: Audio**

**What is an upper triangular matrix?**

a) A matrix with only upper triangular elements

b) A matrix with only lower triangular elements c

) A matrix with only diagonal elements

d) None of the above

Correct answer: Option (a)

Explanation: An upper triangular matrix is a square matrix in which all the elements below the diagonal are zero. It is a matrix in which all the non-zero elements lie on or above the diagonal. Upper triangular matrices have some special properties, such as their determinant is the product of the diagonal elements, and their inverse is also an upper triangular matrix.

Thus, the correct answer is Option (a)

Difficulty Level- Medium

Bloom’s Taxonomy- Understand

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**Q27) What is the determinant of the matrix**

a) -2

b) 2

c) -1

d) 1

Correct Answer: Option (b)

Explanation: The determinant of a 2x2 matrix is given by the formula ad-bc. Therefore, in the given matrix , we have:

The determinant of the given matrix is -2

Thus, the correct answer is Option (b)

Difficulty Level- Easy

Bloom’s Taxonomy- Evaluate

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**Q28) What is the determinant of the following matrix?**

a) -2

b) 2

c) -3

d) 3

Correct Answer: Option (a)

Explanation: The determinant of a 2x2 matrix is given by ad - bc. the determinant of matrix is

Thus, the correct answer is Option (a)

Difficulty Level- Easy

Bloom’s Taxonomy- Evaluate

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**Q29) Which of the following is true for a symmetric matrix?**

a) It has all zero elements.

b) Its transpose is equal to itself.

c) It has only one row and one column.

d) Its determinant is always positive.

Correct Answer: Option (b)

Explanation: A symmetric matrix is a square matrix in which the elements are symmetric about the diagonal. That is, for all i and j. The transpose of a matrix switches its rows and columns, so if a matrix is equal to its transpose, then it must be symmetric.

Thus, the correct answer is Option (b)

Difficulty Level- Medium

Bloom’s Taxonomy- Analyze

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**Q30) How are matrices represented?**

a) With parentheses

b) With brackets

c) With braces

d) With angle brackets

Correct Answer: Option (b)

Explanation: Matrices are typically represented using square brackets [], which are also known as box brackets. Matrices can also be represented using other types of brackets, such as parentheses () or braces {}. However, using square brackets is the most common convention for representing matrices in mathematics, computer science, and other fields.

Thus, the correct answer is Option (b)

Difficulty Level- Easy

Bloom’s Taxonomy- Analyze

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**Q31) What is the dimension of a matrix?**

a) The total number of entries in the matrix

b) The number of rows in the matrix

c) The number of columns in the matrix

d) The number of rows and columns in the matrix

Correct Answer: Option (d).

Explanation: The dimension of a matrix is given by the number of rows and columns it has. The total number of entries in the matrix is simply the product of the number of rows and columns, which is known as the size of the matrix. the size is not the same as the dimension, which specifically refers to the number of rows and columns in the matrix.

Thus, the correct answer is Option (d)

Difficulty Level- Medium

Bloom’s Taxonomy- Understand

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**Q32) Which of the following is not a type of matrix?**

a) Diagonal matrix

b) Identity matrix

c) Scalar matrix

d) Complex matrix

Correct Answer: Option (d)

Explanation: Complex matrix is not a type of matrix. Matrices can be classified into various types based on their properties and characteristics. Diagonal matrix is a matrix in which all the non-diagonal elements are zero. Identity matrix is a diagonal matrix in which all the diagonal elements are 1. Scalar matrix is a diagonal matrix in which all the diagonal elements are equal.

Thus, the correct answer is Option (d)

Difficulty Level- Easy

Bloom’s Taxonomy- Analyze

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**Q33) Answer the following question with reference to the Audio**

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**Type: Audio**

**A matrix with only one row is called a:**

a) Column matrix

b) Row matrix

c) Square matrix

d) Identity matrix

Correct Answer: Option (b)

Explanation: A matrix with only one row is called a row matrix, also known as a row vector.

A row matrix is a matrix that has only one row and can have any number of columns.A square matrix is a matrix in which the number of rows is equal to the number of columns.

An identity matrix is a square matrix in which all the diagonal elements are 1 and all the non-diagonal elements are 0.

Thus, the correct answer is Option (b)

Difficulty Level- Easy

Bloom’s Taxonomy- Understand

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**Q34) Answer the following question with reference to the Audio**

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**Type: Audio**

**A matrix in which all the elements are zero is called a:**

a) Null matrix

b) Identity matrix

c) Inverse matrix

d) Transpose matrix

Correct Answer: Option (a)

Explanation: A null matrix is a matrix in which all the elements are zero. It is also known as a zero matrix. A null matrix can have any number of rows and columns, as long as all the entries are 0. The null matrix is often used in linear algebra as the additive identity element, which means that when we add a null matrix to any other matrix, we get the same matrix back.

Thus, the correct answer is Option (d)

Difficulty Level- Easy

Bloom’s Taxonomy- Analyze

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**Q35) Which of the following is an identity matrix of size 3x3?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: The identity matrix is a square matrix in which all the diagonal elements are 1 and all the non-diagonal elements are 0. Among the given options, the only matrix that satisfies this condition for a 3x3 matrix is option (a).The identity matrix of size is

Thus, the correct answer is Option (a)

Difficulty Level- Easy

Bloom’s Taxonomy- Evaluate

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**Q36) Which of the following is a lower triangular matrix?**

a)

b)

c)

d)

Correct Answer: Option (c)

Explanation: A lower triangular matrix is a square matrix in which all the entries above the main diagonal (top-right to bottom-left diagonal) are zero. In option (c) the given matrix is a lower triangular matrix because all the entries above the main diagonal are zero.

Thus, the correct answer is Option (c)

Difficulty Level- Medium

Bloom’s Taxonomy- Evaluate

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**Q37) Which of the following is an upper triangular matrix?**

a)

b)

c)

d)

Correct Answer: Option (b)

Explanation: An upper triangular matrix is a square matrix in which all the entries below the main diagonal (top-right to bottom-left diagonal) are zero. In option (b) the given matrix is a lower triangular matrix because all the entries below the main diagonal are 0.

Thus, the correct answer is Option (b)

Difficulty Level- Medium

Bloom’s Taxonomy- Evaluate

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**Q38) Answer the following question with reference to the Audio**

[**https://drive.google.com/file/d/1Cg0FrX-5D3hm1B7hvQ-pvKMR1OBjF7nj/view?usp=share\_link**](https://drive.google.com/file/d/1Cg0FrX-5D3hm1B7hvQ-pvKMR1OBjF7nj/view?usp=share_link)

**Type: Audio**

**The statements about singular matrices is true?**

a) A singular matrix has no inverse.

b) A singular matrix has infinitely many inverses.

c) A singular matrix has a unique inverse.

d) A singular matrix has a zero determinant.

Correct Answer: Option (a)

Explanation: A matrix is said to be singular if its determinant is equal to zero. A non-singular matrix has a unique inverse, which means that it is possible to find a matrix that when multiplied by the original matrix gives the identity matrix. However, in the case of a singular matrix, there is no such matrix that can be used to find the inverse, and hence it has no inverse.

Thus, the correct answer is option (a).

Difficulty Level- Easy

Bloom’s Taxonomy- Understand

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**Q39) Which of the following is a condition property of a square matrix?**

a) It has the same number of rows and columns

b) It has more columns than rows

c) It has more rows than columns

d) It has a determinant of zero

Correct Answer: Option (a)

Explanation: A square matrix is defined as a matrix with an equal number of rows and columns. It is represented by the notation , where is the number of rows (which is equal to the number of columns).For example, a matrix has three rows and three columns. Therefore it is a square matrix

Thus, the correct answer is option (a).

Difficulty Level- Medium

Bloom’s Taxonomy- Understand

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**Q40) What is the order of the matrix [4 5 6]?**

a) 3x1

b) 1x3

c) 2x2

d) None of the above

Correct Answer: Option (b)

Explanation: The order of a matrix refers to the number of rows and columns in the matrix, written as " where " is the number of rows and " is the number of columns. In the given matrix [4 5 6], there is only one row and three columns. Therefore, the order of the matrix is .

Thus, the correct answer is Option (b)

Difficulty Level- Easy

Bloom’s Taxonomy- Evaluate

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**Q41) What is the Order of the matrix**

a

b)

c)

d)

Correct Answer: Option (b)

Explanation: The order of a matrix is denoted by (m × n), where m represents the number of rows and n represents the number of columns. the given matrix is In this there is only one row of numbers and three columns of numbers. So, the order of the matrix is 1 × 3.

Thus, the correct answer is Option (b)

Difficulty Level- Easy

Bloom’s Taxonomy- Evaluate

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**Q42) Which of the Following matrices is a square matrix?**

a)

b)

c)

d)

Correct Answer: Option (b)

Explanation: A square matrix is a matrix where the number of rows is equal to the number of columns. A matrix is square if and only if its order is of the form (n × n), where n is a positive integer. Therefore, the only square matrix among the given matrices is option (b) It has 2 rows and 2 columns, making it a square matrix.

Thus, the correct answer is option (b)

Difficulty level- Easy

Bloom’s Taxonomy- Evaluate

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**Q43) What is the determinant of the 2x2 matrix**

a) -2

b) 2

c) 8

d) -8

Correct Answer: Option (a)

Explanation: The determinant of a matrix is a scalar value that can be calculated using the following formula:

determinant = ad - bc

where a, b, c, and d are the elements of the matrix.

Therefore determinant of the ] matrix is

Thus, the correct answer is option (a)

Difficulty Level- Easy

Bloom’s Taxonomy- Evaluate

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**Q44) What is the determinant of the matrix?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: The determinant of a matrix can be found using the formula . Applying this formula to the given matrix, we get

=

Therefore, the determinant of the given matrix is

Thus, the correct answer is option (a)

Difficulty Level- Easy

Bloom’s Taxonomy- Evaluate

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**Q45) If the determinant of a matrix A is zero, what can we conclude?**

a) A is not invertible

b) A is invertible

c) A is a square matrix

d) A is a diagonal matrix

Correct Answer: Option (a)

Explanation: The determinant of a matrix is a scalar value that can be calculated from the elements of . It is denoted by or If then is said to be a singular matrix. A singular matrix is a matrix that does not have an inverse. If the determinant of A is zero, then the inverse of A would involve dividing by zero, which is not defined.

Therefore, if the determinant of a matrix A is zero, then A is not invertible.

Thus, the correct answer is option (a)

Difficulty Level- Medium

Bloom’s Taxonomy- Understand

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**Q46) Which of the following is true about a matrix determinant?**

a) It is a scalar value.

b) It can be negative, positive, or zero.

c) It is equal to the product of its eigenvalues.

d) All of the above.

Correct Answer: Option (d)

Explanation: The determinant of a matrix is a scalar value that can be calculated from the elements of the matrix. The value of the determinant can be negative, positive, or zero depending on the matrix. The determinant of a matrix is equal to the product of its eigenvalues. Therefore it satisfies all the three conditions.

Thus, the correct answer is option (d)

Difficulty Level- Medium

Bloom’s Taxonomy- Analyze

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**Q47) If the determinant of a matrix is zero, which of the following statements is true?**

a) The matrix is invertible.

b) The matrix has no inverse.

c) The matrix is a square matrix.

d) None of the above.

Correct Answer: Option (b)

Explanation: If the determinant of a matrix is zero, it means that the matrix is singular, which implies that the matrix has no inverse. This can be seen from the formula for the inverse of a matrix:

where is the inverse of , is the determinant of A, and adj(A) is the adjugate or classical adjoint of A. Since the formula for the inverse involves the determinant, if the determinant is zero, then the inverse of the matrix is undefined.

Thus, the correct answer is option (b)

Difficulty Level- Medium

Bloom’s Taxonomy- Analyze

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**Q48) Which of the following operations changes the determinant of a matrix?**

a) Adding a multiple of one row to another row.

b) Swapping two rows.

c) Transposing the matrix

d) None of the above.

Correct Answer: Option (b)

Explanation: The determinant of a matrix is a scalar value that can be computed for a square matrix. It is denoted by where is the matrix Swapping two columns changes the sign of the determinant. If we swap two columns of an matrix, the determinant of the resulting matrix is the negative of the determinant of the original matrix.

Thus, the correct answer is option (b)

Difficulty Level- Easy

Bloom’s Taxonomy- Understand

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**Q49) Which of the following is true about the determinant of a matrix?**

a) It is always positive

b) It is always negative

c) It can be positive or negative

d) It is always zero

Correct Answer: Option (c)

Explanation: The determinant of a matrix is a scalar value that can be computed for a square matrix. It is denoted by where is the matrix. It encodes important geometric information about the matrix, such as how much the matrix scales volumes and areas. The determinant can be positive, negative, or zero, depending on the values of the matrix elements.

Thus, the correct answer is option (c)

Difficulty Level- Medium

Bloom’s Taxonomy- Analyze

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**Q50) Which of the following matrices has a determinant of 1?**

a)

b)

c)

d)

Correct Answer: Option (b)

Explanation: The determinant of a matrix is a scalar value that can be calculated from the elements of the matrix. It is denoted by det(A) or |A|, where A is the matrix.

The formula for the determinant of a 2x2 matrix is:

Therefore for the matrix has the determinant of 1.

Thus, the correct answer is option (b).

Difficulty Level- Easy

Bloom’s Taxonomy- Analyze

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**Q51)  What is the determinant of a 3x3 matrix given by**

a)

b)

c)

d)

Correct Answer: Option (c)

Explanation: The determinant of a 3x3 matrix can be calculated as

Let us assume

Thus, the correct answer is option (c).

Difficulty Level- Easy

Bloom’s Taxonomy- Evaluate

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**Q52) Answer the following question with reference to the Audio**

[**https://drive.google.com/file/d/1kfgp0mvYXMeM59C-Tr5YTrNWhR7DoMo1/view?usp=share\_link**](https://drive.google.com/file/d/1kfgp0mvYXMeM59C-Tr5YTrNWhR7DoMo1/view?usp=share_link)

**Type: Audio**

**Which of the following is a property of a square matrix?**

a) It has the same number of rows and columns

b) It has more columns than rows

c) It has more rows than columns

d) It has a determinant of zero

Correct Answer: Option (a)

Explanation: A square matrix is defined as a matrix with an equal number of rows and columns. It is represented by the notation , where is the number of rows (which is equal to the number of columns).For example, a matrix has three rows and three columns. Therefore it is a square matrix

Thus, the correct answer is option (a).

Difficulty Level- Easy

Bloom’s Taxonomy- Understand

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**Q53) Which of the following is true about the determinant of a matrix?**

a) The determinant can be negative or positive

b) The determinant is always negative

c) The determinant is always positive

d) The determinant is always zero

Correct Answer: Option (a)

Explanation: The determinant is a scalar value that can be calculated for a square matrix. It is denoted by or, where A is the matrix. The sign of the determinant indicates whether the matrix changes the orientation of the space it acts on. If the determinant is positive, the matrix preserves orientation, while if the determinant is negative, the matrix reverses orientation..

Thus, the correct answer is option (a)

Difficulty Level- Easy

Bloom’s Taxonomy- Analyze

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**Q54) Answer the following question with reference to the Audio**

[**https://drive.google.com/file/d/1IL6fSnBsNgz-FQiGMZfM4RqZmeD3L0NI/view?usp=share\_link**](https://drive.google.com/file/d/1IL6fSnBsNgz-FQiGMZfM4RqZmeD3L0NI/view?usp=share_link)

**Type: Audio**

**Which of the following is true about the inverse of a matrix?**

a) The inverse of a matrix always exists

b) The inverse of a matrix exists if and only if the determinant is zero

c) The inverse of a matrix exists if and only if the determinant is nonzero

d) The inverse of a matrix does not exist

Correct Answer: Option (c)

Explanation: The inverse of a matrix is a matrix that when multiplied by the original matrix gives the identity matrix. If the determinant of A is nonzero the matrix is said to be non-singular or invertible. In this case, the inverse of A exists and can be computed using the formula where det(A) is the determinant of A and adj(A) is the adjugate of A.

Thus, the correct answer is option (c).

Difficulty Level- Medium

Bloom’s Taxonomy- Analyze

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**Q55) Which of the following is a method for calculating the determinant of a matrix?**

a) Gaussian elimination

b) LU decomposition

c) Singular value decomposition

d) Cholesky decomposition

Correct Answer: Option (a)

Explanation: Gaussian elimination is a method for solving systems of linear equations and can also be used to calculate the determinant of a matrix. It works by performing a sequence of row operations on the matrix, such as multiplying a row by a nonzero scalar or adding a multiple of one row to another row, to transform the matrix into a simpler form.

Thus, the correct answer is option (a).

Difficulty Level- Easy

Bloom’s Taxonomy- Analyze

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**Q56) Which of the following is a method to calculate the determinant of a matrix?**

a) Row reduction

b) Cofactor expansion

c) Gaussian elimination

d) Eigenvalue decomposition

Correct Answer: Option (b)

Explanation: Cofactor expansion, is a method for calculating the determinant of a square matrix. The method involves expanding the determinant as a sum of products of the entries of the matrix and their corresponding cofactors. The cofactor is denoted as Cij.

Thus, the correct answer is option (b)

Difficulty Level- Medium

Bloom’s Taxonomy- Analyze

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**Q57) What is the role of determinants in solving systems of linear equations?**

a) Determinants help us to find the inverse of a matrix.

b) Determinants help us to solve for the variables in a system of linear equations.

c) Determinants help us to find the eigenvalues of a matrix.

d) Determinants do not have any role in solving systems of linear equations.

Correct Answer: Option (b)

Explanation: Determinants are a useful tool in solving systems of linear equations. We can use determinants to find the inverse of a matrix, which allows us to solve for the variables in a system of linear equations. The determinant of a matrix can also be used to determine whether a system of linear equations has a unique solution, no solution, or infinitely many solutions.

Thus, the correct answer is option (b)

Difficulty Level- Easy

Bloom’s Taxonomy- Understand

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**Q58) Which of the following is true about the determinant of a product of matrices?**

a) The determinant of a product of matrices is the product of the determinants of each matrix.

b) The determinant of a product of matrices is the sum of the determinants of each matrix.

c) The determinant of a product of matrices is always zero.

d) The determinant of a product of matrices is always one.

Correct Answer: Option (b)

Explanation: The determinant of a product of matrices is the product of the determinants of each matrix. Let A and B be two square matrices of the same size. Then the determinant of the product AB is given by:

This formula can be extended to the product of any number of square matrices

Thus, the correct answer is option (b)

Difficulty Level- Medium

Bloom’s Taxonomy- Analyze

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**Q59)  what is the following matrix's determinant's value?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: A matrix value is given by the expression . Using this formula, we can calculate the determinant of the given matrix

The determinant of the matrix is -1.

Thus, the correct answer is option (a).

Difficulty Level- Easy

Bloom’s Taxonomy- Evaluate

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**Q60) What is the determinant of a 3x3 matrix A's transpose, AT, if the determinant of A is 5?**

a)

b)

c)

d)

Correct Answer: Option (b)

Explanation: A matrix's original matrix's determinant and its transpose's determinant are the same. The determinant of a matrix A's transpose, denoted as , is equal to the determinant of A, i.e.

As a result, if A has a determinant of , must also have a determinant of .

Thus, the correct answer is option (b).

Difficulty Level- Easy

Bloom’s Taxonomy- Evaluate

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**Q61) What can be said about a matrix A if its determinant is zero?**

a) A can be inverted.

b) The symmetric nature of matrix A.

c) The diagonal matrix A.

d) The matrix A is symmetric.

Correct Answer: Option (b)

Explanation: When a matrix's determinant is 0, it indicates that the matrix cannot be inverted. This is because a matrix's inverse is only possible if its determinant is not zero. The determinant does not provide information about the symmetric nature or diagonal matrix of the matrix A.

Thus, the correct answer is option (b).

Difficulty Level- Medium

Bloom’s Taxonomy- Evaluate

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**Q62) what is the value of det (adj A) if** det A = 4 **if A is a square matrix of order ?**

a)

b)

c)

d)

Correct Answer: Option (b)

Explanation: By transforming the matrix of cofactors of a matrix A, the adjoint of that matrix can be produced. where n is the order of the matrix, yields the value of the adj A determinant.

Thus, the correct answer is option (b).

Difficulty Level- Medium

Bloom’s Taxonomy- Evaluate

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**Q63) If A is a matrix of order 3 such that det A = 0, then which of the following is true?**

a) A is invertible

b) A is non-invertible

c) A is symmetric

d) A is skew-symmetric

Correct Answer: Option (b)

Explanation: If the determinant of a matrix is 0, then the matrix is non-invertible. This means that there is no inverse matrix that can be multiplied by the original matrix to give the identity matrix. The determinant does not provide information about whether the matrix A is symmetric or skew-symmetric.

Thus, the correct answer is option (b).

Difficulty Level- Medium

Bloom’s Taxonomy- Analyze

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**Q64) Which of the following statements about determinants is true?**

a) A matrix's determinant is always positive.

b) A matrix lacks an inverse if its determinant is zero.

c) The diagonal elements of a matrix's determinant are added together.

d) The determinant of a matrix is only defined for square matrices.

Correct Answer: Option (b)

Explanation: The determinant of a matrix is a scalar value that can be computed from the elements of the matrix. It is only defined for square matrices, which means that they have the same number of rows and columns. The determinant is used to determine whether a matrix has an inverse or not. The matrix has no inverse if the determinant is zero.

Thus, the correct answer is option (b).

Difficulty Level- Medium

Bloom’s Taxonomy- Analyze

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**Q65) What is the determinant of if A is a square matrix of order 3 with determinant** **?**

a)

b)

c)

d)

Correct Answer: Option (b)

Explanation: A matrix's original matrix's determinant is the same as its transpose's determinant. Therefore, the determinant of is also 5. However, the question asks for the determinant of which means that we need to take the transpose of A and then compute its determinant. The answer is still 5, as the determinant of is the same as the determinant of

Thus, the correct answer is option (b).

Difficulty Level- Easy

Bloom’s Taxonomy- Evaluate

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**Q66) If A is a 3 x 3 matrix with determinant** **and B is a matrix obtained by multiplying each element of A by 3, then what is the determinant of B?**

a) 6

b) 18

c) 54

d) 162

Correct Answer: Option (c)

Explanation: If we multiply each element of a matrix by a scalar k, the determinant of the resulting matrix is times the determinant of the original matrix, where n is the order of the matrix. In this case, A is a matrix, so its order is . If we multiply each element of A by 3, we obtain the matrix B. Therefore, we have .

Therefore, the determinant of B is

Thus, the correct answer is option (c).

Difficulty Level- Medium

Bloom’s Taxonomy- Evaluate

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**Q67)  which of the following assertions is accurate regarding a matrix's determinant?**

a) A matrix's determinant may be negative.

b) A matrix's determinant is always positive.

c) A matrix's determinant is always zero.

d) The determinant of a matrix is always a fraction.

Correct Answer: Option (a)

Explanation: The determinant of a matrix is a scalar value that can be positive, negative, or zero. The sign of the determinant depends on the number of row or column exchanges required to convert the matrix into its row echelon form. If an odd number of row or column exchanges are required, the determinant is negative; if an even number of exchanges is required, the determinant is positive.

Thus, the correct answer is option (a).

Difficulty Level- Medium

Bloom’s Taxonomy- Analyze

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**Q68) What determines the following matrix's determinant?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: The determinant of a matrix is calculated by multiplying the elements on the main diagonal and subtracting the product of the elements on the other diagonal. In this case, the determinant is

However, since an odd number of row exchanges are required to convert the matrix into its row echelon form, the determinant is negative.

Thus, the correct answer is option (a).

Difficulty Level- Easy

Bloom’s Taxonomy- Evaluate

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**Q69) Answer the following question with reference to the Audio**

[**https://drive.google.com/file/d/1NAN\_zCmFjHA-fDUaOt8J9UL9InC6FIR0/view?usp=share\_link**](https://drive.google.com/file/d/1NAN_zCmFjHA-fDUaOt8J9UL9InC6FIR0/view?usp=share_link)

**Type: Audio**

**Which of the following statements about singular matrices is true?**

a) A singular matrix has no inverse.

b) A singular matrix has infinitely many inverses.

c) A singular matrix has a unique inverse.

d) A singular matrix has a zero determinant.

Correct Answer: Option (a)

Explanation: A matrix is said to be singular if its determinant is equal to zero. A non-singular matrix has a unique inverse, which means that it is possible to find a matrix that when multiplied by the original matrix gives the identity matrix. However, in the case of a singular matrix, there is no such matrix that can be used to find the inverse, and hence it has no inverse.

Thus, the correct answer is option (a).

Difficulty Level- Medium

Bloom’s Taxonomy- Analyze

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**Q70) what determines the following matrix's determinant?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: The determinant of a matrix can be computed by using cofactor expansion. In this case, expanding along the first column yields:

where B, C, and D are matrices obtained by deleting the first row and first column of A. It can be shown that , which implies that

Thus, the correct answer is option (a).

Difficulty Level- Medium

Bloom’s Taxonomy- Analyze

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**Q71) If A is a matrix and** **, what is the determinant of the matrix ?**

a)

b)

c)

d)

Correct Answer: Option (c)

Explanation: The determinant of a scalar multiple of a matrix is equal to the scalar raised to the power of the dimension of the matrix times the determinant of the original matrix. That is, where k is a scalar and n is the dimension of A. In this case, and , so

Thus, the correct answer is option (c).

Difficulty Level- Medium

Bloom’s Taxonomy- Evaluate

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**Q72) If A and B are two square matrices of the same order, then which of the following is true?**

a)

b)

c)

d) det(A+B) cannot be computed.

Correct Answer: Option (d)

Explanation: The determinant of a matrix is a scalar value that can be computed only for square matrices. It provides important information about the matrix, such as whether it is invertible or singular. For two square matrices A and B of the same order, we cannot compute the determinant of their sum directly from the determinants of and.

Thus, the correct answer is option (d).

Difficulty Level- Medium

Bloom’s Taxonomy- Evaluate

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**Q73) If A is a matrix with determinant 5, then what is the determinant of its transpose?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: The determinant of the transpose of a matrix A, denoted by is simply the determinant of the matrix obtained by interchanging the rows and columns of A. In other words, if A has elements , then the transpose of A, denoted by , has elements aji. A matrix's original matrix's determinant is the same as its transpose's determinant. Therefore, the determinant of the transpose of a matrix with determinant is also

Thus, the correct answer is option (a).

Difficulty Level- Easy.

Bloom’s Taxonomy- Evaluate

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**Q74) What does the determinant of the matrix**  **represent?**

a)

b)

c)

d)

Correct Answer: Option (c)

Explanation: The determinant of the 2x2 matrix is given by ad – bc. For the matrix the determinant can be computed as:

. Therefore, the determinant of the matrix is .

Thus, the correct answer is option (c).

Difficulty Level- Easy.

Bloom’s Taxonomy- Evaluate

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**Q75) What is the determinant of the identity matrix?**

a)

b)

c)

d)

Correct answer: Option (a)

Explanation: The determinant of a matrix is a scalar value that can be calculated from the elements of the matrix. The determinant of the identity matrix of any order is always equal to 1.A 3x3 identity matrix is

To find the determinant of a 3x3 matrix, we can use the following formula:

Using this formula, we can calculate the determinant of the 3x3 identity matrix as:

Therefore, the determinant of the identity matrix is

Thus, the correct answer is option (a).

Difficulty Level- Medium.

Bloom’s Taxonomy- Evaluate

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**Q76) If and what is the determinant of AB?**

a) -15

b) 15

c) 8

d) -8

Correct answer: Option (a)

Explanation: The determinant of the product of two matrices can be found by taking the product of their determinants. That is,

Therefore, in this case,

Thus, the determinant of AB is

Thus, the correct answer is option (a).

Difficulty Level- Easy.

Bloom’s Taxonomy- Evaluate

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**Q77) What is the determinant of the matrix ?**

a)

b)

c)

d)

Correct answer: Option (d)

Explanation: To find the determinant of a matrix, we can use the formula:

Using this formula for the given matrix we get:

Therefore, the determinant of the matrix is 2

Thus, the correct answer is option (d).

Difficulty Level- Easy.

Bloom’s Taxonomy- Evaluate

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**Q78) If , what can be said about the matrix**

a) It is invertible

b) It is singular

c) It has infinite solutions

d) It has no solutions

Correct answer: Option (b)

Explanation: A matrix is invertible if and only if its determinant is not equal to zero. If the determinant is zero, it means that some of the rows or columns of the matrix are linearly dependent on the other rows or columns. This implies that the matrix cannot be inverted because there is no unique solution to the system of equations represented by the matrix. If the determinant of a matrix A is 0, then the matrix A is said to be singular.

Thus, the correct answer is option (b).

Difficulty Level- Medium

Bloom’s Taxonomy- Evaluate

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**Q79) What is the determinant of the matrix ?**

a)

b)

c)

d)

Correct answer: b)

Explanation: To find the determinant of a matrix, we can use the formula:

Using this formula for the given matrix we get ,

Therefore, the determinant of the matrix is -79

Thus, the correct answer is option (b).

Difficulty Level- Easy.

Bloom’s Taxonomy- Evaluate

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**Q80) What is the determinant of the 2x2 matrix ?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: The determinant of a 2x2 matrix is given by the formula . Applying this formula to the given matrix we get:

Therefore, the determinant of the 2x2 matrix is ,

Thus, the correct answer is option (a).

Difficulty Level- Easy.

Bloom’s Taxonomy- Evaluate

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**Q81) The slope of the tangent to the curve at is:**

a) 11

b) 10

c) 13

d) 12

Correct Answer: Option (d)

Explanation: The slope of the tangent to a curve at a point is given by the derivative of the function at that point. Therefore, we need to find the derivative of and evaluate it at .

Taking the derivative of with respect to x, we get:

Substituting , we get:

Thus, the correct answer is option (d).

Difficulty Level- Easy.

Bloom’s Taxonomy- Evaluate

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**Q82) If , then the value of x for which f(x) has a minimum value is**:

a)

b)

c) -3

d)

Correct Answer: Option (a)

Explanation: To find the value of x for which f(x) has a minimum value, we need to find the value of x at which . ,

Setting , we get:

We can also use the second derivative test to confirm that this point is a minimum. f''(x) = 2, which is positive, so the point is a minimum.

Thus, the correct answer is option (a).

Difficulty Level- Easy.

Bloom’s Taxonomy- Evaluate

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**Q83) If y = f(x) is a decreasing function of x, then**:

a)

b)

c)

d) None of the above

Correct Answer: Option (b)

Explanation: If y = f(x) is a decreasing function of x, it means that as x increases, y decreases. In other words, the slope of the graph of f(x) is negative. The derivative of a function represents the slope of the function at any point. If the function is decreasing, its derivative is negative.

Thus, the correct answer is option (b).

Difficulty Level- Medium

Bloom’s Taxonomy- Evaluate

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**Q84) If f(x) = sin(x), then f''(x) is:**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: We know that the derivative of is ), and the derivative of is

So, applying the derivative twice, we get:

Therefore the second derivative of the function is

Thus, the correct answer is option (a).

Difficulty Level- Easy

Bloom’s Taxonomy- Evaluate

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**Q85) What is the derivative of ?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: Use the power rule of differentiation, which states that if then

Using this rule, to find the derivative of each term in and add them together to get the derivative of f(x):

Therefore, the derivative of f(x) is:

Thus, the correct answer is option (a).

Difficulty Level- Medium

Bloom’s Taxonomy- Evaluate

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**Q86) What is the equation of the tangent line to the curve at the point (1, 2)?**

a)

b)

c)

d)

Correct Answer: Option (b)

Explanation: We have to find the derivative of y with respect to x:

At x = 1, the derivative is:

This is the slope of the tangent line at the point

Next, we use the point-slope form of the equation of a line:

where m is the slope and is the point

Substituting the values we know, we get:

Simplifying this equation gives:

Thus, the correct answer is option (b).

Difficulty Level- Easy

Bloom’s Taxonomy- Evaluate

$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

**Q87) At what point does the function have a relative maximum?**

a)

b)

c)

d)

Correct Answer: Option (b)

Explanation: The given function  **.**

Now we have to find the derivative of the function:

Next, we set the derivative equal to zero and solve for x:

Dividing both sides by 3 gives:

This is a quadratic equation that can be factored as:

Therefore, the critical points of the function are and

Now, we need to test the values of f(x) at these critical points to see which one corresponds to a relative maximum.

Since is greater than , the point corresponds to a relative maximum of the function.

Thus, the correct answer is option (b).

Difficulty Level- Medium

Bloom’s Taxonomy- Evaluate

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**Q88) What is the derivative of ?**

a)

b)

c)

d) -

Correct Answer: Option (c)

Explanation: The derivative of with respect to is , and the derivative of with respect to x is . We know that the derivative of the difference of two functions is equal to the difference of their derivatives.

Therefore, the derivative of f(x) is:

Thus, the correct answer is option (c).

Difficulty Level- Easy

Bloom’s Taxonomy- Evaluate

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**Q89) What is the equation of the tangent line to the curve at the point ?**

a)

b)

c)

d)

Correct Answer: Option (b)

Explanation: The given function is

First, we find the derivative of the function :

Next, we evaluate the derivative at to find the slope of the tangent line at the point

So, the slope of the tangent line at the point is

Next, we use the point-slope form of the equation of a line to find the equation of the tangent line:

where m is the slope of the tangent line, and is the point on the tangent line.

Substituting the values we have found, we get:

Thus, the correct answer is option (b).

Difficulty Level- Medium

Bloom’s Taxonomy- Evaluate

$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

**Q90) If , what is the derivative of f(x) at ?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: The given function is ,

Here we used the power rule of differentiation, which states that if , then

we need to first find the derivative of f(x) with respect to :

Now, we evaluate f'(x) at .

Therefore, the derivative of f(x) at is .

Thus, the correct answer is option (a).

Difficulty Level- Easy

Bloom’s Taxonomy- Evaluate

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**Q91) What is the derivative of the function at ?**

a)

b)

c)

d)

Correct Answer: Option (d)

Explanation: The given function is

we need to first find the derivative of with respect to

Now, we evaluate

Sub

Using the trigonometric values for , we get:

Therefore, the derivative of f(x) at is .

Thus, the correct answer is option (d).

Difficulty Level- Hard

Bloom’s Taxonomy- Evaluate

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**Q92) What is the equation of the tangent line to the curve at the point ?**

a)

b)

c)

d)

Correct Answer: Option (c)

Explanation: The given function is

Now find the derivative of the function and evaluating it at

So the slope of the tangent line at is

Next, we use the point-slope form of the equation of a line to find the equation of the tangent line. The point-slope form is:

where is a point on the line and m is the slope of the line.

We know that the point lies on the tangent line, and we just found that the slope of the tangent line at that point is . So we can plug in these values into the point-slope form to get:

Simplifying this equation, we get:

Thus, the correct answer is option (c).

Difficulty Level- Easy

Bloom’s Taxonomy- Evaluate

$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

**Q93) What is the derivative of the function ?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: The given function is

Now we have to use the power rule of differentiation, which states that if , then Applying this rule to each term in the function, we get:

The derivative of the given function is

Thus, the correct answer is option (a).

Difficulty Level- Easy

Bloom’s Taxonomy- Evaluate

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**Q94) What is the derivative of the function ?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: The given function is ?

The derivative of is simply

The derivative of requires the use of the chain rule.

Let , then (the derivative of ln(x)). Therefore, the derivative of with respect to is

Thus, the derivative of g(x) is:

Thus, the correct answer is option (a).

Difficulty Level- Medium

Bloom’s Taxonomy- Analyze

$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

**Q95) What is the maximum value of the function in the interval**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: The given function is

To find the critical points of we need to find where its derivative is equal to zero:

Setting and solving for, we get:

Therefore, is the only critical point of in the interval

Now we need to evaluate h(x) at and

Therefore, the maximum value of in the interval [0,5] is

Thus, the correct answer is option (a).

Difficulty Level- Easy

Bloom’s Taxonomy- Evaluate

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**Q96) The derivative of is:**

a)

b)

c)

d)

Correct answer: Option (a)

Explanation: The given function is

Now we have to use the power rule of differentiation, which states that if , then Applying this rule to each term in the function, we get:

The derivative of the given function is

Thus, the correct answer is option (a).

Difficulty Level- Easy

Bloom’s Taxonomy- Evaluate

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**Q97) What is the equation of the tangent line to the curve at the point ?**

a)

b)

c)

d)

Correct answer: Option (a)

Explanation: The given function is

Find the derivation of the given function,

The slope of the tangent line at x = 2

The point (2, 8) is on the curve, so the equation of the tangent line is

Thus, the correct answer is option (a).

Difficulty Level- Easy

Bloom’s Taxonomy- Analyze

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**Q98) The derivative of is:**

a)

b)

c)

d)

Correct answer: Option (a)

Explanation: The given function is

We know that the derivative of is .

Now we have to use the power rule of differentiation, which states that if , then Applying this rule to each term in the function, we get:

The derivative of is .

Therefore, the derivative of is

Thus, the correct answer is option (a).

Difficulty Level- Easy

Bloom’s Taxonomy- Evaluate

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**Q99) What is the equation of the tangent line to the curve at the point (1, 0)?**

a) y = -x + 1

b) y = x - 1

c) y = -2x + 1

d) y = 2x - 1

Correct answer: Option (b)

Explanation: The given function is

The derivative of the given function is

Find the slope of the tangent line at :

So, the slope of the tangent line at x = 1 is 1.

The equation of the tangent line:

where m is the slope and is the point on the line.

Sub the values (1, 0)

Thus, the correct answer is option (b).

Difficulty Level- Easy

Bloom’s Taxonomy- Evaluate

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**Q100) What is the derivative of ?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: The given function is

Now we have to use the power rule of differentiation, which states that if , then Applying this rule to each term in the function, we get:

The derivative of f(x) is

The derivative for the function is

Thus, the correct answer is option (a).

Difficulty Level- Easy

Bloom’s Taxonomy- Evaluate

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**Q101) What is the equation of the tangent line to the curve at the point ?**

a)

b)

c)

d)

Correct Answer: Option (c)

Explanation: The given function is

Determine the derivative for the given function.

The slope of the tangent line at is 6,

The equation of the tangent line at the point

Thus, the correct answer is option (c).

Difficulty Level- Easy

Bloom’s Taxonomy- Evaluate

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**Q102) Which of the following is the definition of the derivative of a function?**

a) The slope of a function at a given point

b) The area under a function at a given point

c) The integral of a function over a given interval

d) The limit of the difference quotient as h approaches 0

Correct Answer: Option (d)

Explanation: The derivative of a function is a fundamental concept in calculus, and it measures the rate at which the function is changing at any given point. More formally, the derivative of a function f(x) at a point is defined as:

where h is a small number that approaches 0.

This expression is known as the difference quotient, and it represents the average rate of change of the function over the interval

Thus, the correct answer is option (d).

Difficulty Level- Hard

Bloom’s Taxonomy- Analyze

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**Q103) Which of the following is the power rule for derivatives?**

a)

b)

c)

d)

Correct Answer: Option (b)

Explanation: The power rule for derivatives is a formula that allows us to find the derivative of a power function, which is a function of the form where n is a constant. The power rule states that the derivative of a power function with respect to x is:

Thus, the correct answer is option (b).

Difficulty Level- Easy

Bloom’s Taxonomy- Analyze

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**Q104) What is the derivative of at x = 3?**

a)

b)

c)

d)

Correct answer: Option (b)

Explanation: The given function is

The derivative of the function is

Evaluating this at we get

Thus, the correct answer is option (b).

Difficulty Level- Easy

Bloom’s Taxonomy- Evaluate

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**Q105) What is the derivative of at ?**

a) 0

b) 1

c) e

d) 1/e

Correct answer: Option (b)

Explanation: The given function is

The derivative for the given function is

Find the value of this derivative at x = e, we substitute e into the formula:

Since ln(e) = 1, we have:

Thus, the correct answer is option (b).

Difficulty Level- Hard

Bloom’s Taxonomy- Evaluate

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**Q106) What is the second derivative of at ?**

a)

b)

c)

d)

Correct answer: Option (c)

Explanation: The given function is

The derivative for the function is

To find the second derivative at

Thus, the correct answer is option (c).

Difficulty Level- Easy

Bloom’s Taxonomy- Evaluate

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**Q107) What is the derivative of ) at ?**

a)

b)

c)

d)

Correct answer: Option (b)

Explanation: The given function is )

The derivative of the given function is

Evaluating this at we get

Thus, the correct answer is option (b).

Difficulty Level- Easy

Bloom’s Taxonomy- Evaluate

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**Q108) What is the derivative of at ?**

a)

b)

c)

d)

Correct answer: Option (b)

Explanation: The given function is

Find the derivative for the given function

Evaluating this at x = 0, we get

Thus, the correct answer is option (b).

Difficulty Level- Easy

Bloom’s Taxonomy- Analyze

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**Q110) What is the derivative of at ?**

a)

b)

c)

d)

Correct answer: Option (b)

Explanation: The given function is

The derivative of the given function is

Evaluating this at x = 2, we get

Thus, the correct answer is option (b).

Difficulty Level- Easy

Bloom’s Taxonomy- Evaluate

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**Q111) What is the equation of the tangent line to the curve at the point (1,2)?**

a)

b)

c)

d)

Correct answer: Option (d)

Explanation: The given function is

The derivative of the function is

f'(x) = 2x + 3

Next, we evaluate the derivative at x = 1

The slope of the tangent line at the point (1,2):

Therefore, the slope of the tangent line at the point (1,2) is 5.

Next, we can use the point-slope form of a line to find the equation of the tangent line:

Thus, the correct answer is option (d).

Difficulty Level- Easy

Bloom’s Taxonomy- Evaluate

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**Q112) What is the derivative of ?**

a)

b)

c)

d)

Correct answer: Option (a)

Explanation: The given function is

Now we have to use the power rule of differentiation, which states that if , then Applying this rule to each term in the function, we get

The derivative for the given function is

Thus, the correct answer is option (a).

Difficulty Level- Easy

Bloom’s Taxonomy- Evaluate

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**Q113) What is the derivative of ?**

a)

b)

c)

d)

Correct answer: Option (a)

Explanation: The given function is

Now we have to use the power rule of differentiation, which states that if , then Applying this rule to each term in the function, we get

The derivative for the given function is

Thus, the correct answer is option (a).

Difficulty Level- Easy

Bloom’s Taxonomy- Evaluate

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**Q114) What is the derivative of**

a)

b)

c)

d)

Correct answer: Option (a)

Explanation: The given function is

Let then. We can express the derivative of f(x) as:

where u' is the derivative of u with respect to x.

Taking the derivative of , we get

Substituting u and u' into f'(x), we have:

Thus, the correct answer is option (a).

Difficulty Level- Medium

Bloom’s Taxonomy- Evaluate

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**Q115) Which of the following is the definition of a derivative?**

a) The instantaneous rate of change of a function

b) The average rate of change of a function

c) The slope of a function at a point

d) The area under a function

Correct answer: Option (a)

Explanation: The derivative measures the rate at which the value of a function changes with respect to its input variable, evaluated at a particular point.

the derivative of a function f(x) is defined as:

where h is a small number that approaches 0. This limit represents the rate at which the function is changing at the specific point x=a

Thus, the correct answer is option (a).

Difficulty Level- Easy

Bloom’s Taxonomy- Understand

$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

**Q116) What is the derivative of a constant function?**

a) 0

b) 1

c) The function does not have a derivative

d) The derivative is undefined

Correct answer: Option (a)

Explanation: The derivative of a constant function is always 0, since the rate of change of a constant is 0. The derivative of a function measures the rate of change of the function with respect to its input variable. For a constant function, the value of the function is the same for all input values, so the rate of change is always zero.

Thus, the correct answer is option (a).

Difficulty Level- Easy

Bloom’s Taxonomy- Understand

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**Q117) Which of the following is a real-world application of derivatives?**

a) Finding the area of a circle

b) Calculating the volume of a sphere

c) Determining the maximum height of a rocket

d) Solving quadratic equations

Correct answer: Option (c)

Explanation: The concept of derivatives is fundamental in mathematics and has many real-world applications. When a rocket is launched, its height, velocity, and acceleration change continuously over time. The derivative of the height function with respect to time is the velocity function, and the derivative of the velocity function with respect to time is the acceleration function. By analyzing these functions, we can determine the maximum height that the rocket can reach, the maximum speed it can attain, and the forces acting upon it.

Thus, the correct answer is option (c).

Difficulty Level- Medium

Bloom’s Taxonomy- Remember

$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

**Q118) What is the equation of the tangent line to at x = 2?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: The given function is

The derivative of the function is

Evaluating f'(2)

the equation of the tangent line is

Thus, the correct answer is option (a).

Difficulty Level- Easy

Bloom’s Taxonomy- Evaluate

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**Q119) What is the derivative of at ?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: The given function is )

The derivative of y is

Evaluating

Thus, the correct answer is option (a).

Difficulty Level- Easy

Bloom’s Taxonomy- Evaluate

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**Q120) What is the derivative of at x = 2?**

a) 19

b) 17

c) 13

d) 11

Correct Answer: Option (b)

Explanation: The given function is

Now we have to use the power rule of differentiation, which states that if , then Applying this rule to each term in the function, we get

The derivative of the given function is

Sub x = 2, we get

Thus, the correct answer is option (b).

Difficulty Level- Easy

Bloom’s Taxonomy- Evaluate

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**Q121) What is the formula to calculate the definite integral of a function f(x) from a to b?**

a) ∫ f(x)dx = F(b) - F(a), where F(x) is the antiderivative of f(x)

b) ∫ f(x)dx = F(a) - F(b), where F(x) is the antiderivative of f(x)

c) ∫f(x)dx = F(b) + F(a), where F(x) is the antiderivative of f(x)

d) ∫f(x)dx = F(a) + F(b), where F(x) is the antiderivative of f(x)

Correct Answer: Option (a)

Explanation: The definite integral of a function f(x) from a to b is:

This formula is known as the Fundamental Theorem of Calculus, which states that if a function F(x) is the antiderivative of f(x), then the definite integral of f(x) from a to b is equal to F(b) - F(a).The limits of integration a and b represent the lower and upper bounds of the integral, respectively. The integral of a function over a certain interval gives us the area under the curve of the function between the given limits of integration.

Thus, the correct answer is option (a).

Difficulty level- Hard  
Bloom’s Taxonomy- Understand

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**Q122) What is the integral of ?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: The integral of dx can be evaluated using integration by substitution, where we substitute and dx.

This gives us:

Thus, the correct answer is option (a).

Difficulty level- Medium

Bloom’s Taxonomy- Evaluate

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**Q123) What is the integral of cos(x) dx?**

a) where C is the constant of integration

b) where C is the constant of integration

c) where C is the constant of integration

d) , where C is the constant of integration

Correct Answer: Option (a)

Explanation: The integral of cos(x) dx can be found using integration by substitution or integration by parts

Thus, the correct answer is option (a).

Difficulty level- Medium

Bloom’s Taxonomy- Evaluate

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**Q124) What is the indefinite integral of sin(x)?**

a) cos(x) + C

b) -cos(x) + C

c) sin(x) + C

d) -sin(x) + C

Correct Answer: Option (a)

Explanation: The indefinite integral of sin(x) can be found using integration by substitution or integration by parts. Here, we will use integration by parts, where we take

This gives us:

Thus, the correct answer is option (a).

Difficulty level- Medium

Bloom’s Taxonomy- Evaluate

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**Q125) What is the definite integral of from 0 to 1?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: The definite integral of from to can be found by evaluating the antiderivative of , which is , at the upper limit of and the lower limit of , and subtracting the two.

That is,

Thus, the correct answer is option (a).

Difficulty level- Medium

Bloom’s Taxonomy- Evaluate

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**Q126) What is the indefinite integral of ?**

a) ln|x| + C

b) ln(x) + C

c) -ln|x| + C

d) -ln(x) + C

Correct Answer: Option (b)

Explanation: The indefinite integral of can be found using integration by substitution or integration by parts. we take and . This gives us:

Thus, the correct answer is option (b).

Difficulty level- Medium

Bloom’s Taxonomy- Evaluate

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**Q127) What is the definite integral of from 0 to 1?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: The definite integral of from 0 to 1 can be found by evaluating the antiderivative of which is , at the upper limit of 1 and the lower limit of 0, and subtracting the two. This gives

Thus, the correct answer is option (a).

Difficulty level- Medium

Bloom’s Taxonomy- Evaluate

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**Q128) What is the indefinite integral of cos(x)?**

a) sin(x) + C

b) -sin(x) + C

c) cos(x) + C

d) -cos(x) + C

Correct Answer: Option (a)

Explanation: The indefinite integral of cos(x) can be found by using integration by substitution or integration by parts

Thus, the correct answer is option (a).

Difficulty level- Medium

Bloom’s Taxonomy- Evaluate

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**Q129)What is the integral of ?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: Let then

Rearranging this, we get

Substituting this into the integral, we get:

Now, we can solve this using a partial fraction decomposition. We can rewrite ,

where A and B are constants. Multiplying both sides by (tan(x) + u)u, we get:

Expanding this, we get:

Since this must hold for all values of x, we can equate the coefficients of u and tan(x) to get:

Solving for A and B, we get:

Substituting these values into the partial fraction decomposition, we get:

Substituting this into the integral, we get:

Integrating both terms separately, we get:

Thus, the correct answer is option (a).

Difficulty level- Very Hard

Bloom’s Taxonomy- Evaluate

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**Q130) What is the integral of dx?**

a)

b)

c)

d)

Correct Answer: Option (b)

Explanation: To solve this integral, we can use substitution. Let , then . Substituting in the integral, we get:

Thus, the correct answer is option (b).

Difficulty level- Very Hard

Bloom’s Taxonomy- Evaluate

$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

**Q131) What is the integral of 2cos(2x) dx?**

a) sin(2x) + C

b) cos(2x) + C

c) 2sin(2x) + C

d) 2cos(2x) + C

Correct Answer: Option (a)

Explanation: The integral of can be found using the trigonometric identity:

where C is the constant of integration. Using this identity, we can see that:

So, in the above identity, and we have:

Thus, the correct answer is option (a).

Difficulty level- Very Hard

Bloom’s Taxonomy- Evaluate

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**Q132) What is the integral of ?**

a)

b)

c)

d)

Correct Answer: Option (d)

Explanation: Using the power rule of integration, we can expand as:

Therefore, the integral of dx can be found by integrating each term separately:

Thus, the correct answer is option (d).

Difficulty level- Very Hard

Bloom’s Taxonomy- Evaluate

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**Q133) What is the indefinite integral of ?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: The indefinite integral of can be found using the power rule of integration.

Using this rule, we can integrate each term of the given function as follows:

where C1, C2, and C3 are constants of integration.

Putting these together, we get:

Simplifying the constants of integration, we get:

where C is the constant of integration that combines C1, C2, and C3

Thus, the correct answer is option (a).

Difficulty level- Very Hard

Bloom’s Taxonomy- Evaluate

$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

**Q134) What is the derivative of the function F(x) = ?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: The function is the indefinite integral of 1/x with respect to x. Therefore, we can apply the fundamental theorem of calculus to find its derivative:

Thus, the correct answer is option (a).

Difficulty level- Very Hard

Bloom’s Taxonomy- Analyze

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**Q135) What is the definite integral of sin(x) from to ?**

a) 1

b) 0

c)

d) -1

Correct Answer: Correct (a)

Explanation: The definite integral of sin(x) from 0 to can be found by evaluating the antiderivative of sin(x) and then plugging in the limits of integration:

Using the limits of integration, we get:

Thus, the correct answer is option (a).

Difficulty level- Very Hard

Bloom’s Taxonomy- Evaluate

$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

**Q136) What is the derivative of ln|2x + 1|?**

a)

b)

c)

d)

Correct Answer: Option (b)

Let

Then

Taking the derivative of using the chain rule, we get:

Substituting back in for u, we get:

Thus, the correct answer is option (b).

Difficulty level- Very Hard

Bloom’s Taxonomy- Analyze

$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

**Q137) What is the definite integral of x\*sin(x) dx from 0 to ?**

a)

b) 1

c) 2

d) 0

Correct Answer: Option (b)

Explanation: Let and . Then and

Using the formula for integration by parts, we get:

Using the limits of integration, we get:

Thus, the correct answer is option (b).

Difficulty level- Very Hard

Bloom’s Taxonomy- Analyze

$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

**Q138) What is the indefinite integral of ?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: Let . Then, , and

Substituting these expressions into the integral, we get:

Substituting back in for u, we get:

Thus, the correct answer is option (a).

Difficulty level- Very Hard

Bloom’s Taxonomy- Evaluate

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**Q139) What is the derivative of**

a)

b)

c)

d)

Correct Answer: Option (d)

Explanation: Applying power rule of differentiation to the given function, we get:

Thus, the correct answer is option (d).

Difficulty level- Medium

Bloom’s Taxonomy- Evaluate

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**Q140) What is the derivative of ln(x)?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: Using the chain rule, we get:

Here, so

Substituting these values, we get:

Thus, the correct answer is option (a).

Difficulty level- Hard

Bloom’s Taxonomy- Evaluate

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**Q141) What is the integral of ?**

a)

b

c)

d)

Correct Answer: Option (a)

Explanation: The integral of x^3 can be found by applying the power rule of integration.

Using the power rule, we get:

Thus, the correct answer is option (a).

Difficulty level- Medium

Bloom’s Taxonomy- Evaluate

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**142) What is the indefinite integral of 2x + 3?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: The indefinite integral of 2x + 3 can be found by applying the power rule of integration. Using the power rule, we get:

Thus, the correct answer is option (a).

Difficulty level- Medium

Bloom’s Taxonomy- Evaluate

$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

**Q143) What is the definite integral of sin(x) from 0 to ?**

a) 1

b) 0

c) π/2

d) -1

Correct Answer: Option (a)

Explanation: The definite integral of sin(x) from 0 to can be using the calculated formula:

Plugging in the limits of integration, we get:

Thus, the correct answer is option (a).

Difficulty level- Medium

Bloom’s Taxonomy- Evaluate

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**Q144) What is the indefinite integral of ?**

a)

b) ln|x| + C

c)

d)

Correct Answer: Option (c)

Explanation: The indefinite integral of is where C is an arbitrary constant of integration.

We can use the power rule of integration, which states that the integral of with respect to is , where C is a constant of integration.

In this, can be thought of as , so we can use the power rule with and to get:

Thus, the correct answer is option (c).

Difficulty level- Medium

Bloom’s Taxonomy- Evaluate

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**Q145) What is the definite integral of from to ?**

a)

b) 4

c)

d) 2

Correct Answer: Option (c)

Explanation: The definite integral of from to , we have to evaluate the antiderivative of with respect to , and then evaluate that antiderivative at the upper and lower limits of integration and take the difference.

The antiderivative of is ,

where C is a constant of integration.

.

Thus, the correct answer is option (c).

Difficulty level- Medium

Bloom’s Taxonomy- Evaluate

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**Q146) What is the indefinite integral of ?**

a)

b)

c)

d)

Correct Answer: Option (c)

Explanation: Let and , then and Using the formula for integration by parts again, we have:

Substituting this result back into the original equation, we get:

Solving for the integral, we get:

Dividing by 2, we get:

Thus, the correct answer is option (c).

Difficulty level- Hard

Bloom’s Taxonomy- Evaluate

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**Q147) What is the derivative of**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: Let , then we have:

Taking the derivative of both sides with respect to x, we get:

Substituting back , we have:

Taking the derivative of with respect to x, we get:

Simplifying the expression, we have:

Thus, the correct answer is option (a).

Difficulty level- Hard

Bloom’s Taxonomy- Analyze

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**Q148) What is the derivative of ln|sin(x)|?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: Let then we have:

Taking the derivative of both sides with respect to x, we get:

Using the chain rule, we have:

Using the chain rule again, we have:

Substituting back into the expression for , we get:

Since is always positive, we can drop the absolute value signs, and the final answer is:

Thus, the correct answer is option (a).

Difficulty level- Hard

Bloom’s Taxonomy- Evaluate

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**Q149) What is the indefinite integral of**

a)

b)

c)

d)

Correct Answer: Option (d)

Explanation: Let , then , or . Substituting this in the integral, we get:

Thus, the correct answer is option (d).

Difficulty level- Medium

Bloom’s Taxonomy- Evaluate

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**Q150) What is the derivative of the function ?**

a)

b)

c)

d)

Correct answer: Option (d)

Explanation: The derivative of the given function can be obtained using the Fundamental Theorem of Calculus and the chain rule of differentiation. Let . Using this theorem, we can rewrite the given function as:

where F(x) is the antiderivative of which is and we have used the chain rule to obtain as . Therefore,

Thus, the correct answer is option (d).

Difficulty level- Medium

Bloom’s Taxonomy- Evaluate

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**Q151) Which method is used to find the length of a curve?**

a) Integration

b) Differentiation

c) Both integration and differentiation

d) None of the above

Correct answer: Option (c)

Explanation: To find the length of a curve, we need to integrate the square root of the sum of the squares of the first derivative of the function with respect to x. The length of each segment is given by:

Here, ds represents the length of the small segment, and is the derivative of the function f(x) with respect to x.

Thus, the correct answer is option (c).

Difficulty level- Hard

Bloom’s Taxonomy- Understand

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**Q152) What is the area bounded by the curve and the x-axis from x = 0 to x = 2?**

a) 8

b) 12

c) 16

d) 24

Correct Answer: Option (b)

Explanation: The area bounded by the curve and the x-axis from x = 0 to x = 2

Evaluating the given function

Thus, the correct answer is option (b).

Difficulty level- Medium

Bloom’s Taxonomy- Understand

$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

**Q153) What is the length of the curve y = x^2 from x = 0 to x = 1?**

a) 1

b)

c) 3

d) 4

Correct Answer: Option (b)

Explanation: The derivative of y with respect to x:

arc length

Thus, the correct answer is option (b).

Difficulty level- Medium

Bloom’s Taxonomy- Evaluate

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**Q154) What is the area of the region bounded by the curve and the x-axis from x = 0 to ?**

a) 6

b) 9

c) 12

d) 18

Correct Answer: Option (b)

Explanation: The area bounded by the curve is

Integral the function with respect to x

The area of the region bounded by the curve and the x-axis from x = 0 to x = 3 is .

Thus, the correct answer is option (b).

Difficulty level- Medium

Bloom’s Taxonomy- Evaluate

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**Q155) What is the area of the region bounded by the curves and**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: Find the points of intersection of the two curves:

Integral for the given function

Thus, the correct answer is option (a).

Difficulty level- Medium

Bloom’s Taxonomy- Evaluate

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**Q156) Which theorem is used to evaluate integrals using substitution?**

a) Chain rule

b) Mean value theorem

c) Fundamental theorem of calculus

d) None of the above

Correct answer: Option (a)

Explanation: The chain rule is the theorem that is used to evaluate integrals using substitution, because it allows us to manipulate the integrand in a way that simplifies the integration process. The chain rule tells us that:

This formula allows us to express the derivative of a composite function as a product of derivatives.

Thus, the correct answer is option (a).

Difficulty level- Medium

Bloom’s Taxonomy- Understand

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**Q157) Which formula is used to find the area between two curves?**

a) ∫(f(x) + g(x)) dx

b) ∫(f(x) - g(x)) dx

c) ∫|f(x) - g(x)| dx

d) None of the above

Correct answer: Option (c)

Explanation: To find the area between two curves, we need to first identify the region of interest. This region is bounded by the two curves, and its boundaries are the points where the two curves intersect. Once we have identified the region of interest, we need to take the absolute difference between the two functions that bound the region, and integrate it over the region of interest. This gives us the area between the two curves.

The formula for the area between two curves is:

Thus, the correct answer is option (c).

Difficulty level- Medium

Bloom’s Taxonomy- Remember

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**Q158) What is the area of the region enclosed by the curve and the line ?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: Find the point of intersection for the two given curve

So, the curves intersect at x = 0 and x = 1.

Integrate the difference between the two functions with respect to x from x = 0 to x = 1

Thus, the correct answer is option (a).

Difficulty level- Medium

Bloom’s Taxonomy- Evaluate

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**Q159) What is the area of the region bounded by the curve and the x-axis from x = 0 to x = 1?**

a)

b)

c)

d) 1

Correct Answer: Option (b)

Explanation: Integrate the given curve with respect to x

Thus, the correct answer is option (b).

Difficulty level- Medium

Bloom’s Taxonomy- Evaluate

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**Q160) What is the meaning of the integral ∫f(x) dx over an infinite interval?**

a) The area under the curve f(x) from negative infinity to positive infinity

b) The area under the curve f(x) from zero to positive infinity

c) The area under the curve f(x) from negative infinity to zero

d) None of the above

Correct answer: Option (a)

Explanation: The integral of a function over an infinite interval gives us the total area under the curve over that entire interval. When we integrate a function f(x) over an infinite interval, we are essentially finding the area under the curve of the function from negative infinity to positive infinity. This type of integral is called an improper integral, because it involves an infinite limit of integration.

Thus, the correct answer is option (a).

Difficulty level- Medium

Bloom’s Taxonomy- Understand

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**Q161) What is the formula for finding the volume of a solid of revolution about the x-axis?**

a)

b)

c)

d) None of the above

Correct Answer: Option (c)

Explanation: The formula for finding the volume of a solid of revolution about the x-axis is the integral of π times the square of the function representing the radius of the solid, with respect to x, i.e.,

where R(x) is the distance from the curve to the x-axis at a given value of x. Once you have R(x), you can square it and integrate it over the region of interest from x=a to x=b using the integral symbol ∫.

Thus, the correct answer is option (c).

Difficulty level- Medium

Bloom’s Taxonomy- Remember

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**Q162) What is the area of the region enclosed by the curve y = sin(x) and the x-axis from x = 0 to x = π?**

a) 1

b) 2

c)

d) π

Correct Answer: Option (b)

Explanation: Integrate the given curve

Let , then and Substituting this into the integral, we get:

Thus, the correct answer is option (b).

Difficulty level- Medium

Bloom’s Taxonomy- Evaluate

$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

**Q163) What is the area of the region enclosed by the curve y = cos(x) and the x-axis from x = 0 to ?**

a) 0

b) 1

c) 2

d)

Correct Answer: (b)

Explanation: Integrate the given curve

Let , then and Substituting this into the integral, we get:

Thus, the correct answer is option (b).

Difficulty level- Medium

Bloom’s Taxonomy- Evaluate

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**Q164) The definite integral of e dx has the following value:**

a) e – 1

b) e

c) e + 1

d) 2e

Correct Answer: Option (a)

Explanation: Integral for the given function is

Evaluate the integral from 0 to 1

Thus, the correct answer is option (a).

Difficulty Level- Hard

Bloom’s Taxonomy- Understand

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**Q165) The value of the definite integral dx is:**

a) 4

b) 8

c) 12

d) 16

Correct Answer: Option (a)

Explanation: Evaluate the given interval from 0 to 4

Thus, the correct answer is option (a).

Difficulty level - Medium

Bloom’s Taxonomy- Evaluate

$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

**Q166) What is the fundamental theorem of calculus?**

a) It relates the derivative to the antiderivative of a function.

b) It relates the derivative to the limit of a function.

c) It relates the integral to the derivative of a function.

d) It relates the integral to the antiderivative of a function.

Correct answer: Option (d)

Explanation: The fundamental theorem of calculus is a fundamental concept in calculus that establishes a relationship between differentiation and integration. It consists of two parts: the first part states that if a function f is continuous on the closed interval [a, b] and F is an antiderivative of f on [a, b], then the definite integral of f from a to b can be evaluated as F(b) - F(a):

Thus, the correct answer is option (d).

Difficulty level- Medium

Bloom’s Taxonomy- Remember

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**Q167) What is the area between a curve and the x-axis?**

a) Definite integral of the curve with respect to x.

b) Definite integral of the curve with respect to y.

c) Indefinite integral of the curve with respect to x.

d) Indefinite integral of the curve with respect to y.

Correct answer: Option (a)

Explanation: The definite integral of a function f(x) over the interval [a, b] represents the area under the curve of the function between the x-values a and b. Therefore, the definite integral of the curve with respect to x gives the area between the curve and the x-axis.

Thus, the correct answer is option (a).

Difficulty level- Medium

Bloom’s Taxonomy- Analyze

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**Q168) What is the process of finding the volume of a solid generated by rotating a curve around an axis?**

a) Integration by substitution.

b) Integration by parts.

c) Disk method.

d) Shell method.

Correct answer: Option (d)

Explanation: The shell method involves finding the volume of a solid by adding up the volumes of thin cylindrical shells generated by rotating a curve around an axis. The shell method involves dividing the solid into thin cylindrical shells of equal thickness and then summing the volumes of these shells using integration. To use the shell method, we need to integrate a function of x or y depending on the axis of rotation

Thus, the correct answer is option (d).

Difficulty level- Medium

Bloom’s Taxonomy- Understand

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**Q169) The Fundamental Theorem of Calculus relates the concepts of:**

a) Differentiation and integration

b) Limits and derivatives

c) Antiderivatives and definite integrals

d) Limits and indefinite integrals

Correct Answer: Option (c)

Explanation: The Fundamental Theorem of Calculus states that differentiation and integration are inverse processes, and that finding the antiderivative of a function and evaluating a definite integral are intimately related concepts. It relates the derivative of the definite integral of a function to the original function.

Thus, the correct answer is option (c).

Difficulty level- Medium

Bloom’s Taxonomy- Remember

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**Q170) The definite integral represents the:**

a) Slope of a curve

b) Area between a curve and the x-axis

c) Area between a curve and the y-axis

d) Maximum value of a function

Correct Answer: Option (b)

Explanation: The definite integral is a calculus concept that allows us to find the area between a function and the x-axis over a specified interval. The definite integral of a function f(x) over the interval [a,b] represents the area between the curve y=f(x) and the x-axis over that interval. We can calculate an approximation of the area under the curve between the limits of integration a and b.

Thus, the correct answer is option (b).

Difficulty level- Medium

Bloom’s Taxonomy- Remember

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**Q171) What is the purpose of using integration to find the volume of a solid of revolution?**

a) To obtain an exact value of the volume

b) To determine the volume's worth.

c) To obtain a range of values for the volume

d) To estimate the volume's worth.

Correct Answer: Option (a)

Explanation: The purpose of using integration to find the volume of a solid of revolution is to obtain an exact value of the volume. When a curve is rotated around an axis, it creates a three-dimensional solid with a specific volume. This volume can be calculated by slicing the solid into thin disks or cylindrical shells, finding the area of each slice, and adding them up using integration.

Thus, the correct answer is option (a).

Difficulty level - Medium

Bloom’s Taxonomy- Analyze

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**Q172) what is the purpose of using integration to find the length of a curve?**

a) To obtain an exact value of the length

b) To determine the length's value.

c) To obtain a range of values for the length

d) To determine a rough estimate of the duration

Correct Answer: Option (a)

Explanation: The purpose of using integration to find the length of a curve is to obtain an exact value of the length. When a curve is not a straight line, its length cannot be found by simply subtracting the endpoints. Instead, it is necessary to break the curve into infinitesimally small segments and sum their lengths. This is done using calculus and the process is known as arc length integration.

Thus, the correct answer is option (a).

Difficulty level - Medium

Bloom’s Taxonomy- Analyze

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**Q173) Calculus's basic theorem aims to:**

a) Find the integral of a function;

b) Find the limit of a function;

c) Establish a relationship between differentiation and integration;

d) Determine the region under a curve.

Correct Answer: Option (c)

Explanation: The fundamental theorem of calculus establishes a fundamental relationship between the two branches of calculus: differentiation and integration. It states that differentiation and integration are inverse processes, and that integration can be used to find the antiderivative (or primitive) of a function, which can then be used to calculate the definite integral of the function over a given interval.

Thus, the correct answer is option (c).

Difficulty level - Medium

Bloom’s Taxonomy- Understand

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**Q174) What is the formula for calculating the area of a region between two curves?**

a) A = ∫(upper function - lower function) dx

b) A = ∫(lower function - upper function) dx

c) A = ∫(upper function + lower function) dx

d) A = ∫(lower function + upper function) dx

Correct Answer: Option (a)

Explanation: The formula for calculating the area of a region between two curves is based on the idea of slicing the region into small vertical strips, each with width dx. The area of each strip is approximately given by the difference between the heights of the upper and lower curves at that value of x, multiplied by the width dx. Mathematically, we can express this as:

Thus, the correct answer is option (a).

Difficulty level - Medium

Bloom’s Taxonomy- Remember

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**Q175) What is the formula for calculating the volume of a solid of revolution using the disk method?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: The disk method is a technique for finding the volume of a solid of revolution by slicing the solid into thin disks perpendicular to the axis of rotation, and then summing up the volumes of the disks. If the axis of rotation is the x-axis and the solid is bounded by the curves y = f(x), y = 0, and the lines x = a and x = b, the volume of the solid is given by

.

Thus, the correct answer is option (a).

Difficulty level - Medium

Bloom’s Taxonomy- Remember

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**Q176) What is the area bounded by the curve and the x-axis in the interval [0,2]?**

a)

b) 4

c)

d) 2

Correct Answer: Option (a)

Explanation: The given function is

We can evaluate this integral using the power rule of integration:

The area bounded by the curve and the x-axis in the given interval is given by the definite integral from 0 to 2, which is .

Thus, the correct answer is option (a).

Difficulty level - Medium

Bloom’s Taxonomy- Evalaute

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**Q177) What is the average value of on the interval [0,1]?**

a)

b)

c)

d)

Correct Answer: Option (c)

Explanation: The given function is

We can evaluate this integral using the power rule of integration:

The average value of f(x) on the interval [0,1] is given by the integral of f(x) divided by the length of the interval, which is .

Thus, the correct answer is option (a).

Difficulty level - Easy

Bloom’s Taxonomy- Evaluate

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**Q178) What is the area of the region enclosed by the curves and in the interval [0,2]?**

a)

b)

c)

d) 2

Correct Answer: Option (a)

Explanation: The given curves are  **and**

Find the points of intersection of the two curves:

Therefore, the two curves intersect at (0,0) and (1,1).

Next, we integrate the difference of the curves with respect to x over the interval [0,2]:

Thus, the correct answer is option (a).

Difficulty level - Easy

Bloom’s Taxonomy- Evaluate

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**Q179) The purpose of integration by parts is to:**

a) Calculate a trigonometric function integral

b) Calculate a polynomial function integral

c) Calculate a rational function integral

d) Simplify a complex integral

Correct Answer: Option (d)

Explanation: Integration by parts is a technique used to decompose complex integrals. One method for integrating the result of two functions is called "integration by parts," which involves differentiating one function and integrating the other. When two functions are multiplied together, integration by parts is a special type of integration that is frequently helpful. Nevertheless, it also has other applications.

Thus, the correct answer is option (d).

Difficulty Level - Medium

Bloom’s Taxonomy- Remember

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**Q180) What is the work done by a force of on a particle moving along the x-axis from x = 0 to x = 2?**

a) 3

b) 6

c) 9

d) 12

Correct Answer: Option (b)

Explanation: The work done by a force F(x) over a displacement ∆x is given by the definite integral:

Here, a and b represent the initial and final positions of the particle, respectively. In this case, the force is given by , and the particle moves from x = 0 to x = 2. Therefore, we have:

Integrating with respect to x, we get:

Substituting the limits of integration, we get:

The work done by the force is given by the definite integral of the force function from 0 to 2, which is 6.

Thus, the correct answer is option (b).

Difficulty Level - Medium

Bloom’s Taxonomy- Evaluate

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**Q181) What is the use of the derivative of an integral is to:**

a) Calculate a function's integral

b) Determine a function's limit

c) Determine a tangent line's slope

d) Locate the space beneath a curve.

Correct Answer: Option (c)

Explanation: The tangent shows how quickly the given function is changing at a particular point in time. For a specific point, the slope of the tangent is equal to the derivative of the function. The slope of a tangent line can be determined using the derivative of an integral. The slope of a tangent line at a certain location on the curve can be determined using the derivative of an integral.

Thus, the correct answer is option (c).

Difficulty level - Medium

Bloom’s Taxonomy- Understand

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**Q182) Describe the centre of mass of system using integration**

a) To determine an object's speed

b) To determine the entire volume of a solid

c) To determine the displacement of an object

d) To locate the point where the system's mass is concentrated

Correct Answer: Option (d)

Explanation: It is the system's average location, weighted by the mass of each component. The center of mass is at the centroid for a straightforward stiff object with a uniform density. When a system is divided into infinitesimally small bits, the center of mass of each part can be determined via integration.

Thus, the correct answer is option (d).

Difficulty level - Hard

Bloom’s Taxonomy- Understand

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**Q182)What is the integral of ?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: The integral of dx can be evaluated using integration by substitution, where we substitute and dx.

This gives us:

Thus, the correct answer is option (a).

Difficulty level- Medium

Bloom’s Taxonomy- Evaluate

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**Q183) The area of the region bounded by the curves and y = x is:**

a)

b)

c)

d)

Correct Answer: Option (c)

Explanation: The given curve

Find their intersection points.

Thus, the curves intersect at x = 0 and x = 1.

The curve y = x is above the curve in the interval [0,1].

So, the area of the region bounded by the curves and y = x in the interval [0,1] is:

Thus, the correct answer is option (c).

Difficulty level- Easy

Bloom’s Taxonomy- Evaluate

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**Q184) The area bounded by the curves and y = 0 is:**

a)

b)

c)

d)

Correct Answer: Option (c)

Explanation: The given equation is

We need to find their intersection points.

Thus, the curves intersect at x = 0 and x = 2.

The curve is above the x-axis in the interval

So, the area of the region bounded by the curves and y = 0 in the interval is:

Thus, the correct answer is option (c).

Difficulty level- Easy

Bloom’s Taxonomy- Evaluate

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**Q185) what is the main objective of using integration to find the work done by a force?**

a) To calculate the distance travelled by an object

b) To determine the displacement of an object

c) To determine the system's overall energy.

d) To estimate the amount of change in a quantity

Correct Answer: Option (b)

Explanation: To calculate an object's displacement. By integrating the dot product of the force and the displacement over the course of the item, integration can be used to determine the work performed by a force. An object's position changes if it moves in relation to a reference frame, such as when a passenger moves to the back of an aeroplane or a lecturer moves to the right in relation to a whiteboard. Displacement describes this shift in location.

Thus, the correct answer is option (b).

Difficulty level - Very Hard

Bloom’s Taxonomy- Understand

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**Q186) What is the area enclosed by the curves and y = x + 2 from x = 0 to x = 2?**

a)

b)

c)

d)

Correct Answer: Option (b)

Explanation: The given equation is and y = x + 2

We need to integrate the difference between the curves over the given interval:

Thus, the correct answer is option (b).

Difficulty level - Medium

Bloom’s Taxonomy- Evaluate

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**Q187) What is the value of the definite integral ?**

a) 1

b) 0

c) -1

d) -2

Correct Answer: Option (a)

Explanation: Using the integral formula for the indefinite integral of cos x, we get:

So, we have:

Thus, the correct answer is option (a).

Difficulty level - Medium

Bloom’s Taxonomy- Evaluate

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**Q188) What is the power rule for integration?**

a

b)

c)

d)

Correct Answer: Option (a)

Explanation: The power rule for integration states that the antiderivative of is

where C is the constant of integration. This rule holds for all values of n except for n = -1. The power rule only gives you the indefinite integral, which means that the constant of integration C could have any value. To find the definite integral, you need to evaluate the integral at the limits of integration and subtract the result at the lower limit from the result at the upper limit.

Thus, the correct answer is option (a).

Difficulty level - Medium

Bloom’s Taxonomy- Evalaute

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**Q189) What is the substitution method for integration?**

a) It involves using algebraic manipulations to simplify an integrand before integrating.

b) It involves splitting an integrand into simpler components before integrating.

c) It involves replacing a variable in the integrand with a new variable before integrating.

d) It involves approximating an integral using numerical methods.

Correct Answer: Option (c)

Explanation: The substitution method is a technique used for integrating functions that can be expressed in terms of a variable substitution. The substitution method involves replacing a variable in the integrand with a new variable before integrating. This new variable should be chosen in such a way that the integrand becomes simpler or easier to integrate.

Thus, the correct answer is option (c).

Difficulty level - Medium

Bloom’s Taxonomy- Understand

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**Q190) What is the formula for the average value of a function f(x) on the interval [a, b]?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: The formula for the average value of a function f(x) on the interval [a, b] is:

This formula calculates the average or mean value of the function f(x) over the interval [a, b]. It is also called the mean or average of f(x) over the interval [a, b].

To find the average value of f(x) on the interval [a, b], we first calculate the definite integral of f(x) over the interval [a, b], which gives us the total area under the curve of f(x) over that interval. We then divide this total area by the length of the interval [a, b], which is given by (b-a).

Mathematically, this can be expressed as:

Average value of f(x) on [a, b] =

Thus, the correct answer is option (a).

Difficulty level - Medium

Bloom’s Taxonomy- Analyze

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**Q191) What is the distance travelled by a particle moving along the x-axis with velocity in the interval [0,1]?**

a)

b)

c)

d) 1

Correct Answer: Option (b)

Explanation: The velocity of the particle is given by

Integrating this, we get the displacement function:

We can find the constant of integration C by using the initial condition that the particle starts from rest at t=0. Thus, we have:

, which gives

Therefore, the displacement function becomes:

To find the distance travelled by the particle, we need to integrate the absolute value of the velocity function from to

Now, the expression inside the absolute value function changes sign at and . So we break the integral into two parts:

Simplifying this, we get:

Thus, the correct answer is option (b).

Difficulty level - Hard

Bloom’s Taxonomy- Evaluate

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**Q192) Which of the following statements is true about the definite integral of a function f(x) from a to b?**

a) It represents the area under the curve of f(x) between and .

b) It represents the value of the function f(x) at x = b minus the value of the function at x = a. c) It represents the slope of the tangent line to the function f(x) at minus the slope at

d) It represents the maximum value of the function f(x) between and .

Correct Answer: Option (a)

Explanation: The definite integral of a function f(x) from a to b represents the area under the curve of between x = a and x = b. This is because the definite integral is given by:

This integral is equal to the net signed area between the curve and the x-axis over the interval

If is a positive function between a and b, then the definite integral represents the area between the curve and the x-axis. If f(x) is a negative function between a and b, then the definite integral represents the negative of the area between the curve and the x-axis. If changes sign on the interval , then the definite integral represents the net signed area between the curve and the x-axis.

Thus, the correct answer is option (a).

Difficulty level - Medium

Bloom’s Taxonomy- Evaluate

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**Q193) Which of the following is the definite integral of the function between x = 0 and x = 2?**

a)

b)

c)

d) 2

Correct Answer: Option (a)

Explanation: To find the definite integral of between and , we can use the formula:

Evaluating this expression at and gives:

Thus, the correct answer is Option (a)

Difficulty level - Easy

Bloom’s Taxonomy- Evalaute

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**Q194) What is the main purpose of using integration to find the volume of a solid of revolution?**

a) To determine the solid's surface area

b) To determine the displacement of an object

c) To estimate the amount of change in a quantity

d) To determine the solid's entire volume.

Correct Answer: Option (d)

Explanation: To determine the solid's entire volume. Slicing a solid into infinitesimally thin discs and adding their volumes together will allow you to use integration to determine the volume of the solid under consideration. Take a moment to consider the volumes of each three-dimensional solid shape before we begin to answer the issues based on the combination of solids. The formula for volume and surface area is given by: for a cuboid with dimensions of length (l), width (b), and height (h).

Thus, the correct answer is option (d).

Difficulty level - Medium

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**Q195) What is the average value of on the interval ]?**

a)

b)

c)

d)

Correct Answer: Option (c)

Explanation: The average value of a function ) on the interval [ is given by the formula:

In this case, we have and the interval is So we can plug in these values into the formula and evaluate the definite integral:

Thus, the correct answer is option (c).

Difficulty level - Hard

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**Q196) What is the work done by a force of on a particle moving along the x-axis from x = 0 to** ?

a) 3

b) 6

c) 9

d) 12

Correct Answer: Option (b)

Explanation: The work done by a force F(x) on a particle moving along the x-axis from to is given by the definite integral:

In this case, the force is given by  and the particle moves from to . So we can plug in these values into the formula and evaluate the definite integral:

Thus, the correct answer is option (b).

Difficulty level - Medium

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**Q197) The area of the region bounded by the curves and y = x is:**

a)

b)

c)

d)

Correct Answer: Option (c)

Explanation: The area of the region bounded by the curves by taking the definite integral of the difference between the curves over the interval

Therefore, the area of the region bounded by the curves and from to is

Thus, the correct answer is option (c).

Difficulty level - Medium

$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

**Q198) The area bounded by the curves and y = 0 is:**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: The given equation is

To find the area bounded by the given curves, we need to find the x-coordinates of their intersection points. Setting equal to zero, we get:

So, the curves intersect at and We can now find the area by integrating the function with respect to x from :

Thus, the correct answer is option (a).

Difficulty level - Medium

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**Q199) The definite integral of e dx has the following value:**

a) e – 1

b) e

c) e + 1

d) 2e

Correct Answer: Option (a)

Explanation: Integral for the given function is

Evaluate the integral from 0 to 1

Thus, the correct answer is option (a).

Difficulty Level- Medium

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**Q200) How do you calculate the center of mass of a system using integration?**

a) Take the average of the positions of all the particles in the system.

b) Sum up the positions of all the particles in the system.

c) Integrate over the mass distribution of the system.

d) Integrate over the position distribution of the system.

Correct Answer: Option (d)

Explanation To calculate the center of mass of a system using integration, you need to integrate over the position distribution of the system, weighted by the mass distribution. The formula for the x-coordinate of the center of mass is:

where M is the total mass of the system, x is the position of each particle, and dm is the differential mass element.

Thus, the correct answer is option (d).

Difficulty Level- Hard

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**Q201) What is the order of the differential equation** y'' - 3y' + 2y = 0 **?**

a) First Order

b) Second Order

c) Third Order

d) Fourth Order

Correct Answer: Option (b)

Explanation: The order of a differential equation is the highest derivative present in the equation. In the given differential equation, the highest derivative present is the second derivative Therefore the order of the differential equation is

Thus, the correct answer is option (b).

Difficulty Level - Easy

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**Q202) Which of the following is a linear differential equation?**

a) y' = 2y

b) y'' = 0

c) y' = y2

d) y'' + y2 = 0

Correct Answer: Option (a)

Explanation: A differential equation is said to be linear if it can be expressed in the form of a linear combination of derivatives of the dependent variable and the dependent variable itself Therefore the equation is linear, as it can be written as Here, is the first derivative of and it occurs to the first power.

Thus, the correct answer is option (a).

Difficulty Level - Medium

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**Q203) What is the general solution of the differential equation**

a)

b)

c)

d)

Correct Answer: Option (c)

Explanation: The general solution of the given differential equation can be found by solving the characteristic equation

which factors as

This gives the roots and

Thus, the general solution is of the form

where and are constants determined by any initial or boundary conditions.

Thus, the correct answer is option (c).

Difficulty level - Hard

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**Q204) Which of the following is the order of the differential equation** y' + y = 0 **?**

a) First Order

b) Second Order

c) Third Order

d) Fourth Order

Correct answer: Option (a)

Explanation: The given differential equation is This is a first-order differential equation because it contains only the first derivative of the dependent variable A differential equation of order contains thederivative of the dependent variable . Therefore in this differential the order is 1, and only the first derivative of y is appears.

Thus, the correct answer is option (a).

Difficulty level - Easy

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**Q205) Which of the following is not a method to solve a first-order linear differential equation?**

a) Separation of Variables

b) Integrating Factor

c) Homogeneous Equations

d) All the above

Correct answer: Option (d)

Explanation: A first-order linear differential equation is an equation of the form:

where is the dependent variable, is the independent variable, and p(x) and q(x) are given functions of

This type of differential equation can be solved using various methods, such as

* Integrating Factor Method
* Variation of Parameters Method:
* Homogeneous Equations
* Separation of Variables

Therefore All the given methods, Separation of Variables, Integrating Factor, Homogeneous Equations, and Exact Equations, are valid methods to solve a first-order linear differential equation.

Thus, the correct answer is option (d).

Difficulty level - Very Hard

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**Q206) Which of the following is a nonlinear differential equation?**

a)

b)

c)

d)

Correct answer: Option (a)

Explanation: A nonlinear differential equation is a differential equation that contains nonlinear terms involving the dependent variable or its derivatives. The differential equation is a nonlinear differential equation because it contains a nonlinear term , involving the dependent variable.

Thus, the correct answer is option (a).

Difficulty level - Hard

Bloom’s Taxonomy- Evaluate

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**Q207) What is the order of the differential equation ?**

a) First Order

b) Second Order

c) Third Order

d) Fourth Order

Correct answer: Option (c)

Explanation: The order of a differential equation is defined as the order of the highest derivative present in the equation. In the given differential equation the highest derivative present is , so the order of the differential equation is

Thus, the correct answer is option (c).

Difficulty level - Medium

Bloom’s Taxonomy- Analyze

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**Q208) Which of the following is a differential equation of order 2?**

a)

b)

c)

d)

Correct answer: Option (b)

Explanation: The order of a differential equation is defined as the order of the highest derivative present in the equation. The differential equation can be rewrite as follows;

In the above differential equation the derivative of has the highest order of

Thus, the correct answer is option (b).

Difficulty level - Medium

Bloom’s Taxonomy- Understand

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**Q209) Which method can be used to solve the differential equation ?**

a) Separation of variables

b) Substitution method

c) Integration by parts

d) Method of undetermined coefficients

Correct answer: Option (a)

Explanation: Separation of variables is a method used to solve certain types of differential equations, particularly first-order ordinary differential equations (ODEs). The basic idea is to separate the variables of the differential equation and integrate both sides of the equation. And also this method is used for solving first-order linear and nonlinear ordinary differential equations.

Thus, the correct answer is option (a).

Difficulty level - Medium

Bloom’s Taxonomy- Understand

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**Q210) The general solution of the differential equation is:**

a)

b)

c)

d)

Correct answer: Option (a)

Explanation: The given differential equation is first-order and separable. To solve it using the separation of variables method, we can rearrange it as:

Integrating both sides, we get:

where is the constant of integration

Taking the exponential of both sides, we get:

Since is just a constant, we can write:

where .Therefore is the general solution

Thus, the correct answer is option (a).

Difficulty level - Hard

Bloom’s Taxonomy- Evaluate

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**Q211) What is the order of the differential equation of the family of curves** y = mx+ c **?**

a) 0

b) 1

c) 2

d) 3

Correct answer: Option (a)

Explanation The family of curves y = mx + c represents a straight line equation, where m and c are constants. A differential equation involves the derivatives of a function, whereas this equation only involves the variables m, x, y, and c. Therefore, the order of this "differential equation" is not applicable as it is not a differential equation.

Thus, the correct answer is option (a).

Difficulty level - Medium

Bloom’s Taxonomy- Analyze

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**Q212) What is the order of the differential equation that represents the family of circles ?**

a) 0

b) 1

c) 2

d) 3

Correct answer: Option (c)

Explanation: By differentiating both sides of the given equation, we get

Solving this equation for we get

Differentiating this equation once more, we get

Since the order of the differential equation is equal to the highest derivative involved, the order of this differential equation is 2.

Thus, the correct answer is option (c).

Difficulty level - Hard

Bloom’s Taxonomy- Evalaute

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**Q213) What is the degree of the differential equation ?**

a) First Degree

b) Second Degree

c) Third Degree

d) Fourth Degree

Correct answer: Option (b)

Explanation: The degree of a differential equation is defined as the highest power of the highest-order derivative present in the equation. In the given differential equation, the highest-order derivative present is the second derivative y''. The coefficient of is , which is a second-degree polynomial in . Therefore, the highest power of the highest-order derivative is

Thus, the correct answer is option (b).

Difficulty level - Medium

Bloom’s Taxonomy- Understand

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**Q214) Which of the following is a homogeneous differential equation?**

a

b)

c)

d)

Correct answer: Option (c)

Explanation: A homogeneous differential equation is of the form:

The differential equation is a homogeneous differential equation because it can be written in the form:

Taking the antiderivative of both sides:

Solving for y:

Thus, the correct answer is option (c).

Difficulty level - Hard

Bloom’s Taxonomy- Evaluate

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**Q215) What is the solution of the differential equation with initial condition ?**

a)

b)

c)

d)

Correct answer: Option (a)

Explanation: The differential equation is of the form

where .

Now we need to find an antiderivative of the function with respect to which is given by:

where C is a constant of integration.

To determine the value of C, we need to use the initial condition given in the problem. We know that ,

Therefore, the particular solution of the given differential equation with the initial condition is:

Thus, the correct answer is option (a).

Difficulty level - Hard

Bloom’s Taxonomy- Evaluate

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**Q216) Which of the following is a Bernoulli differential equation?**

a)

b)

c)

d)

Correct Answer: Option (d)

Explanation: A Bernoulli differential equation is an equation that can be written in the form

where n is a constant other than 1.

The equation be rewritten as , and we get the equation as

Dividing both sides by gives

,

which can be written as

Comparing this with the standard form of a Bernoulli equation, we see that and Therefore the equation is a Bernoulli equation

Thus, the correct answer is option (d).

Difficulty Level- Very Hard

Bloom’s Taxonomy- Understand

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**Q217) Which approach is utilized to resolve a homogeneous linear differential equation with the following equation:** **?**

a) Separation of variables

b) Integrating factor

c) Substitution method

d) None of the above

Correct Answer: Option (b)

Explanation: We can use the integrating factor method for the homogeneous linear differential equation of the form

where is a continuous function of

The first step is to multiply both sides of the equation by an integrating factor, which is defined as

This gives us:

We can simplify this equation by recognizing that the left-hand side is the product rule for differentiation of the product

Integrating both sides with respect to x gives us:

where C is a constant of integration. Solving for y, we get:

This is the general solution of the homogeneous linear differential equation.

Thus, the correct answer is option (b).

Difficulty Level- Hard

Bloom’s Taxonomy- Understand

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**Q218) What is the particular solution of the differential equation: ?**

 a)

 b)

c)

d)

Correct Answer: Option (d)

Explanation: We can solve the given differential equation by separating variables as follows:

To find the particular solution that satisfies the initial condition , we can substitute these values into the equation:

Since is always positive, we can drop the absolute value and solve for C:

Therefore, the particular solution is:

Note that this solution is defined for , since is undefined at .

Thus, the correct answer is option (d).

Difficulty Level-Hard

Bloom’s Taxonomy- Evaluate

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**Q219) What is the solution of the differential equation , given that y(0) = 1?**

a)

b)

c)

Correct Answer: Option (a)

Explanation: Integrating both sides of the differential equation with respect to , we get

where C is the constant of integration. Using the initial condition , we can solve for C

Substituting the value of C, we get

Thus, the correct answer is option (a).

Difficulty Level- Medium

Bloom’s Taxonomy- Evaluate

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**Q220) What is the integrating factor for the differential equation ?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: To find the integrating factor for the differential equation

Identify the coefficient of y, which is

Take the exponential of the integral of the coefficient, which gives us the integrating factor.

Thus, the correct answer is option (a).

Difficulty Level- Hard

Bloom’s Taxonomy- Evaluate

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**Q221) What is the general solution of the differential equation**

a)y = Acos(x) + Bsin(x)

b)

c)

d)

Correct Answer: Option (a)

Explanation: The differential equation is a second-order homogeneous linear differential equation with constant coefficients.

The characteristic equation is obtained by assuming the solution is of the form

where r is a constant. Substituting this into the differential equation, we get:

Dividing both sides by and simplifying, we get:

Solving for r, we get:

The general solution is a linear combination of the two solutions of the form , where A and B are constants.

Thus, the correct answer is option (a).

Difficulty Level- Hard

Bloom’s Taxonomy- Evaluate

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**Q222) What is the solution of the differential equation y' = ky, where k is a constant?**

a) y = e^kx

b) y = e^(-kx)

c) y = kx

d) y = 1/kx

Correct Answer: Option (a)

Explanation: Separating variables in the differential equation, we get

which can be integrated to give

where C is the constant of integration. Taking exponential of both sides, we get

where A is the constant of integration. Hence, the solution is but we can absorb the sign into the constant, hence the solution is .

Thus, the correct answer is option (a).

Difficulty Level- Hard

Bloom’s Taxonomy- Evaluate

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**Q223) What is the solution of the differential equation given that ?**

a)

b)

c)

d)

Correct Answer: Option (b)

Explanation: The integrating factor for the given differential equation is . After multiplying both sides of the equation by this integrating factor, we get

Integrating both sides, we get

Using the initial condition , we get C = 1.

Thus, the correct answer is option (b).

Difficulty Level- Hard

Bloom’s Taxonomy- Evaluate

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**Q224) Which of the following differential equations represents a growth or decay model?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: The differential equation represents exponential growth or decay, where k is a constant that determines the rate of growth or decay. When k is positive, the equation represents exponential growth i.e , k > 0 and when k is negative, it represents exponential decay i.e k < 0.

Thus, the correct answer is option (a)

Difficulty Level- Hard

Bloom’s Taxonomy- Analyze

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**Q225) What is the solution of the differential equation y' + 3y = 5, given that ?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: The integrating factor for the given differential equation is After multiplying both sides of the equation by this integrating factor, we get

Integrating both sides, we get Using the initial condition , we get .

Thus, the correct answer is option (a).

Difficulty Level- Hard

Bloom’s Taxonomy- Evaluate

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**Q226) Which of the following differential equations represents a logistic growth model?**

a)

b)

c)

d)

Correct Answer: Option (b)

Explanation: A logistic growth model is a type of differential equation that describes population growth when there are limited resources. The logistic growth model is typically represented by the following differential equation:

where y is the population size, t is time, k is a constant representing the maximum growth rate, and K is the carrying capacity or maximum sustainable population size.

The differential equation is a logistic growth model, where the growth rate is proportional to the current population size and the difference between the maximum carrying capacity and the current population size. The carrying capacity term is which limits the population growth as y approaches 1.

Thus, the correct answer is option (b).

Difficulty Level- Very Hard

Bloom’s Taxonomy- Evaluate

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**Q227) Which of the following is an exact differential equation?**

a)

b)

c)

d)

Correct Answer: Option (b)

Explanation: An exact differential equation is one that can be written as

where and are partial derivatives of with respect to x and y, respectively.

These partial derivatives are equal. Therefore the equation is an exact differential equation.

Thus, the correct answer is option (b).

Difficulty Level- Hard

Bloom’s Taxonomy- Understand

**Q228) Which of the following is a separable differential equation?**

a)

b)

c)

d)

Correct Answer: Option (b)

Explanation: A separable differential equation is a type of differential equation that can be written in the form of

where f(x) and g(y) are functions of x and y, respectively. If a differential equation can be written in this form, we can integrate both sides of the equation with respect to their respective variables to solve the equation.

Now, we can divide both sides by to separate the variables:

Then, we can integrate both sides to get:

where C is the constant of integration.

Therefore is a separable differential equation.

Thus, the correct answer is option (b).

Difficulty Level- Hard

Bloom’s Taxonomy- Evaluate

**Q229) Which of the following differential equations represents exponential growth?**

a)

b)

c)

d)

Correct Answer: Option (c)

Explanation: Exponential growth refers to a situation where the rate of growth of a quantity is proportional to its current value. The differential equation represents exponential growth, where k is a constant. This equation can be solved using separation of variables to obtain

where C is the initial value of y.

Thus, the correct answer is option (c).

Difficulty Level- Hard

Bloom’s Taxonomy- Evaluate

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**Q230) What is the general solution of the differential equation**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: The differential equation is a first-order differential equation, which means it involves only the first derivative of the function y.

Now we integrate both sides with respect to:

This gives us:

where C is an arbitrary constant of integration. This is the general solution of the differential equation, since it includes all possible solutions of the equation.

Thus, the correct answer is option (a).

Difficulty Level- Easy

Bloom’s Taxonomy- Evaluate

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**Q231) The differential coefficient of with respect to x**

Correct Answer: Option (b)

Explanation:We have:

Now, taking the derivative of both sides with respect to , we get:

Therefore, the differential coefficient of with respect to x is

Thus, the correct answer is option (b).

Difficulty Level- Hard

Bloom’s Taxonomy- Evaluate

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**Q232) What is the general solution of the differential equation y'' - 4y' + 4y = 0?**

a)

b)

c)

d)

Correct Answer: Option (c)

Explanation: The characteristic equation of the differential equation is

which has a repeated root of .

Therefore, the general solution is of the form

which can be simplified as by using the rule of exponents.

Thus, the correct answer is option (c).

Difficulty Level- Hard

Bloom’s Taxonomy- Evaluate

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**Q233) What is the general solution of the differential equation ?**

a)

b)

c)

d)

Correct Answer: Option (c)

Explanation: The given differential equation is To solve this differential equation, we first rearrange it to separate the variables:

Integrating both sides, we get:

where C is the constant of integration. We can simplify this to:

Using properties of logarithms, we can simplify further:

Taking the exponential of both sides, we get:

Thus, the correct answer is option (c).

Difficulty Level- Hard

Bloom’s Taxonomy- Evaluate

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**Q234) What is the general solution of the differential equation y' = 2x?**

a) y = x^2 + C

b) y = x^2

c) y = 2x + C

d) y = 2x

Correct Answer: Option (a)

Explanation: The differential equation is a first-order differential equation that can be solved by separation of variables. We can write the equation as:

Separating the variables gives:

Integrating both sides with respect to their respective variables gives:

where C is a constant of integration. This is the general solution of the differential equation which means that any function of the form satisfies the differential equation.a

Thus, the correct answer is option (a).

Difficulty Level- Medium.

Bloom’s Taxonomy- Evalaute

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**Q235) Which of the following is a solution of the differential equation ?**

a)

b)

c)

d)

Correct Answer: Option (d)

Explanation: The differential equation is a first-order homogeneous linear differential equation, which means that it has the form:

where

The general solution of this type of differential equation is given by:

where C is the constant of integration.

In the case of the given differential equation , we have:

Substituting this into the general form of the differential equation gives:

which is a true statement. Therefore, any function of the form:

where C is a constant, is a solution of the differential equation

Thus, the correct answer is option (d).

Difficulty Level- Hard.

Bloom’s Taxonomy- Evaluate

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**Q236) Which of the following is a solution of the differential equation y'' + y = 0?**

a)

b)

c)

d)

Correct Answer: Option (b)

Explanation: The differential equation is a second-order homogeneous linear differential equation.

The characteristic equation is

which has complex roots .

The general solution is

Therefore, any function of the form is a solution of the differential equation

Thus, the correct answer is option (b).

Difficulty Level- Medium.

Bloom’s Taxonomy- Evalaute

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**Q237) What is the general solution of the differential equation y' = 2?**

a) y = 2x + C

b) y = 2x

c) y = x^2 + C

d) y = x^2

Correct Answer: Option (a)

Explanation: The differential equation is a first-order differential equation that can be solved by separation of variables. We can write the equation as

Integrating both sides with respect to their respective variables gives

where C is a constant of integration.

This is the general solution of the differential equation y' = 2.

Thus, the correct answer is option (a).

Difficulty Level- Medium.

Bloom’s Taxonomy- Evaluate

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**Q238) Which of the following is a method for integrating a function by breaking it down into simpler fractions?**

a) Integration by parts

b) Partial fractions

c) Trigonometric substitution

d) None of the above

Correct Answer: Option (b)

Explanation: Partial fractions is a method used to decompose a rational function into simpler fractions. A rational function is defined as a quotient of two polynomials. The goal of partial fractions is to express the rational function as a sum of simpler fractions.

Thus, the correct answer is option (b).

Difficulty Level- Medium.

Bloom’s Taxonomy- Understand

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**Q239) Which of the following is a method for integrating a function by converting it into an infinite sum of power functions?**

a) Integration by parts

b) Partial fractions

c) Taylor series

d) None of the above

Correct Answer: Option (c)

Explanation: Taylor series is a method used to represent a function as an infinite sum of power functions. This can be useful for integrating functions that are difficult to integrate directly, as it allows us to convert the function into a series of simpler power functions that can be integrated term-by-term.

Thus, the correct answer is option (c).

Difficulty Level- Medium.

Bloom’s Taxonomy- Understand

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**Q240) Answer the following question with reference to the Audio**

[**https://drive.google.com/file/d/18WdOr\_s8n7IX4JuFOiOFEAAo0zsJvs1v/view?usp=share\_link**](https://drive.google.com/file/d/18WdOr_s8n7IX4JuFOiOFEAAo0zsJvs1v/view?usp=share_link)

**Type: Audio**

**What is the general solution of a differential equation?**

a) A solution that satisfies the differential equation and all initial conditions

b) A solution that satisfies the differential equation but not necessarily all initial conditions

c) A solution that satisfies all initial conditions but not necessarily the differential equation

d) None of the above

Correct Answer: Option (b)

Explanation: The general solution of a differential equation is a family of solutions that satisfies the differential equation but contains arbitrary constants. These arbitrary constants are determined by applying any initial or boundary conditions that are given. Therefore, the general solution may not necessarily satisfy all initial conditions, but it can be used to generate a particular solution that does satisfy the initial conditions.

Thus, the correct answer is option (b).

Difficulty Level- Medium.

Bloom’s Taxonomy- Understand

$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$**Q241) Which of the following claims about the dot product of two vectors a and b is accurate?**

a)

b)

c)

d)

Correct Answer: Option (c)

Explanation: The dot product of two vectors a and b is a scalar quantity that is defined as:

where and are the magnitudes (lengths) of vectors a and b, respectively, and is the angle between them. The dot product measures the extent to which the two vectors are aligned with each other, and the cosine of the angle θ between them gives the measure of this alignment.

Thus, the correct answer is option (c).

Difficulty Level - Medium

Bloom’s Taxonomy- Understand

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**Q242) If a and b are nonzero vectors and** a · b = 0**, then:**

a) A and B are horizontal

b) The angles a and b are parallel.

c) A and B are Collinear

d) A and B are Linearly Independent

Correct Answer: Option (c)

Explanation: The dot product of two nonzero vectors and is defined as:

where and are the magnitudes (lengths) of vectors a and b, respectively, and θ is the angle between them.

If , then it follows from the above formula that , which means that the angle θ between a and b is either or . This implies that the two vectors are perpendicular to each other.

If two nonzero vectors are perpendicular to each other, then they are not parallel, nor do they lie on the same line.

If a and b are perpendicular to each other, then they are collinear with the origin as the common point. This means that they lie on the same line passing through the origin.

Hence, if , then and are collinear.

Thus, the correct answer is option (c).

Difficulty Level - Very Hard

Bloom’s Taxonomy- Analyze

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**Q243) If a and b are two non-zero vectors such that** a + b = 0**, then:**

a) A and B are horizontal

b) The angles a and b are parallel.

c) A and B are Collinear

d) A and B are Linearly Independent

Correct Answer: Option (c)

Explanation: Let's assume that a and b are two nonzero vectors such that . Then, we can write this equation as:

This means that and are scalar multiples of each other, with opposite directions. Therefore, a and b are collinear, i.e., they lie on the same line.

Thus, the correct answer is option (c).

Difficulty Level- Easy

Bloom’s Taxonomy- Understand

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**Q244) Which of the following is true about the dot product of two perpendicular vectors?**

a) It is zero

b) It is one

c) It is infinity

d) It is undefined

Correct Answer: Option (a)

Explanation: The dot product of two vectors is defined as the product of their magnitudes and the cosine of the angle between them. For two perpendicular vectors, the cosine of the angle between them is zero, since the angle between them is (or ) and the cosine of is zero.

Thus, the dot product of two perpendicular vectors is:

Thus, the correct answer is option (a).

Difficulty Level - Easy

Bloom’s Taxonomy- Remember

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**Q245) What is the angle between the vectors <1,2> and <3,4>?**

a) 45 degrees

b) 60 degrees

c) 90 degrees

d) 0.05 radians

Correct Answer: Option (d)

Explanation: The dot product of the two vectors is .

The magnitudes of the vectors are

The cosine of the angle between the vectors is

Then we get the angle to be approximately 0.05 radians.

Thus, the correct answer is option (d).

Difficulty Level - Hard

Bloom’s Taxonomy- Evaluate

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**Q246) Which of the following is true about the angle between two vectors a and b?**

a) It is equal to the cosine of the angle between their unit vectors.

b) It is equal to the sine of the angle between their unit vectors.

c) It is equal to the tangent of the angle between their unit vectors.

d) It is equal to the secant of the angle between their unit vectors.

Correct Answer: Option (a)

Explanation: The angle between two vectors a and b is defined as the smallest angle between the two vectors. We can find the cosine of the angle between the two vectors using the dot product formula:

where |a| and |b| are the magnitudes of the vectors a and b, and θ is the angle between the two vectors.

Dividing both sides of the equation by |a| |b|, we get:

Now, let's define the unit vectors and for vectors a and b, respectively:

where and are the normalized vectors (i.e., they have a magnitude of 1).

Using these unit vectors, we can rewrite the dot product as:

Substituting this into the cosine formula gives:

Therefore, the angle between two vectors a and b is equal to the cosine of the angle between their unit vectors and

Thus, the correct answer is option (a).

Difficulty Level - Hard

Bloom’s Taxonomy- Analyze

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**Q247) Which of the following statements regarding the cross product of two vectors a and b is true?**

a) It is a scalar.

b) It is commutative:

c) It is distributive:

d) It is perpendicular to both a and b.

Correct Answer: Option (d)

Explanation The cross product of two vectors a and b, denoted by , is a vector that is perpendicular to both and The magnitude of the cross product is given by:

where |a| and |b| are the magnitudes of the vectors a and b, respectively, and is the angle between the two vectors.

Thus, the correct answer is option (d).

Difficulty Level - Medium

Bloom’s Taxonomy- Evaluate

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**Q248) Which of the following is true about the projection of a vector a on a vector b?**

a) It is a vector that is parallel to b.

b) It is a vector that is perpendicular to b.

c) It is a scalar that measures the component of a in the direction of b.

d) It is a scalar that measures the component of b in the direction of a.

Correct Answer: Option (a)

Explanation: The projection of a vector a onto a vector b, denoted by is a vector that represents the component of a that lies in the direction of b.

To find the projection of a onto b, we can use the formula:

where · represents the dot product, and |b| is the magnitude of the vector b. The expressiongives us the scalar component of a in the direction of b, and multiplying it by b gives us a vector that is parallel to b.

Thus, the correct answer is option (a).

Difficulty Level - Hard

Bloom’s Taxonomy- Evaluate

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**Q249) Which of the following statements regarding the dot product of two vectors a and b is true?**

a) It is commutative: a · b = b · a.

b) It is distributive: a · (b + c) = a · b + a · c.

c) It is associative: a · (b · c) = (a · b) · c.

d) All of the above.

Correct Answer: Option (a)

Explanation: The dot product of two vectors a and b, denoted by , is a scalar that measures the degree to which the two vectors are aligned with each other. It is defined as the product of the magnitudes of the vectors and the cosine of the angle between them:

where |a| and |b| are the magnitudes of the vectors a and b, respectively, and θ is the angle between the two vectors. The dot product is commutative, meaning and are equal. This is because the cosine function is symmetric about and , so .

Thus, the correct answer is option (a).

Difficulty Level - Hard

Bloom’s Taxonomy- Evaluate

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**Q250) Which of the following is true about the cross product of two vectors a and b in three-dimensional space?**

a) It produces a vector that is perpendicular to both a and b.

b) Its magnitude is not equal to the product of the magnitudes of a and b times the size of the angle between them. `

c) It is un distributive: a × (b + c) = a × b + a × c.

d) All of them.

Correct Answer: Option (a)

Explanation: The cross product of two vectors a and b in three-dimensional space, denoted by a × b, is a vector that is perpendicular to both a and b. Its magnitude is equal to the product of the magnitudes of a and b times the sine of the angle between them:

where |a| and |b| are the magnitudes of the vectors a and b, respectively, and θ is the angle between the two vectors. Therefore the cross product of two vectors in three-dimensional space is a vector that is perpendicular to both a and b.

Thus, the correct answer is option (a).

Difficulty Level - Hard

Bloom’s Taxonomy- Analyze

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**Q251) Which of the following is the scalar product of two vectors?**

a) A × B

b) A . B

c) A - B

d) A + B

Correct Answer: Option (b)

Explanation: The scalar product of two vectors, also known as the dot product, is a binary operation that takes two vectors and returns a scalar. It is denoted by and is defined as:

where |A| and |B| are the magnitudes of the vectors A and B, respectively, and θ is the angle between the two vectors.

Thus, the correct answer is option (b).

Difficulty Level - Medium

Bloom’s Taxonomy- Understand

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**Q252) What is the vector product of two vectors?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: The vector product of two vectors, also known as the cross product, is a binary operation that takes two vectors and returns a vector. It is denoted by A × B and is defined as:

where |A| and |B| are the magnitudes of the vectors A and B, respectively, θ is the angle between the two vectors, and n is a unit vector perpendicular to both A and B in the direction given by the right-hand rule.

Thus, the correct answer is option (a).

Difficulty Level - Easy

Bloom’s Taxonomy- Evaluate

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**Q253) What is the projection of vector A on vector B?**

a)

b)

c)

d)

Correct Answer: Option (c)

Explanation: The projection of vector A onto vector B is a vector that represents the component of A that is parallel to B. It is denoted or and is given by:

where is the scalar product of vectors A and B, is the magnitude of vector B, and is a unit vector in the direction of B. The expression is used to find the component of vector A in the direction of a unit vector that makes an angle θ with A, where θ is the angle between A and the unit vector.

Thus, the correct answer is option (c).

Difficulty Level - Hard

Bloom’s Taxonomy- Analyze

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**Q254)** **Answer the following question with reference to the Audio**

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Type: Audio

**Which of the following is true for two perpendicular vectors?**

a) Their dot product is zero.

b) Their cross product is zero.

c) Their magnitudes are equal.

d) Their projections are equal.

Correct Answer: Option (a)

Explanation: Two vectors are said to be perpendicular or orthogonal if the angle between them is 90 degrees. If two vectors A and B are perpendicular to each other, then the cosine of the angle between them is zero. The dot product of vectors A and B is defined as

where θ is the angle between them. Therefore, if , then . Hence, the dot product of two perpendicular vectors is zero.

Thus, the correct answer is option (a).

Difficulty Level - Easy

Bloom’s Taxonomy- Analyze

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**Q255) Answer the following question with reference to the Audio**

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**Type: Audio**

**Which of the following is true for two parallel vectors?**

a) Their dot product is zero.

b) Their cross product is zero.

c) Their magnitudes are equal.

d) Their projections are equal.

Correct Answer: Option (d)

Explanation: Two vectors are said to be parallel if they are pointing in the same direction or in the opposite direction. If two vectors are parallel to each other, then their projections onto each other will be equal to their magnitude. Therefore, their projections will be equal.

Thus, the correct answer is option (d).

Difficulty Level - Medium

Bloom’s Taxonomy- Remember

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**Q256) If the cross product of two vectors is zero, which of the following statements is true?**

a) The two vectors are parallel.

b). The two vectors are coplanar.

c) The two vectors are collinear.

d) All the above

Correct Answer: Option (d)

Explanation: If the cross product of two vectors is zero, then the two vectors are either parallel or one of them has zero magnitude. If the two vectors are collinear, then their cross product is zero because the sine of the angle between them is zero. If the two vectors are coplanar, then their cross product is a vector that is perpendicular to both of them and is normal to the plane containing the two vectors. Therefore if the cross product of two vectors is zero, then the two vectors are either parallel, collinear, or coplanar.

Thus, the correct answer is option (d).

Difficulty Level - Hard

Bloom’s Taxonomy- Analyze

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**Q257) What is the unit vector in the direction of vector A?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: The unit vector in the direction of a vector A is defined as the vector that has the same direction as A, but has a magnitude of 1. It is denoted by ā.

The formula for the unit vector in the direction of A is given by:

Here, A is the vector whose unit vector is to be found, and is the magnitude of vector A.

Thus, the correct answer is option (a).

Difficulty Level - Medium

Bloom’s Taxonomy- Understand

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**Q258) What is the scalar triple product of three vectors?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: The scalar triple product of three vectors A, B, and C is defined as the dot product of the first vector with the cross product of the second and third vectors:

It is a scalar quantity that is used to determine whether the three vectors are coplanar or not. If the scalar triple product is equal to zero, then the three vectors are coplanar.

Thus, the correct answer is option (a).

Difficulty Level - Hard

Bloom’s Taxonomy- Understand

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**Q259) Which of the following is true for two vectors A and B?**

a) A ×  B = B ×  A

b)

c) A ×  B = -B ×  A

d) A . B = -B . A

Correct Answer: Option (b)

Explanation: The vector satisfy the condition of commulative property.This property is known as the commutative property of the dot product. The dot product is defined as the product of the magnitudes of the two vectors and the cosine of the angle between them. Since the cosine function is symmetric, that is, we have:

Therefore, the dot product is commutative, which means that the order of the vectors does not matter.

Thus, the correct answer is option (b).

Difficulty Level - Medium

Bloom’s Taxonomy- Remember

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**Q260) Which of the following is true for two vectors A and B?**

a) A ×  B = 0 if and only if A and B are parallel.

b) A . B = 0  if and only if A and B are perpendicular.

c) A ×  B = A . B if and only if A and B are perpendicular.

d) A x× B = A . B if and only if A and B are parallel.

Correct Answer: Option (b)

Explanation: The dot product of two vectors A and B is defined as:

where |A| and |B| are the magnitudes of A and B, and is the angle between them.

If A and B are perpendicular, then , which means that the dot product of A and B is zero.

Conversely, if the dot product of A and B is zero, then: Since |A| and |B| are positive, this equation can only be true if , which means that , and hence A and B are perpendicular.

Thus, the correct answer is option (b).

Difficulty Level - Very Hard

Bloom’s Taxonomy- Analyze

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**Q261) What is the magnitude of the vector**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: The magnitude of a vector in two-dimensional space is given by the formula:

where and are the components of the vector in the x and y directions, respectively.

In this case, the vector is so its magnitude is:

Thus, the correct answer is option (a).

Difficulty Level - Medium

Bloom’s Taxonomy- Evaluate

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**Q262) If a vector is multiplied by a scalar, what changes?**

a) Magnitude

b) Direction

c) Both magnitude and direction

d) None of the above

Correct Answer: Option (c)

Explanation: When a vector is multiplied by a scalar, only its magnitude and direction change. The magnitude of the vector is multiplied by the absolute value of the scalar, while the direction of the vector remains the same if the scalar is positive and is reversed if the scalar is negative. For example, if we have a vector and multiply it by a scalar of , the resulting vector would be which has the same direction as v but its magnitude is doubled.

Thus, the correct answer is option (c).

Difficulty Level - Medium

Bloom’s Taxonomy- Evaluate

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**Q263) Answer the following question with reference to the audio**

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**Type: Audio**

**What are unit vectors?**

a) Vectors that have zero magnitude

b) Vectors with a magnitude equal to one

c) Vectors with negative magnitudes

d) Vectors with infinite magnitudes

Correct Answer: Option (b)

Explanation: Unit vectors are vectors with a magnitude equal to one. They are typically used to indicate direction. For any non-zero vector, we can find a unit vector in the same direction by dividing the vector by its magnitude. Unit vectors are used to describe directions and orientations, and to simplify calculations involving vectors.

Thus, the correct answer is option (b).

Difficulty Level - Easy

Bloom’s Taxonomy- Remember

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**Q264) Find the scalar product of the vectors (-2,3) and (4,-5).**

a) -23

b) -7

c) 23

d) 7

Correct Answer: Option (a)

Explanation: The scalar product of two vectors A and B is defined as:

where |A| and |B| are the magnitudes of vectors A and B, and θ is the angle between them.

The given vectors are and

To find the scalar product of these vectors, we need to first find the magnitudes of the vectors and the angle between them.

To find the angle between the vectors, we can use the dot product formula:

Thus, the correct answer is option (a).

Difficulty Level - Medium

Bloom’s Taxonomy- Evaluate

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**Q265) What is the angle between two perpendicular vectors?**

a) 0°

b) 45°

c) 90°

d) 180°

Correct Answer: Option (c)

Explanation The angle between two perpendicular vectors is 90°.

When two vectors are perpendicular to each other, their dot product is zero, which means that the cosine of the angle between them is zero. Recall that the dot product of two vectors A and B is given by:

where θ is the angle between A and B.

So if A and B are perpendicular, then , which means that . Therefore, the angle between two perpendicular vectors is

Thus, the correct answer is option (c).

Difficulty Level - Medium

Bloom’s Taxonomy- Evaluate

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**Q266) In the vector addition of two vectors, if the resultant vector is perpendicular to one of the vectors, what is the angle between the two vectors?**

a) 0°

b) 45°

c) 90°

d) 180°

Correct Answer: Option (c)

Explanation: When the resultant vector is perpendicular to one of the vectors, it means that the other vector is projected onto the first vector in a direction perpendicular to the first vector. This projection creates a right triangle between the two vectors and the resultant vector. In a right triangle, the angle between the two sides that form the right angle is always 90°. Therefore, if the resultant vector is perpendicular to one of the vectors, then the angle between the two vectors is 90°.

Thus, the correct answer is option (c).

Difficulty Level - Hard

Bloom’s Taxonomy- Analyze

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**Q267) What is the result of two parallel vectors' cross product?**

a) Zero

b) Undefined

c) Infinite

d) None of the above

Correct Answer: Option (a)

Explanation: The result of two parallel vectors' cross product is always zero.

The magnitude of the cross product of two vectors A and B is given by:

where is the angle between A and B. If A and B are parallel, then theta is either 0 or 180 degrees.

If theta is 0 degrees, then is 0 and the cross product is zero. If is 180 degrees, then is also 0 and the cross product is again zero.

Thus, the correct answer is option (a).

Difficulty Level - Medium

Bloom’s Taxonomy- Evaluate

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**Q268) What is the projection of the vector (2,3) on the vector (-1,2)?**

a) (1,2)

b) (-2,1)

c) (2,-3)

d) (3,2)

Correct Answer: Option (b)

Explanation: The projection of a vector A on a vector B is given by the formula:

The dot product A.B is:

The magnitude of B is:

So the projection of A onto B is:

Simplifying, we get:

Thus, the correct answer is option (b).

Difficulty Level - Hard

Bloom’s Taxonomy- Evaluate

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**Q269) If two vectors are orthogonal, what is the dot product of the vectors?**

a) 0

b) 1

c) -1

d) None of the above

Correct Answer: Option (a)

Explanation: If two vectors are orthogonal, then their dot product is 0. When two vectors are orthogonal, their is 90 degrees where θ is the angle between the two vectors, and the cosine of 90 degrees is 0. Therefore,

Thus, the correct answer is option (a).

Difficulty Level - Easy

Bloom’s Taxonomy- Evaluate

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**Q270) What is the magnitude of the vector <3, 4, 5>?**

a) 3

b)

c)

 d)

Correct answer: Option (d)

Explanation: The magnitude of a three-dimensional vector with components (x,y,z) is given by:

Therefore, for the vector we have:

Thus, the correct answer is an option (d).

Difficulty level - Medium

Bloom’s Taxonomy- Evaluate

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**Q271) What is the scalar projection of vector A onto vector B?**

a)

b)

c)

d)

Correct answer: Option (c)

Explanation: The scalar projection of vector A onto vector B is given by the formula:

where is the dot product of vectors A and B, and |B| is the magnitude of vector B.

The dot product of two vectors A and B is defined as:

where |A| and |B| are the magnitudes of vectors A and B, and is the angle between them.

Substituting the dot product formula into the scalar projection formula, we get:

Therefore, the scalar projection of vector A onto vector B is simply the magnitude of vector A multiplied by the cosine of the angle between vectors A and B.

Thus, the correct answer is an option (c).

Difficulty level - Very Hard

Bloom’s Taxonomy- Evaluate

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**Q272) Answer the following question with reference to the Audio**

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**Type: Audio**

**Which statement about a unit vector is accurate?**

a) Its magnitude is 1

b) Its magnitude can be any positive number

c) Its direction is arbitrary

d) Its direction is fixed

Correct answer: option (a)

Explanation: A unit vector is defined as a vector that has a magnitude or length of 1. It is a vector that has been normalized to have a length of 1 without changing its direction. The direction of a unit vector is not arbitrary, but rather it is fixed and points in the same direction as the original vector.

Thus, the correct answer is an option (a)

Difficulty level - Medium

Bloom’s Taxonomy- remember

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**Q273) What is the vector projection of vector A onto vector B?**

a)

b)

c)

d)

Correct answer: Option (d)

Explanation: The vector projection of vector A onto vector B is given by:

where represents the dot product and |B| represents the magnitude of vector B.

This formula essentially involves scaling the vector B by the cosine of the angle between A and B, which gives the length of the projection of A onto B. Then, multiplying this length by the unit vector in the direction of B gives the vector projection

Thus, the correct answer is option (d).

Difficulty level - Hard

Bloom’s Taxonomy- Remember

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**Q274) Answer the following with reference to the audio**

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**Type: Audio**

**A vector quantity is which of the following?**

a)Temperature

b) Energy

c) Momentum

d)Pressure

Correct answer: Option (c)

Explanation: A vector quantity is a quantity that has both magnitude and direction. Examples of vector quantities include displacement, velocity, acceleration, force, momentum, and electric field. Momentum is a vector quantity as it has both magnitude and direction. It is defined as the product of mass and velocity of an object, and its direction is the same as that of its velocity.

Thus the correct answer is option (c).

Difficulty level - Medium

Bloom’s Taxonomy- Analyze

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**Q275) Which of the following claims about a vector is true?**

a) A vector is a type of scalar quantity.

b) A single number can be used to represent a vector.

c) A vector's magnitude and direction are both present.

d) A vector only possesses magnitude.

Correct answer: Option (c)

Explanation: A vector is a quantity that has both magnitude and direction. It can be represented by an arrow, with the length of the arrow representing the magnitude and the direction of the arrow representing the direction of the vector. A single number cannot represent a vector, as it requires both magnitude and direction to be fully described.

Thus, the correct answer is (c).

Difficulty level - Easy

Bloom’s Taxonomy- Analyze

$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ **Q276) Answer the following question with reference to the Audio**

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**Type: Audio**

**Which of the following operations can be applied to two vectors?**

a) Addition

b) Subtraction

c) Multiplication

d) All of the above

Correct Answer: Option (d)

Explanation: All of the given operations (addition, subtraction, and multiplication) can be applied to two vectors. When two vectors are added, their corresponding components are added separately Similar to addition, when two vectors are subtracted, their corresponding components are subtracted separately. There are two types of multiplication that can be applied to two vectors: the dot product and the cross product.

Thus, the correct answer is (d)

Difficult Level- Easy

Bloom’s Taxonomy- Understand

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**Q277) Answer the following question with reference to the Audio**

[**https://drive.google.com/file/d/1aUGNJeiae\_jCIV28L3gMqKl04p-qFr3j/view?usp=share\_link**](https://drive.google.com/file/d/1aUGNJeiae_jCIV28L3gMqKl04p-qFr3j/view?usp=share_link)

**Type: Audio**

**Which of the following is a scalar quantity?**

a) Velocity

b) Force

c) Temperature

d) Acceleration

Correct Answer: Option (c)

Explanation: Scalar quantity is a quantity that has only magnitude and no direction. Among the given options, temperature is the only scalar quantity. Temperature only has magnitude and does not have a direction associated with it.

Thus, the correct answer is (c)

Difficult Level- Easy

Bloom’s Taxonomy- Understand

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**Q278) What is the dot product of the vectors (2, 3) and (-4, 1)?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: The dot product of two vectors is the sum of the products of their corresponding components.

Therefore, the dot product of the vectorsand is .

Thus, the correct answer is (a)

Difficult Level- Easy

Bloom’s Taxonomy- Evaluate

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**Q279) Answer the following question with reference to the Audio**

[**https://drive.google.com/file/d/1fRIJfjZyHPTHbfw4cYCujzMD4BrPo9vS/view?usp=share\_link**](https://drive.google.com/file/d/1fRIJfjZyHPTHbfw4cYCujzMD4BrPo9vS/view?usp=share_link)

**Type: Audio**

**Which of the following is a vector quantity?**

a) Density

b) Pressure

c) Velocity

d) Temperature

Correct Answer: Option (c)

Explanation: A vector quantity has both magnitude and direction, and can be represented by a mathematical vector. Examples of vector quantities include displacement, velocity, acceleration, force, and momentum. Velocity is a vector quantity, as it has both magnitude (speed) and direction (the direction of motion).

Thus, the correct answer is (a)

Difficult Level- Easy

Bloom’s Taxonomy- Analyze

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**Q280) What is the cross product of two vectors?**

a) The product of the magnitudes of the vectors

b) The sum of the components of the vectors

c) The angle between the vectors

d) A vector perpendicular to the two vectors

Correct Answer: Option (d)

Explanation: The cross product of two vectors is a vector that is perpendicular to both of the original vectors. It is also known as the vector product. The magnitude of the cross product is equal to the product of the magnitudes of the two vectors multiplied by the sine of the angle between them. Mathematically, if we have two vectors A and B, their cross product is denoted as A x B, and it is calculated as:

Thus, the correct answer is (d)

Difficult Level- Medium

Bloom’s Taxonomy- Understand

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**Q281) Answer the following question with reference to the audio**

[**https://drive.google.com/file/d/1vhWI2adZUGkUJ1RvvGVyuemhx9tj38io/view?usp=share\_link**](https://drive.google.com/file/d/1vhWI2adZUGkUJ1RvvGVyuemhx9tj38io/view?usp=share_link)

**Type: Audio**

**What is the Purpose of an Isometric drawing?**

a) To represent a three-dimensional object in two dimensions

b) To create a perspective view of an object

c) To show the hidden lines of an object

d) To create a detailed engineering drawing

Correct Answer: Option (a)

Explanation: Isometric drawing is a type of pictorial drawing that shows the three-dimensional object in two dimensions. The present vertical line and the connected horizontal lines combine to generate the three axes. An isometric graphic displays the three dimensions of width, height, and depth. 01

Thus, the correct answer is option (a)

Difficulty Level- Hard

Bloom’s Taxonomy- Understand

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**Q282) Answer the following question with reference to the audio**

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**Type: Audio**

**What is the Purpose of a Section View?**

a) To Show the Overall shape of an object

b) To show the hidden lines of an object

c) To display internal features of an object

d) To create a perspective view of an object

Correct Answer: Option (c)

Explanation: Section view is a type of drawing used to display the internal features of an object. Sketching the object as it would appear if it were cut apart allows for a clearer portrayal of the interior when an object grows more complex, as in the instance of an automobile engine block. In this manner, the sketch's numerous concealed lines are removed.

Thus, the correct answer is option (c)

Difficulty Level- Medium

Bloom’s Taxonomy- Remember

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**Q283) What is the Purpose of an exploded view?**

a) To display internal features of an object

b) To show the overall shape of an object

c) To create a perspective view of an object

d) To show the individual parts of an object and how they fit together

Correct Answer: Option (d)

Explanation: An exploded view is a type of drawing used to show the individual parts of an object and how they fit together. A form of drawing that demonstrates the proposed assembly of mechanical or other pieces is an exploded-view drawing. It demonstrates how each component of the assembly fits with the others. In mechanical systems, the component closest to the centre is typically constructed first or serves as the focal point for the assembly of the other components.

Thus, the correct answer is option (d).

Difficulty Level- Hard

Bloom’s Taxonomy- Understand

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**Q284) What is the Purpose of a detail View?**

a) To show the overall shape of an object

b) To display internal features of an object

c) To create a perspective view of an object

d) To show a specific part of an object in more detail

Correct Answer: Option (d)

Explanation: A detail view is a type of drawing used to show a specific part of an object in more detail. They can be seen on the majority of sectional views and serve to highlight the surface that the cutting plane has exposed. Due to the fact that it was not altered by sectioning, the square hole in the object has no section lining.

Thus, the correct answer is option (d).

Difficulty Level- Hard

Bloom’s Taxonomy- Remember

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**Q285)** **Answer the following question with reference to the audio**

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Type: Audio

**What is the Purpose of a Perspective View?**

a) To show the overall shape of an object

b) To display internal features of an object

c) To create a three-dimensional representation of an object

d) To show a specific part of an object in more detail

Correct Answer: Option (c)

Explanation: Perspective view is a type of drawing used to create a three-dimensional representation of an object. Orthographic projection is a popular technique for depicting three-dimensional things. It typically consists of three two-dimensional drawings, each of which shows the object as seen from parallel lines perpendicular to the drawing's plane.

Thus, the correct answer is option (c)

Difficulty Level- Hard

Bloom’s Taxonomy- Understand

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**Q286) Answer the following question with reference to the Audio**

[**https://drive.google.com/file/d/11XAauq8tI6YhZXAK3jrG9apJW3vof0O0/view?usp=share\_link**](https://drive.google.com/file/d/11XAauq8tI6YhZXAK3jrG9apJW3vof0O0/view?usp=share_link)

**Type: Audio**

**What is the Purpose of a Scale Drawing?**

a) To create a perspective view of an object

b) To show the hidden lines of an object

c) To represent a three-dimensional object in two dimensions

d) To show the actual size of an object

Correct Answer: Option (c)

Explanation: A scale drawing is a type of drawing used to represent a three-dimensional object in two dimensions.

A net in geometry is a means to draw a polyhedron by connecting all of its faces into a single, connected polygon on a 2D surface, such as wrapping paper. The 3D item that it symbolises might then be created by cutting and folding it.

Thus, the correct answer is option (c)

Difficulty Level- Medium

Bloom’s Taxonomy- Analyze

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**Q287) What is the Purpose of Technical Drawing?**

a) To create a realistic representation of an object

b) To show the overall shape of an object

c) To provide detailed information about an object

d) To create a perspective view of an object

Correct Answer: Option (c)

Explanation: Technical drawing is a type of drawing used to provide detailed information about an object.

An object exposes its activity through methods and keeps its state in fields (variables in some programming languages) (functions in some programming languages). The main means of communication between objects is through methods, which act on an object's internal state.

Thus, the correct answer is option (c)

Difficulty Level- Hard

Bloom’s Taxonomy- Understand

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**Q288) What is the Purpose of Working Drawing?**

a) To show the overall shape of an object

b) To create a perspective view of an object

c) To provide detailed information about an object for manufacturing

d) To create a realistic representation of an object

Correct Answer: Option (c)

Explanation: Working drawing is a type of drawing used to provide detailed information about an object for manufacturing. Manufacturing enables companies to sell completed goods for more money than they paid for the raw materials. Mass production of commodities using assembly line techniques and cutting-edge technologies is made possible by large-scale manufacturing.

Thus, the correct answer is option (c)

Difficulty Level- Medium

Bloom’s Taxonomy- Analyze

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**Q289) Answer the following question with reference to the audio**

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**Type: Audio**

**What is the purpose of using wireframe models in 3D graphics?**

a) To represent a solid object with the help of lines and curves

b) To create a 3D object using mesh topology

c) To apply textures and materials to a 3D object

d) To generate realistic lighting and shadows in a scene

Correct Answer: Option (a)

Explanation: Wireframe models are used to represent a 3D object using lines and curves. They are often used as a preliminary step in the 3D modelling process to create a rough outline of the object. Solid shapes are nothing more than solids with three dimensions—height, width, and length. 3D shapes are another name for solid shapes. These substantial forms take up room and are ubiquitous in daily life.

Thus, the correct answer is option (a)

Difficulty Level- Hard

Bloom’s Taxonomy- Analyze

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**Q290) Answer the following question with reference to the Audio**

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**Type: Audio**

**What is the Primary purpose of Computer-aided design (CAD) Software?**

a) To Create 3D models for virtual reality environments

b) To Stimulate Physical process and scientific phenomena

c) To aid in product design and development

d) To edit and manipulate photos and other digital images

Correct Answer: Option (c)

Explanation: CAD software is used to create digital models of physical models of physical objects that can be tested and refined before they are manufactured. While it may be used in conjunction with virtual reality or scientific simulations, its primary purpose is to assist in product design and development. It is not used to edit digital images.

Thus, the correct answer is option (c).

Difficulty Level- Hard

Bloom’s Taxonomy- Understand

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**Q291) Answer the following question with reference to the Audio**

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**Type: Audio**

**What is the purpose of UV mapping in 3D graphics?**

a) To create a 3D object using mesh topology

b) To apply textures and materials to a 3D object

c) To generate realistic lighting and shadows in a scene

d) To create wireframe models of a 3D object

Correct Answer: Option (b)

Explanation: UV mapping is the process of mapping a 2D image onto a 3D object's surface. It is used to apply textures and materials to a 3D object.

The colour and sheen or dullness of an object are determined by the substance from which it is made. A texture is a pattern that alters a material's otherwise homogeneous look. In the real world, there are very few items with perfectly uniform surfaces.

Thus, the correct answer is option (b)

Difficulty Level- Medium

Bloom’s Taxonomy- Remember

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**Q292)  Answer the following question with reference to the Audio**

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**Type: Audio**

**What is the purpose of key frame animation in 3D graphics?**

a) To create a 3D object using mesh topology

b) To generate realistic lighting and shadows in a scene

c) To create wireframe models of a 3D object

d) To create smooth motion in an animation

Correct Answer: Option (d)

Explanation: An animation method called key frame animation is used to produce fluid movements. To produce a smooth motion, it entails placing key frames at precise periods in time and allowing the computer to fill in the gaps between the frames. The key frame of an animation is a frame when we specify changes. Each frame acts as a key frame as we create the animation frame by frame.

Thus, the correct answer is option (d)

Difficulty Level- Medium

Bloom’s Taxonomy- Understand

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**Q293) What is the purpose of rigging in 3D graphics?**

a) To generate realistic lighting and shadows in a scene

b) To create a 3D object using mesh topology

c) To create wireframe models of a 3D object

d) To create a skeletal structure for a 3D character

Correct Answer: Option (d)

Explanation: Rigging is the process of creating a skeletal structure for a 3D character. It allows the character to move realistically and be animated easily. The process of giving a 3D object a skeleton so it can move is known as 3D rigging. Characters are typically rigged before they are animated because without a rig, a character model cannot be distorted or moved.

Thus, the correct answer is option (d)

Difficulty Level- Hard

Bloom’s Taxonomy- Understand

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**Q294) What is the purpose of subdivision surfaces in 3D graphics?**

a) To create a 3D object using mesh topology

b) To apply textures and materials to a 3D object

c) To generate realistic lighting and shadows in a scene

d) To create smooth curves and surfaces in a 3D object

Correct Answer: Option (d)

Explanation: Subdivision surfaces are used to create smooth curves and surfaces in a 3D object. They work by dividing the polygons of a 3D object into smaller polygons to create a smoother surface.

Cones and cylinders are examples of 3D shapes that feature curved surfaces in addition to flat surfaces. Two flat surfaces and one curved surface make up a cylinder. A cone features a curved surface in addition to one flat one.

Thus, the correct answer is option (d)

Difficulty Level- Medium

Bloom’s Taxonomy- Understand

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**Q295) Answer the following question with reference to the Audio**

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**Type: Audio**

**What is the purpose of global illumination in 3D graphics?**

a) To create a 3D object using mesh topology

b) To generate realistic lighting and shadows in a scene

c) To create wireframe models of a 3D object

d) To apply textures and materials to a 3D object

Correct Answer: Option (b)

Explanation Global illumination is a technique used in 3D graphics to simulate the way light interacts with objects in a scene. It calculates the indirect illumination in a scene, which includes the light that bounces off surfaces and illuminates other objects in the scene. This creates more realistic lighting and shadows in a 3D scene, making it look more natural and lifelike.

Thus, the correct answer is option (b)

Difficulty Level- Hard

Bloom’s Taxonomy- Understand

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**Q296) Which of the below is the main reason why 3D models are made?**

a) To entertain viewers

b) To visually represent complex concepts

c) To make images look more realistic

d) To create abstract art

Correct Answer: Option (b)

Explanation: The primary purpose of creating 3D models is to provide a visual representation of complex concepts, designs or structures that may be difficult to understand through 2D drawings or images. This enables easier comprehension and visualization of complex information.

Thus, the correct answer is option (b).

Difficulty Level- Hard

Bloom’s Taxonomy- Analyze

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**Q297) Answer the following question with reference to the audio**

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**Type: Audio**

**What is the purpose of texturing in 3D modeling?**

a) To give the model some color

b) To create realistic surface characteristics

c) To add lighting effects

d) To create animation

Correct Answer: Option (b)

Explanation: Texturing in 3D modeling involves adding a surface texture to the model to create a realistic appearance. This includes adding details such as roughness, smoothness, and reflectivity to the surfaces of the model, giving it a more natural and believable appearance.

Thus, the correct answer is option (b).

Difficulty Level- Medium

Bloom’s Taxonomy- Understand

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**Q298) What does 3D printing primarily serve?**

a) To create models for video games

b) To create toys for children

c) To produce customized parts and objects

d) To create artwork

Correct Answer: Option (c)

Explanation: The primary purpose of 3D printing is to produce customized parts and objects that may be difficult or expensive to manufacture using traditional manufacturing methods. This includes creating prototypes, replacement parts, and custom designs for a variety of applications.

Thus, the correct answer is option (c).

Difficulty Level- Medium

Bloom’s Taxonomy- Understand

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**Q299) Which of the following is a common use of 3D modeling in the field of medicine?**

a) Creating virtual reality games

b) Designing clothing and accessories

c) Producing customized prosthetic limbs

d) Creating abstract art

Correct Answer: Option (c)

Explanation: 3D modeling is commonly used in the field of medicine to create customized prosthetic limbs, implants, and other medical devices. This allows for precise customization and fitting, resulting in better outcomes for patients.

Thus, the correct answer is option (c).

Difficulty Level- Hard

Bloom’s Taxonomy- Analyze

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**Q300) What is the purpose of rendering in 3D modeling?**

a) To create animation

b) To add textures and lighting effects

c) To convert a 3D model into a 2D image or video

d) To create 3D printed models

Correct Answer: Option (c)

Explanation: Rendering in 3D modeling involves converting a 3D model into a 2D image or video, with added textures, lighting, and other effects to create a realistic or stylized appearance. This is commonly used in film, video games, and advertising to create realistic or visually appealing images and animations.

Thus, the correct answer is option (c).

Difficulty Level- Hard

Bloom’s Taxonomy- Understand

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**Q301) Answer the following question with reference to the Audio**

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**Type: Audio**

**What does the term "3D" refer to?**

a) Three dimensions

b) Three dots

c) Three directions

d) Three designs

Correct Answer: Option (a)

Explanation: 3D refers to the representation of objects or scenes in a three-dimensional space that includes length, width, and depth. The concept of three dimensions is based on the Cartesian coordinate system, where each point in space is represented by three numbers that correspond to its position along the x, y, and z axes.

Thus, the correct answer is option (a).

Difficulty Level- Easy

Bloom’s Taxonomy- Understand

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**Q302) Which of the following is not a method for creating 3D models?**

a) Extrusion

b) Revolve

c) Transform

d) Sweep

Correct Answer: Option (c)

Explanation: Extrusion, revolve, and sweep are all methods for creating 3D models, but "transform" is not a specific method in 3D modeling. Extrusion is a method where a 2D shape is extended into a 3D shape by pulling it along a straight line or path. Revolve is a method where a 2D shape is rotated around an axis to create a 3D shape. Sweep is a method where a 2D shape is moved along a path or trajectory to create a 3D shape.

Thus, the correct answer is option (c).

Difficulty Level- Hard

Bloom’s Taxonomy- Remember

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**Q303) Answer the following question with reference to the Audio**

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**Type: Audio**

**What is the difference between 2D and 3D design?**

a) 2D design has two dimensions, while 3D design has three dimensions

b) 2D design is flat, while 3D design has depth and volume

c) 2D design is black and white, while 3D design is full-color

d) 2D design is used for print media, while 3D design is used for digital media

Correct Answer: Option (b)

Explanation: The key difference between 2D and 3D design is that 2D designs are flat and lack depth, while 3D designs have depth and volume. 2D designs are primarily used for print media, such as magazines, newspapers, and brochures, while 3D designs are used primarily for digital media, such as video games, virtual reality experiences, and 3D printing.

Thus, the correct answer is option (b).

Difficulty Level- Medium

Bloom’s Taxonomy- Understand

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**Q304) Answer the following question with reference to the Audio**

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**Type: Audio**

**What is a polygon?**

a) A type of 3D modeling software

b) A 3D shape with flat sides and straight edges

c) A texture used in 3D design

d) A type of animation used in 3D modeling

Correct Answer: Option (b)

Explanation: In 3D modeling, a polygon is a basic building block used to create 3D shapes. A polygon is a 3D shape made up of flat sides and straight edges that is commonly used in 3D modeling to create the faces of 3D shapes. Polygons can be manipulated and combined to create complex 3D models, and are a fundamental building block of 3D design.

Thus, the correct answer is option (b).

Difficulty Level- Medium

Bloom’s Taxonomy- Remember

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**Q305) What is a texture map in 3D design?**

a) A method for adding color to a 3D model

b) A method for creating a 3D model from a 2D image

c) A way to add texture to a 3D model's surface

d) A method for animating a 3D model

Correct Answer: Option (c)

Explanation: In 3D design, a texture map is a 2D image that is applied to a 3D model's surface to create the appearance of texture. Texture maps can be used to simulate a variety of surface qualities, such as roughness, smoothness, reflectivity, and transparency. They can also be used to add details like scratches, dents, or patterns to a 3D model's surface.

Thus, the correct answer is option (c).

Difficulty Level- Hard

Bloom’s Taxonomy- Understand

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**Q306) Answer the following question with reference to the Audio**

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**Type: Audio**

**What is a mesh in 3D modeling?**

a) A type of lighting used in 3D design

b) A wireframe structure used to build 3D models

c) A type of animation used in 3D modeling

d) A texture used to add detail to a 3D model's surface

Correct Answer: Option (b)

Explanation: In 3D modeling, a mesh is a wireframe structure that represents the geometry of a 3D object. A mesh is made up of interconnected points (vertices), edges, and faces (polygons). Meshes are the foundation of 3D models, and they can be manipulated and transformed to create complex shapes and designs.

Thus, the correct answer is option (b).

Difficulty Level- Hard

Bloom’s Taxonomy- Understand

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**Q307) Answer the following question with reference to the Audio**

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**Type: Audio**

**Which of the following is NOT a common file format for 3D models?**

a) .obj

b) .stl

c) .gif

d) .fbx

Correct Answer: Option (c)

Explanation: A file format is a standardized way of encoding data for storage or transmission. In 3D modeling, different file formats are used to store and exchange 3D models between different software programs and platforms. The most commonly used file formats for 3D models include .obj, .stl, and .fbx. Each file format has its own strengths and weaknesses, and choosing the right format depends on the specific requirements of the project and the software being used.

Thus, the correct answer is option (c).

Difficulty Level- Medium

Bloom’s Taxonomy- Analyze

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**Q308) What is the process of creating a 3D model from a series of photographs called**?

a) Photogrammetry

b) 3D Scanning

c) Modeling from Scratch

d) CAD

Correct Answer: Option (a)

Explanation: Photogrammetry is the process of creating a 3D model from a series of photographs. In this process, photographs of an object or a scene are taken from different angles, and then software is used to analyze the photographs and create a 3D model. The software identifies common points in the photographs and uses them to calculate the position and orientation of the camera for each photograph

Thus, the correct answer is option (a).

Difficulty Level- Medium

Bloom’s Taxonomy- Understand

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**Q309) Answer the following question with reference to the audio**

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**Type: Audio**

**Which of the following is NOT a common method of 3D printing?**

a) FDM

b) SLS

c) DLP

d) VR

Correct Answer: Option (d)

Explanation: VR (Virtual Reality) is not a method of 3D printing. VR is a technology that allows users to experience a computer-generated 3D environment as if it were real. It typically involves wearing a headset that tracks the user's movements and displays images in 3D.

Thus, the correct answer is option (d).

Difficulty Level- Medium

Bloom’s Taxonomy- Analyze

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**Q310) Which of the following is NOT a benefit of 3D printing?**

a) Reduced production costs

b) Faster production times

c) Higher quality prints than traditional manufacturing methods

d) Limited design possibilities

Correct Answer: Option (d)

Explanation: 3D printing offers numerous benefits, including reduced production costs, faster production times, and higher quality prints than traditional manufacturing methods. It also offers greater design possibilities and flexibility. Therefore Limited design possibilities in not in 3D printing

Thus, the correct answer is option (d).

Difficulty Level- Medium

Bloom’s Taxonomy- Analyze

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**Q311) Answer the following question with reference to the Audio**

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**Type: Audio**

**Which of the following is a software commonly used for 3D modeling?**

a) Adobe Photoshop

b) Blender

c) Microsoft Word

d) Google Chrome

Correct Answer: Option (b)

Explanation: Blender is a free and open-source 3D creation software that can be used for creating 3D models, animations, visual effects, and video games. It has a comprehensive set of tools for modeling, sculpting, texturing, lighting, and rendering 3D objects.

Thus, the correct answer is option (b).

Difficulty Level- Medium

Bloom’s Taxonomy- Understand

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**Q312) Which of the following is NOT a common application of 3D printing?**

a) Medical implants

b) Aerospace components

c) Fast food packaging

d) Jewellery

Correct Answer: Option (c)

Explanation: 3D printing, also known as additive manufacturing, is a process of creating physical objects from a digital model by layering material one layer at a time. 3D printing is used to create custom-made implants such as dental implants, orthopaedic implants, and prosthetics. 3D printing is used to create lightweight and complex aerospace components, such as rocket engine parts, turbine blades, and satellite parts. While 3D printing is used in many industries, it is not commonly used for fast food packaging.

Thus, the correct answer is option (c).

Difficulty Level- Hard

Bloom’s Taxonomy- Analyze

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**Q313) Which of the following is NOT a type of 3D modelling?**

a) Mesh modelling

b) Surface modelling

c) Solid modelling

d) Vector modelling

Correct Answer: Option (d)

Explanation: 3D modelling is the process of creating a three-dimensional representation of an object or scene using specialized software. While mesh modelling, surface modelling, and solid modelling are common types of 3D modelling, Vectors are often used in 2D graphics to define shapes using mathematical equations and are not typically used for creating complex 3D models.

Thus, the correct answer is option (d).

Difficulty Level- Hard

Bloom’s Taxonomy- Analyze

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**Q314) Which of the following is a popular website for sharing 3D models?**

a) Instagram

b) Facebook

c) Sketch fab

d) LinkedIn

Correct Answer: option (c)

Explanation: Sketch fab is a platform for sharing, viewing, and embedding 3D models. It allows users to upload their 3D models in various formats such as OBJ, FBX, and STL, and share them with others. Sketch fab also provides tools for embedding 3D models on websites, blogs, and social media.

Thus, the correct answer is option (c).

Difficulty Level- Medium

Bloom’s Taxonomy- Analyze

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**Q315) What is the process of smoothing out the edges of a 3D model called?**

a) Extrusion

b) Subdivision

c) Boolean

d) Bevelling

Correct Answer: Option (d)

Explanation: Bevelling is a process that involves rounding or chamfering the edges of a 3D model to make them smoother and less sharp. This technique is often used to create a more polished and professional look for 3D models. Bevelling is usually done by selecting the edges of a 3D model and applying a bevel operation. This operation involves creating additional faces around the edges to create a smooth transition between the edges and the adjacent faces.

Thus, the correct answer is option (d).

Difficulty Level- Very Hard

Bloom’s Taxonomy- Understand

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**Q316) Which of the following is a technique used to create organic 3D models?**

a) Box modelling

b) Sculpting

c) Extrusion modelling

d) Parametric modelling

Correct Answer: Option (b)

Explanation Sculpting allows artists to create 3D models by molding and shaping virtual clay in a way that mimics real-world sculpting. Box modelling, extrusion modelling, and parametric modelling are different techniques used to create 3D models, but they are not typically used for organic shapes..

Thus, the correct answer is option (b).

Difficulty Level- Hard

Bloom’s Taxonomy- Analyze

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**Q317) Answer the following question with reference to the Audio**

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**Type: Audio**

**Which of the following is not a type of 3D animation?**

a) Stop-motion animation

b) Cell animation

c) Motion graphics

d) Brick film animation

Correct Answer: Option (b)

Explanation: Cell animation is a traditional animation technique that involves creating hand-drawn or painted images on transparent sheets called cells, which are then photographed and played back in sequence to create the illusion of motion. This technique is not used in 3D animation, as it is a 2D animation technique.

Thus, the correct answer is option (b).

Difficulty Level- Hard

Bloom’s Taxonomy- Analyze

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**Q318) Answer the following question with reference to the Audio**

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**Type: Audio**

**Which of the following is not a common use of 3D printing?**

a) Prototyping

b) Jewellery making

c) Medical implants

d) Cooking food

Correct Answer: Option (d)

Explanation: 3D printing is not commonly used for cooking food. 3D printing is a process of creating three-dimensional objects from a digital file. It has many applications across a wide range of industries, including prototyping, jewellery making, and medical implants.

Thus, the correct answer is option (d).

Difficulty Level- Hard

Bloom’s Taxonomy- Analyze

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**Q319) Which of the following is not a 3D modelling tool?**

a) Brush

b) Pencil

c) Curve

d) Extrude

Correct Answer: Option (b)

Explanation: A pencil is a traditional tool used for drawing in 2D. It is not a 3D modelling tool, but brush is a 3D modelling tool used for sculpting and painting 3D models and curve tool used for creating 3D models by drawing curves and surfaces. And extrude tool used for creating 3D models by extending a 2D shape into a 3D object.

Thus, the correct answer is option (b).

Difficulty Level- Easy

Bloom’s Taxonomy- Analyze

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**Q320) Which of the following is a technique used for creating 3D models by adding and subtracting shapes?**

a) Sculpting

b) Extrusion modelling

c) Boolean modelling

d) Flat modelling

Correct Answer: Option (c)

Explanation: Boolean modelling is a technique used in 3D modelling to combine or subtract multiple shapes to create a complex 3D model. This technique is named after the Boolean algebra, which is a branch of mathematics that deals with logical operations on logical values.

Thus, the correct answer is option (c).

Difficulty Level- Medium

Bloom’s Taxonomy- Understand

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**Q321) Answer the following question with reference to the audio**

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**Type: Audio**

**What is the objective of linear programming?**

a) To minimize or maximize an objective function

b) To solve a system of equations

c) To find the slope of a line

d) To find the area of a circle

Correct Answer: Option (a)

Explanation: The linear programming is a mathematical technique used to find the best possible outcome or solution, given a set of constraints that are expressed as linear equations or inequalities. The objective function is the mathematical expression that represents the quantity to be optimized (i.e., minimized or maximized).

Thus, the correct answer is option (a)

Difficulty Level- Easy

Bloom’s Taxonomy- Understand

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**Q322) What is the graphical method of solving linear programming problems?**

a) Drawing the feasible region and identifying the optimal solution

b) Solving the equations algebraically

c) Using a computer program to find the optimal solution

d) None of the above

Correct Answer: Option (a)

Explanation: The graphical method of solving linear programming problems involves drawing the feasible region of the problem on a two-dimensional plane and identifying the optimal solution within that region. To use the graphical method, we first plot the constraints of the problem on the plane, creating a polygonal region that represents all feasible solutions. This region is called the feasible region, and it is defined by the intersection of the constraints.

Thus, the correct answer is option (a).

Difficulty Level- Medium

Bloom’s Taxonomy- Understand

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**Q323) What is the simplex method of solving linear programming problems?**

a) An algebraic method for solving linear programming problems

b) A graphical method for solving linear programming problems

c) A method for solving quadratic programming problems

d) A method for solving non-linear programming problems

Correct Answer: Option (a)

Explanation: The simplex method is an algebraic method for solving linear programming problems. The simplex method is an iterative procedure that starts with a basic feasible solution and systematically improves the solution until the optimal solution is found. The basic feasible solution is a feasible solution in which only a subset of the variables has non-zero values.

Thus, the correct answer is option (a).

Difficulty Level- Hard

Bloom’s Taxonomy- Analyze

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**Q324) Answer the following question with reference to the Audio**

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**Type: Audio**

**What is a slack variable in linear programming?**

a) A variable that represents the surplus or slack in a constraint

b) A variable that represents the objective function

c) A variable that represents the decision variables

d) A variable that is not needed

Correct Answer: Option (a)

Explanation: A slack variable in linear programming is a variable that represents the amount of surplus or slack in a constraint. In linear programming, constraints are expressed as linear equations or inequalities that limit the feasible solutions to a problem. In some cases, the constraints may be strict (i.e., the feasible region is a boundary), while in other cases, there may be some slack or surplus in the constraints (i.e., the feasible region is a larger region).

Thus, the correct answer is option (a).

Difficulty Level- Hard

Bloom’s Taxonomy- Understand

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**Q325) What is the difference between a feasible solution and an optimal solution in linear programming?**

a) A feasible solution satisfies all constraints, while an optimal solution maximizes or minimizes the objective function

b) A feasible solution maximizes or minimizes the objective function, while an optimal solution satisfies all constraints

c) A feasible solution violates some constraints, while an optimal solution satisfies all constraints

d) A feasible solution is not needed, while an optimal solution is necessary

Correct Answer: Option (b)

Explanation: The main difference between a feasible solution and an optimal solution in linear programming is that a feasible solution satisfies all constraints, while an optimal solution maximizes or minimizes the objective function. A feasible solution is any solution that satisfies all constraints, regardless of whether it maximizes or minimizes the objective function. On the other hand, an optimal solution is a feasible solution that maximizes or minimizes the objective function.

Thus, the correct answer is option (b).

Difficulty Level- Hard

Bloom’s Taxonomy- Analyze

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**Q326) Answer the following question with reference to the audio**

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**Type: Audio**

**What is a binding constraint in linear programming?**

a) A constraint that is satisfied at equality

b) A constraint that is not satisfied

c) A constraint that has no effect on the solution

d) A constraint that is not needed

Correct Answer: Option (a)

Explanation: A binding constraint is a constraint that is satisfied at equality in the optimal solution. This means that the optimal solution lies on the boundary of the feasible region defined by the binding constraint. Binding constraints define the shape and size of the feasible region and help to identify the optimal solution.

Thus, the correct answer is option (a).

Difficulty Level- Medium

Bloom’s Taxonomy- Understand

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**Q327) What is the primary use of linear programming in economics?**

a) To maximize profits and minimize costs

b) To forecast future market trends

c) To create demand-supply models

d) To measure elasticity of demand

Correct Answer: Option (a)

Explanation: One of the most common applications of linear programming in economics is in the optimization of production processes. Linear programming can be used to determine the optimal mix of inputs (e.g., labor, capital, and raw materials) needed to produce a given output at the minimum cost. The objective function of the linear programming model is typically to minimize the total cost of production, subject to constraints such as the availability of resources, the capacity of production facilities, and the demand for the product.

Thus , the correct answer is option (a).

Difficulty level- Medium

Bloom’s Taxonomy- Remember

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**Q328) How does linear programming help businesses in decision-making?**

a) By providing optimal solutions to complex problems

b) By creating non-linear relationships between variables

c) By predicting future market trends

d) By minimizing uncertainty in decision-making

Correct Answer: Option (a)

Explanation: The major benefits of linear programming in business is that it can provide an optimal solution to a complex problem. By optimizing a decision variable subject to constraints, linear programming can help businesses identify the best possible outcome, given the available resources and constraints. This can help businesses make informed decisions that are based on data-driven analysis and reduce uncertainty.

Thus, the correct answer is option (a).

Difficulty level- Hard

Bloom’s Taxonomy- analze

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**Q329) Which of the following is NOT a limitation of linear programming?**

a) The assumption of linearity

b) The inability to handle non-linear relationships

c) The reliance on quantitative data

d) The inability to solve multi-objective problems

Correct Answer: Option (d)

Explanation: Linear programming is a powerful tool for optimizing decision-making processes, but it does have some limitations. Linear programming has the limitations in terms of the assumption of linearity, the inability to handle non-linear relationships, and the inability to solve multi-objective problems. While the reliance on quantitative data is not a limitation of linear programming.

Thus, the correct answer is option (d).

Difficulty level- Medium

Bloom’s Taxonomy- Analyze

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**Q330) Answer the following question with reference to the audio**

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**Type: Audio**

**Which of the following is NOT an application of linear programming?**

a) Resource allocation

b) Transportation planning

c) Portfolio optimization

d) Predicting future market trends

Correct Answer: Option (d)

Explanation: Linear programming is a mathematical technique used to optimize a linear objective function, subject to a set of linear constraints. Linear programming has many practical applications, including resource allocation, transportation planning, and portfolio optimization. However, it is not a tool for predicting future market trends.

Thus, the correct answer is option (d)

Difficulty level- Medium

Bloom’s Taxonomy- Analyze

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**Q331) Answer the following question with reference to the Audio**

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**Type: Audio**

**Which of the following is not a method for solving linear programming problems?**

 a) Graphical method

 b) Simplex method

 c) Dual simplex method

 d) Factorization method

Correct Answer: Option (d)

Explanation: Linear programming problems can be solved using a variety of methods, including graphical method, simplex method, and dual simplex method.

Graphical method: This method is used for solving linear programming problems with two decision variables

Simplex method: This method is an algebraic method that is used for solving linear programming problems with any number of decision variables

Dual simplex method: This method is a variant of the simplex method that is used for solving linear programming problems with slack variables.

Thus, the correct answer is option (d)

Difficulty level- Medium

Bloom’s Taxonomy- Analyze

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**Q332) Answer the following question with reference to the Audio**

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**Type: Audio**

**What is the dual problem in linear programming?**

a) A problem that is obtained by interchanging the roles of the objective function and the constraints.

b) A problem that is obtained by taking the reciprocal of the objective function coefficients.

c) A problem that is obtained by adding slack variables to the constraints.

d) A problem that is obtained by multiplying the objective function by a scalar.

Correct Answer: Option (a)

Explanation: The dual problem in linear programming is a problem that is obtained by interchanging the roles of the objective function and the constraints. In other words, if we have a primal problem with an objective function to maximize and constraints, we can obtain a dual problem with constraints to maximize and an objective function

Thus, the correct answer is option (a)

Difficulty level- Hard

Bloom’s Taxonomy- Understand

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**Q333) In linear programming, what is a feasible solution?**

a) A solution that meets all the constraints of the problem.

b) A solution that maximizes the objective function.

c) A solution that minimizes the objective function.

d) A solution that violates some of the constraints of the problem

Correct Answer: Option (a)

Explanation: In linear programming, a feasible solution is a solution that satisfies all the constraints of the problem. And feasible solution is also a set of values for the decision variables that make all the constraints of the problem true.

Thus, the correct answer is option (a)

Difficulty level- Medium

Bloom’s Taxonomy- Remember

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**Q334) Answer the following question with reference to the Audio**

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**Type: Audio**

**Which of the following is a key element in linear programming?**

a) Maximization of profits

b) Minimization of cost

c) Optimization of a objective function

d) Solving quadratic equations

Correct answer: Option (c)

Explanation: Linear programming is a mathematical technique used to find the best solution from a set of feasible solutions that optimize a given objective function. The objective function represents the goal or objective of the problem, which is either to maximize profits or minimize costs or some other measure of performance.

Thus, the correct answer Is option (c)

Difficulty level- Hard

Bloom’s Taxonomy- Analyze

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**Q335) Which of the following is not a standard form constraint?**

a) ≤

b) ≥

c) =

d) >

Correct Answer: Option (d)

Explanation: Standard form constraints in linear programming problems are of the form ≤, ≥, or =. These constraints are used to define the feasible region, which is the set of all points that satisfy the constraints. The > symbol is not used in standard form constraints because it defines a strict inequality, which cannot be directly represented in the constraints.

Thus, the correct answer Is option (d)

Difficulty level- Medium

Bloom’s Taxonomy- Analyze

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**Q336) In a linear programming problem, the objective function is**

a) A linear function of the decision variables

b) A nonlinear function of the decision variables

c) A quadratic function of the decision variables

d) Not necessary for the problem

Correct Answer: Option (a)

Explanation: The goal of linear programming is to find the values of the decision variables that maximize or minimize the objective function subject to the constraints. This is typically done using optimization algorithms such as the simplex method or interior point methods.

Thus, the correct answer Is option (a)

Difficulty level- Medium

Bloom’s Taxonomy- Understand

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**Q337) If the optimal solution of a linear programming problem lies at a corner point of the feasible region, then the problem has:**

a) Multiple optimal solutions

b) No optimal solution

c) A unique optimal solution

d) None of the above

Correct Answer: Option (c)

Explanation: If the optimal solution lies at a corner point of the feasible region, then the problem has a unique optimal solution. This is because the objective function is a linear function of the decision variables, and the feasible region is a convex polyhedron or polytope. At a corner point, the objective function can only take one value, and there are no other points in the feasible region that can provide a better objective function value.

Thus, the correct answer Is option (a)

Difficulty level- Very Hard

Bloom’s Taxonomy- Analyze

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**Q338) Answer the following question with reference to the Audio**

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**Type: Audio**

**In the simplex method, the first step is to:**

a) Identify the basic variables

b) Identify the non-basic variables

c) Choose a pivot element

d) Calculate the objective function value

Correct Answer: Option (a)

Explanation: The simplex method starts by identifying the basic variables and non-basic variables of the linear programming problem. The basic variables are the variables that correspond to the non-zero entries in the columns of the identity matrix in the tableau, which is a matrix representation of the linear programming problem. The non-basic variables are the variables that correspond to the zero entries in the columns of the identity matrix in the tableau.

Thus, the correct answer Is option (a)

Difficulty level- Medium

Bloom’s Taxonomy- Analyze

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**Q339) Answer the following question with reference to the audio**

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**Type: Audio  
Which of the following is not a linear programming component?**

a) Objective function

b) Decision variables

c) Feasible region

d) Inequality constraint

Correct Answer: Option (d)

Explanation: Linear programming is a mathematical method for finding the optimal value of a linear objective function subject to linear inequality or equality constraints. The basic components of a linear programming problem includes objective function, decision variables, and constraints, which may be in the form of linear equalities or inequalities.

Thus, the correct answer Is option (d)

Difficulty level- Medium

Bloom’s Taxonomy- Analyze

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**Q340) Which of the following is not a disadvantage of the graphical method for solving linear programming problems?**

a) It can only be used for two-dimensional problems

b) It may not always find the optimal solution

c) It may not always be able to represent the feasible region accurately

d) It is computationally expensive for large problems

Correct Answer: Option (a)

Explanation: The graphical method is a simple and intuitive method for solving linear programming problems with two decision variables. It involves graphing the constraints and the objective function on the same coordinate plane to identify the feasible region and the optimal solution and it is not always be able to represent the feasible region accurately and it is computationally expensive for large problems:

Thus, the correct answer Is option (a)

Difficulty level- Hard

Bloom’s Taxonomy- Analyze

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**Q341) Which of the following is not a method for selecting a pivot element in the simplex method?**

a) Minimum ratio test

b) Largest coefficient rule

c) Blend’s rule

d) Gaussian elimination

Correct Answer: Option (d)

Explanation: The simplex method is an iterative algorithm that moves from one basic feasible solution to another until an optimal solution is found. The algorithm uses a pivot element to select which variable to enter or leave the basis at each iteration. The most common methods for selecting a pivot element are the minimum ratio test, the largest coefficient rule, and Blend’s rule. Gaussian elimination is a method for solving systems of linear equations.

Thus, the correct answer Is option (d)

Difficulty level- Hard

Bloom’s Taxonomy- Analyze

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**Q342) Which of the following is not a basic component of a linear programming problem?**

a) Objective function

b) Decision variables

c) Constraints

d) Polynomial equation

Correct Answer: Option (d)

Explanation: The basic components of a linear programming problem are the objective function, decision variables, and constraints. The objective function and constraints are linear equations or inequalities, while the decision variables are the variables to be optimized. A polynomial equation is not a component of a linear programming problem because it is not a linear equation.

Thus, the correct answer Is option (d)

Difficulty level- Medium

Bloom’s Taxonomy- Analyze

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**Q343) Which of the following is not a constraint type in a linear programming problem?**

a) Equality constraint

b) Inequality constraint

c) Integer constraint

d) All of the above are constraint types

Answer: c) Integer constraint

Explanation: Linear programming problems involve optimizing a linear objective function subject to linear constraints. The two common types of constraints in a linear programming problem are Equality constraint and Inequality constraint. Integer constraint is a constraint that requires the decision variables to take integer values and it is only used in integer programming problems,

Thus, the correct answer Is option (c)

Difficulty level- Hard

Bloom’s Taxonomy- Understand

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**Q344) Answer the following question with reference to the audio**

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**Type: Audio**

**Which of the following is a linear programming application?**

a) Financial forecasting

b) Medical diagnosis

c) Image recognition

d) Resource allocation

Correct Answer: Option (d)

Explanation: Linear programming is a mathematical optimization technique that is used to find the best possible solution to a problem subject to linear constraints. One of the most common applications of linear programming is resource allocation. In this application, linear programming is used to allocate scarce resources, such as labor, materials, and capital, to different activities in a way that maximizes profits or minimizes costs.

Thus, the correct answer Is option (d)

Difficulty level- Hard

Bloom’s Taxonomy- Understand

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**Q345) Which of the following is not a property of the feasible region in a linear programming problem?**

a) It is bounded

b) It is unbounded

c) It is convex

d) It is concave

Correct Answer: Option (d)

Explanation: In a linear programming problem, the feasible region is the set of all points in the decision variable space that satisfy all of the constraints. The feasible region plays a critical role in determining the optimal solution to the problem. It is characterized by several properties, that are

* The feasible region is bounded
* The feasible region is unbounded
* The feasible region is convex if any two points in the region can be connected by a straight line segment

Hence the feasible region cannot be concave, as this would violate the convexity property.

Thus, the correct answer Is option (d)

Difficulty level- Hard

Bloom’s Taxonomy- Analyze

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**Q346) Answer the following question with reference to the Audio**

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**Type: Audio**

**Which of the following is not a step in the simplex method for solving linear programming problems?**

a) Initialization

b) Feasibility test

c) Pivot rule

d) Gradient descent

Correct Answer: Option (d)

Explanation: The simplex method is an algorithm used to solve linear programming problems. It involves iteratively moving from one feasible solution to another, with the aim of maximizing or minimizing the objective function. The method involves several steps, including Initialization, Feasibility test and Pivot rule. Gradient descent is an optimization algorithm used to minimize a function by iteratively moving in the direction of steepest descent.

Thus, the correct answer Is option (d)

Difficulty level- Medium

Bloom’s Taxonomy- Analyze

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**Q347) Which of the following is not a decision variable in a linear programming problem?**

a) The number of units to produce

b) The price of a product

c) The amount of labor to use

d) The number of customers to target

Correct Answer: Option (d)

Explanation: Decision variables are the unknown quantities that we want to determine in a linear programming problem. They represent the choices that we have control over, and that we can manipulate to achieve our objectives. In general, decision variables are represented by symbols like x1, x2, x3, and so on.

Thus, the correct answer Is option (d)

Difficulty level- Hard

Bloom’s Taxonomy- Analyze

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**Q348) Answer the following question with reference to the audio**

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**Type: Audio**

**What is a non-basic variable in the simplex method?**

a) A variable that is not at its upper or lower bound

b) A variable that is not part of the current basic solution

c) A variable that is at its upper or lower bound

d) A variable that has a zero coefficient in the

Correct Answer: Option (b)

Explanation: In the simplex method for solving linear programming problems, a basic solution is a solution that has exactly n linearly independent variables with nonzero values, where n is the number of variables in the problem. A non-basic variable is any variable that is not part of the current basic solution. In other words, its value is set to zero.

Thus, the correct answer Is option (b)

Difficulty level- Medium

Bloom’s Taxonomy- Understand

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**Q349) What is the difference between a slack variable and a surplus variable in linear programming?**

a) Slack variables represent underutilized resources, while surplus variables represent over utilized resources

b) Slack variables represent over utilized resources, while surplus variables represent underutilized resources

c) Slack variables represent the amount by which a constraint is exceeded, while surplus variables represent the amount by which a constraint falls short

d) Slack variables represent the amount by which a constraint falls short, while surplus variables represent the amount by which a constraint is exceeded

Correct answer: Option (d)

Explanation: In linear programming, slack variables are introduced to convert inequalities into equalities, while surplus variables are introduced to convert inequalities in the opposite direction. Slack variables represent the amount by which a constraint falls short, while surplus variables represent the amount by which a constraint is exceeded.

Thus, the correct answer Is option (d)

Difficulty level- Hard

Bloom’s Taxonomy- Analyze

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**Q350) Answer the following question with reference to the Audio**

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**Type: Audio**

**What is the duality theorem in linear programming?**

a) A theorem that states that every linear programming problem has an equivalent dual problem

b) A theorem that states that every linear programming problem has a unique optimal solution c) A theorem that states that every linear programming problem has a feasible solution

d) A theorem that states that every linear programming problem can be solved using the simplex method

Correct answer: Option (a)

Explanation: The duality theorem in linear programming states that every linear programming problem has a dual problem that is equivalent to it. The dual problem is obtained by interchanging the roles of the objective function and the constraints, and then minimizing the resulting function. The dual problem provides useful information about the original problem, such as the range of possible objective function values and the sensitivity of the solution to changes in the constraints.

Thus, the correct answer Is option (a)

Difficulty level- Hard

Bloom’s Taxonomy- Understand

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**Q351) Answer the following question with reference to the audio**

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**Type: Audio**

**What is the graphical method in linear programming?**

a) A method for solving linear programming problems using algebraic formulas

b) A method for solving linear programming problems using calculus

c) A method for solving linear programming problems using graphical representation

d) A method for solving linear programming problems using numerical analysis

Correct Answer: Option (c)

Explanation: The graphical method is a technique used in linear programming to find the optimal solution to a problem. It involves plotting the constraints and objective function on a graph to visually determine the feasible region and identify the optimal solution. The optimal solution is the point where the objective function intersects the feasible region and maximizes or minimizes the objective function.

Thus, the correct answer Is option (c)

Difficulty level- Medium

Bloom’s Taxonomy- Remember

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**Q352) Answer the following question with reference to the Audio**

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**Type: Audio**

**In Linear Programming, what is the objective function?**

a) A constraint that must be satisfied

b) A decision variable that must be maximized or minimized

c) The set of possible solutions to the problem

d) The optimal value of the decision variable

Correct Answer: Option (b)

Explanation: The objective function is a mathematical expression that represents the goal or objective of a linear programming problem. It is a linear equation that expresses a decision variable as a linear combination of its coefficients, with the coefficients representing the contribution of each variable to the objective function.

Thus, the correct answer Is option (b)

Difficulty level- Medium

Bloom’s Taxonomy- Analyze

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**Q353) What is the difference between an optimization problem and a linear programming problem?**

a) Linear programming is a subset of optimization problems

b) Optimization problems are a subset of linear programming problems

c) Linear programming is only concerned with minimizing functions

d) Optimization problems are only concerned with maximizing functions

Correct Answer: Option (a)

Explanation: Linear programming is a type of optimization problem that involves maximizing or minimizing a linear objective function subject to linear constraints. Optimization problems are a broader category of problems that involve finding the best solution among a set of possible alternatives. The main difference between linear programming and other types of optimization problems is that linear programming involves linear functions, both in the objective function and the constraints. This means that the decision variables are multiplied by coefficients, and the sum of these products determines the value of the function.

Thus, the correct answer Is option (a)

Difficulty level- Hard

Bloom’s Taxonomy- Analyze

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**Q354) What is the difference between a maximization problem and a minimization problem in Linear Programming**?

a) The direction of the objective function

b) The number of constraints

c) The number of decision variables

d) The type of decision variables

Correct Answer: Option (a)

Explanation: In linear programming, the objective function is a linear function that represents the quantity to be maximized or minimized. The direction of the objective function determines whether the problem is a maximization problem or a minimization problem.A maximization problem seeks to find the maximum value of the objective function, while a minimization problem seeks to find the minimum value of the objective function. The decision variables, constraints, and number of decision variables and constraints can be the same for both maximization and minimization problems.

Thus, the correct answer Is option (a)

Difficulty level- Hard

Bloom’s Taxonomy- Analyze

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**Q355) Answer the following question with reference to the audio**

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**Type: Audio**

**Which of the following is a non-linear optimization problem?**

a) Minimize the sum of two linear functions

b) Maximize the product of two linear functions

c) Minimize the sum of two quadratic functions

d) Maximize the sum of two linear functions

Correct Answer: Option (c)

Explanation: Nonlinear optimization problems are optimization problems where at least one of the objective function or the constraints is nonlinear. The objective function of a nonlinear optimization problem may be a polynomial function, a trigonometric function, an exponential function, or a combination of these. The constraints may also be nonlinear functions.

Thus, the correct answer Is option (c)

Difficulty level- Medium

Bloom’s Taxonomy- Analyze

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**Q356) Which of the following is a decision variable in Linear Programming?**

a) An input to the problem

b) An output of the problem

c) A parameter of the problem

d) A variable to be optimized

Correct Answer: Option (d)

Explanation: In Linear Programming, decision variables are the variables that need to be optimized in order to find the optimal solution to the problem. These variables represent the quantities that the decision maker wants to determine or control, such as the number of units of a product to produce, the amount of a resource to allocate, or the level of a service to provide.

Thus, the correct answer Is option (d)

Difficulty level- Medium

Bloom’s Taxonomy- Analyze

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**Q357) Which of the following is not a characteristic of Linear Programming problems?**

a) The objective function and the constraints are linear

b) The decision variables are continuous

c) The feasible region is bounded

d) The problem can have multiple optimal solutions

Correct Answer: Option (d)

Explanation: a Linear Programming problem, there is only one optimal solution that maximizes or minimizes the objective function while satisfying all the constraints. This solution lies at a vertex or on an edge of the feasible region. Linear Programming problems have a unique optimal solution if the objective function and constraints are linear and the feasible region is non-empty and bounded.

Thus, the correct answer Is option (d)

Difficulty level- Medium

Bloom’s Taxonomy- Analyze

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**Q358) Answer the following question with reference to the Audio**

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**Type: Audio**

**What is the shadow price in linear programming?**

a) The maximum value of the objective function

b) The minimum value of the objective function

c) The change in the objective function per unit increase in a constraint

d) The change in the objective function per unit decrease in a constraint

Correct Answer: Option (c)

Explanation: The shadow price in linear programming refers to the change in the optimal value of the objective function due to a change in the right-hand side (RHS) of a constraint. The shadow price can be interpreted as the rate of change of the objective function for a unit change in the constraint. The difference between the original optimal value of the objective function and the new optimal value is the shadow price for that constraint.

Thus, the correct answer Is option (c)

Difficulty level- Hard

Bloom’s Taxonomy- Understand

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**Q359) Answer the following question with reference to the Audio**

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**Type: Audio**

**In Linear Programming, what is the optimal solution?**

a) The solution that satisfies all the constraints

b) The solution that violates some of the constraints

c) The solution that maximizes or minimizes the objective function

d) The solution that is not feasible

Correct Answer: Option (c)

Explanation: In Linear Programming, the optimal solution is the feasible solution that maximizes or minimizes the objective function. The objective function is a linear function of the decision variables that the linear programming problem aims to maximize or minimize. The feasible region is the set of all feasible solutions that satisfy all the constraints of the problem. The optimal solution is the solution that lies in the feasible region and maximizes or minimizes the objective function.

Thus, the correct answer Is option (c)

Difficulty level- Medium

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**Q360) Which of the following is not a requirement for the constraints in a Linear Programming problem?**

a) They must be linear

b) They must be inequalities

c) They must be non-negative

d) They must be represented by a matrix equation

Correct Answer: Option (b)

Explanation: Constraints in a Linear Programming problem must be linear, which means they can be expressed as a linear equation involving the decision variables. They must also be inequalities, either less than or equal to, greater than or equal to, or strict inequality. Additionally, they must be non-negative, which means that all decision variables and slack variables must be greater than or equal to zero.

Thus, the correct answer Is option (b)

Difficulty level- Medium

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**Q361) If P(E) = 0.07, what will the value of P(not E) be?**

a) 90

b) 007

c) 93

d) 72

Correct Answer: Option (c)

Explanation: The sum of the probabilities of an event and its complement is equal to 1.

We are given , therefore:

Subtracting from both sides, we get:

Thus, the correct answer is option (c).

Difficulty Level- Medium.

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**Q362) If a die is thrown, what is the likelihood of receiving an odd number?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: When a die is thrown, there are six possible outcomes

Out of these, three are odd numbers (1, 3, and 5) and three are even numbers (2, 4, and 6). Therefore, the probability of receiving an odd number is the number of favorable outcomes (i.e., the number of odd numbers) divided by the total number of possible outcomes:

Thus, the correct answer is option (a).

 Difficulty Level- Easy

Bloom’s Taxonomy- Evaluate

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**Q363) What is the likelihood of rolling three dice and receiving the sum three?**

a)

b)

c) 4

d)

Correct Answer: Option (b)

Explanation: The possible outcomes when rolling a single die are . Therefore, the total number of possible outcomes when rolling three dice is . Now we have to determine the number of ways that the sum of three can be obtained and divide that by the total number of possible outcomes when rolling three dice. To obtain a sum of three, we need one die to be 1 and the other two dice to be 1 as well. There are three ways that this can occur: and

Therefore, the rolling three dice and receiving the sum three is or

Thus, the correct answer is option (b).

 Difficulty Level: Medium

Bloom’s Taxonomy- Evaluate

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**Q364) When throwing a dice, what is the likelihood of receiving an even number?**

a)

b)

c)

d)

Correct Answer: Option (b)

Explanation: When a die is rolled, the sample field is S = (1, 2, 3, 4, 5, and 6). E is the event of receiving an even number, and as a result. So, . Drawing an even number equals the sum of all positive outcomes divided by the sum of all outcomes, where

Thus, the correct answer is option (b).

Difficulty Level- Medium

Bloom’s Taxonomy- Evaluate

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**Q365) What is the probability of rolling a 6 on a fair die?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: The probability of rolling a 6 on a fair die is . This is because there are six equally likely outcomes when rolling a fair die, and only one of these outcomes is a Therefore, the probability of rolling a is out ofor

Thus, the correct answer is option (a).

Difficulty level- Easy

Bloom’s Taxonomy- Analyze

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**Q366) What is the probability of getting a sum of 7 when rolling two dice?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: When rolling two dice, there are possible outcomes, where each outcome is equally likely. To get a sum of , there are six possible ways:

Therefore, the probability of getting a sum of is

Thus, the correct answer is option (a).

Difficulty level - Medium

Bloom’s Taxonomy- Evaluate

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**Q367) What is the probability of drawing a heart from a standard deck of 52 cards?**

a)

b)

c)

d)

Correct Answer: Option (b)

Explanation In a standard deck of cards, there are cards of each suit (hearts, diamonds, clubs, and spades). Since we are interested in drawing a heart, which is one of the four suits, there are possible outcomes of drawing a heart out of a total of possible outcomes. Therefore, the probability of drawing a heart from a standard deck of cards is:

Thus, the correct answer is option (b).

Difficulty level- Easy

Bloom’s Taxonomy- Evaluate

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**Q368) What is the probability of getting at least one head when flipping a fair coin twice?**

a)

b)

c)

d)

Correct Answer: Option (b)

Explanation: When a coin is flipped twice, there are four possible outcomes: HH, HT, TH, and TT. of the time we get at least one head (HH, HT, TH). Only one time TT occurs. Therefore the probability is

Thus, the correct answer is option (b).

Difficulty level- Medium

Bloom’s Taxonomy- Evalaute

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**Q369) Four times a coin is thrown. What is the chance of receiving at least three heads?**

a)

b)

c)

d)

Correct Answer: Option (d)

Explanation: To solve this problem, we can use the binomial distribution formula:

where:

* n is the number of trials (in this case, n = 4)
* k is the number of successes (in this case, we want at least successes, so or
* p is the probability of success on a single trial (in this case,, since we have a fair coin)

To find the probability of at least three heads, we need to add the probabilities of getting :

Therefore, the chance of receiving at least three heads is which corresponds to

Thus, the correct answer is option (d).

Difficulty Level- Hard

Bloom’s Taxonomy- Evaluate

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**Q370) A bag contains 5 red balls, 3 blue balls and 2 green balls. A random ball is chosen. How likely is it that the colour is not blue?**

a)

b)

c)

d)

Correct Answer: Option (c)

Explanation**:** The total number of balls in the bag is

The probability of selecting a blue ball is , because there are blue balls out of total balls in the bag.

Therefore, the probability of not selecting a blue ball is

Therefore, the probability of non-blue ball is

Thus, the correct answer is option (c)

Difficulty Level- Medium

Bloom’s Taxonomy- Evaluate

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**Q371) There are 52 cards in a typical deck of cards. What is the chance of pulling a face card from the deck—a jack, queen, or king?**

a) 1/13

b) 3/13

c) 4/13

d) 12/13

Correct Answer: Option (b)

Explanation: There are 12 face cards in a standard deck of cards. The face cards are four jacks, four queens, and four kings.

So, the probability of drawing a face card is

Thus, the correct answer is option (b)

Difficulty Level- Medium

Bloom’s Taxonomy- Understand

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**Q372) The probability that a bulb produced by a company lasts more than 800 hours is 0.7. What is the probability that at least 3 out of 5 bulbs produced by the company will last more than 800 hours?**

a) 0.3087

b) 0.83692

c) 0.16807

d) 0.36015

Correct Answer: Option (b)

Explanation: This problem involves a binomial distribution, where each bulb can either last more than 800 hours (success) or not (failure), with a probability of success p = 0.7.

The formula for the probability of exactly k successes in n trials is:

where (n choose k) is the binomial coefficient, equal to

Using this formula, we get:

Probability of exactly three bulbs:

Probability of exactly four bulbs

Probability of exactly five bulbs:

Adding these probabilities together, we get:

Thus, the correct answer is option (b)

Difficulty Level- Hard

Bloom’s Taxonomy- Evaluate

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**Q373) A jar contains 10 red balls, 6 blue balls and 4 green balls. Randomly, two balls are selected. How likely is it that two balls are blue?**

a)

b)

c)

d)

Correct Answer: Option (d)

Explanation: The formula for the probability of the intersection of two events:

where P(A) is the probability of event A, and P(B|A) is the conditional probability of event B given that event A has occurred.

Event A is the probability of selecting a blue ball on the first draw, and event B is the probability of selecting a blue ball on the second draw given that the first ball drawn was blue.

To calculate the probability of event A, we use the total number of balls and the number of blue balls:

Calculate the probability of event B given that the first ball drawn was blue, we use the total number of balls remaining and the number of blue balls remaining:

There are only 19 balls left in the jar after the first ball is drawn.

Using the formula for the intersection of two events, we get:

Thus, the correct answer is option (d)

Difficulty Level- Hard

Bloom’s Taxonomy- Evaluate

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**Q374) How likely is it to roll a number higher than 4 on a single die?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation A standard die has six sides, numbered to . The probability of rolling a number higher than on a single die is the probability of rolling a or a. There are two ways to roll a number higher than and there are six possible outcomes, so the probability is:

Thus, the correct answer is option (a).

Difficulty Level - Medium

Bloom’s Taxonomy- Analyze

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**Q375) A 52-card deck that has been thoroughly shuffled has two cards picked at random. How likely is it that both cards are aces?**

a)

b)

c)

d)

Correct Answer: Option (a)

 Explanation: The probability of picking an ace on the first draw is , since there are aces in a deck of cards. Once an ace has been drawn, there are only 3 aces left in the deck of cards. Therefore, the probability of drawing a second ace given that the first card was an ace is

To calculate the probability of both cards being aces, we use the multiplication rule of probability.

Thus, the correct answer is option (a).

Difficulty Level -  Medium

Bloom’s Taxonomy- Analyze

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**Q376) Three times are used to toss a coin. How likely is it that I will obtain at least two heads?**

a)

b)

c)

d)

Correct Answer: Option (b)

Explanation: There are possible outcomes for each coin toss, heads or tails. Therefore, there are possible outcomes for three coin tosses. We can use the complement rule to find the probability of obtaining at least two heads. The complement of obtaining at least two heads is obtaining zero or one head.

The probability of obtaining zero heads is , since the probability of obtaining tails on each of the three tosses is

The probability of obtaining a head on the first toss is

The probability of obtaining tails on the next two tosses is

The probability of obtaining exactly one head is

Therefore, the probability of obtaining at least two heads is:

Thus, the correct answer is option (b).

Difficulty Level - Very Hard

Bloom’s Taxonomy- Evaluate

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**Q377) A box contains 5 red balls, 4 green balls, and 3 blue balls. What is the likelihood of drawing a red ball followed by a green ball without replacement?**

a)

b)

c)

d)

Correct Answer: Option (c)

Explanation: The probability of drawing a red ball on the first draw is  .

Since the ball is not replaced, there are now green balls and balls in total. The probability of drawing a green ball on the second draw is 4/11. Therefore, the probability of drawing a red ball followed by a green ball without replacement is

Thus, the correct answer is option (c).

Difficulty Level- Hard

Bloom’s Taxonomy- Analyze

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**Q378) A factory produces 4% defective items. If 3 items are selected at random, what is the probability that exactly 2 items are defective?**

a) 0.0384

b) 0.0046

c) 0.1072

d) 0.1728

Correct Answer: Option (b)

Explanation: The probability of selecting a defective item is . The probability of selecting exactly defective items out of is given by the binomial distribution formula:

Thus, the correct answer is option (b).

Difficulty Level- Hard

Bloom’s Taxonomy- Analyze

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**Q379) What is the likelihood that a fair six-sided dice will roll an even number?**

a)

b)

c)

d)

Correct Answer: Option (a).

Explanation: A fair six-sided dice has an equal probability of rolling each of the six numbers, through. The probability of rolling an even number is , and .

Out of the six possible outcomes, there are three even numbers, so the probability of rolling an even number is:

Thus, the correct answer is option (a).

Difficulty level- Easy

Bloom’s Taxonomy- Analyze

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**Q380) If two cards are drawn from a standard deck of 52 cards without replacement, what is the probability that both cards are black?**

a)

b)

c)

d)

Correct Answer: Option (c)

Explanation There are black cards and red cards in a standard deck of 52 cards. The probability of drawing a black card on the first draw is , since half of the cards in the deck are black.

The first card was not replaced, there are now black cards and total cards remaining in the deck. The probability of drawing a black card on the second draw, given that the first card was black, is .

Simplifying, we get:

Thus, the correct answer is option (c).

Difficulty level- Medium

Bloom’s Taxonomy- Evaluate

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**Q381) What is the probability of getting a sum of 7 when rolling two fair six-sided dice**?

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: There are six ways to get a sum of when rolling two dice: . Since there are possible outcomes

the probability of getting a sum of 7 is

Thus, the correct answer is option (a).

Difficulty level- Easy

Bloom’s Taxonomy- Evaluate

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**Q382)** **Six red and four green balls are contained in a box. If two balls are drawn at random without replacement, what is the probability that both balls are red?**

a)

b)

c)

d)

Correct Answer: Option (d)

Explanation: The probability of drawing a red ball on the first draw is . Since the balls are drawn without replacement, the probability of drawing a second red ball is now . Therefore, the probability of drawing two red balls is

Thus, the correct answer is option (d).

Difficulty level- Easy

Bloom’s Taxonomy- Evaluate

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**Q383) A company sells two products, A and B. The probability of a customer buying product A is 0.6, and the probability of a customer buying both products A and B is 0.2. What is the likelihood that a consumer will only purchase product B?**

a) 0.2

b) 0.3

c) 0.4

d) 0.5

Correct Answer: Option (a).

Explanation: Let P(A) be the probability of buying product A, and P(B) be the probability of buying product B. Also, let P(A ∩ B) be the probability of buying both products A and B.

We know that and .

The probability of buying only product B can be calculated as follows:

Since a customer can either buy product A, product B, or both, we know that:

We can rearrange this equation to solve for P(B):

We know that the sum of all probabilities must equal 1, so:

Since we want to find the probability of buying only product B, we can rephrase this as:

Now we can substitute the given probabilities and solve for P(only B):

Substituting the given probabilities, we get:

Thus, the correct answer is option (a).

Difficulty level - Hard

Bloom’s Taxonomy- Evaluate

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**Q384) A fair coin is flipped three times. What is the probability of getting exactly two heads?**

a)

b)

c)

d)

Correct Answer: Option (b)

Explanation: Let's denote H as the event of getting heads and T as the event of getting tails.

The probability of getting two heads and one tail is given by:

where P(HHT) represents the probability of getting heads on the first two tosses and tails on the third toss,

P(HTH) represents the probability of getting heads on the first and third tosses and tails on the second toss

P(THH) represents the probability of getting tails on the first toss and heads on the last two tosses.

Each of these probabilities can be calculated as:

So, the total probability of getting exactly two heads is:

Thus, the correct answer is option (b).

Difficulty level - Medium

Bloom’s Taxonomy- Evaluate

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**Q385) Two dice are rolled. What is the probability that the sum of the dice is greater than 9?** a)

b)

c)

d)

Correct Answer: Option (d)

Explanation: The sum of two dice ranges from to , with a total of possible outcomes.

The possible outcomes where the sum is greater than 9 are and . So, there are six such outcomes.

The total number of outcomes is , as there are six possible outcomes for each of the two dice.

Therefore, the probability of getting a sum greater than is or

Thus, the correct answer is option (a).

Difficulty level- Medium

Bloom’s Taxonomy- Analyze

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**Q386) A jar contains 8 red marbles and 4 green marbles. Two marbles are drawn at random without replacement. What is the probability that at least one marble is red?**

a)

b)

c)

d)

Correct Answer: Option (b)

Explanation: The probability of getting at least one red marble can be found by calculating the probability of getting no red marbles and subtracting it from

The probability of getting no red marbles in the first draw is .

The probability of getting no red marbles in the second draw given that the first draw was not a red marble is .

The probability of getting at least one red marble is:

Thus, the correct answer is option (b).

Difficulty level- Medium

Bloom’s Taxonomy- Analyze

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**Q387) A jar contains 10 red balls and 5 green balls. If two balls are drawn at random without replacement, what is the probability that both balls are red?**

a)

b)

c)

d)

Correct Answer: Option (c)

Explanation: The probability of drawing a red ball on the first draw is (since there are 10 red balls out of 15 total balls).

On the second draw, there are now red balls out of total balls.

The probability of drawing two red balls without replacement is

Thus, the correct answer is option (c).

Difficulty level- Easy

Bloom’s Taxonomy- Evaluate

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**Q388) What is the probability of rolling an odd number on a fair six-sided dice**?

a)

b)

c)

d)

Correct Answer: Option (b).

Explanation: A fair six-sided dice has six possible outcomes, each with an equal probability of There are three odd numbers on a dice: , and .

Therefore, the probability of rolling an odd number on a fair six-sided dice is:

Thus, the correct answer is option (b).

Difficulty level- Easy

Bloom’s Taxonomy- Analyze

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**Q389) A bag contains 8 red balls and 4 blue balls. If one ball is drawn at random, what is the probability that it is blue?**

a)

b)

c)

d)

Correct Answer: Option (b)

Explanation: There are a total of balls in the bag, out of which are blue. Therefore, the probability of drawing a blue ball is:

Thus, the correct answer is option (b).

Difficulty level- Easy

Bloom’s Taxonomy- Evaluate

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**Q390) A box contains 5 red balls and 3 green balls. If two balls are drawn at random without replacement, what is the probability that both balls are green?**

a)

b)

c)

d)

Correct Answer: Option (c)

Explanation: Total number of balls in the box

Probability of drawing a green ball in the first attempt =

Since a ball has already been drawn without replacement, the total number of balls left in the box is .

Probability of drawing a green ball in the second attempt =

Probability of drawing two green balls without replacement

Thus, the correct answer is option (c).

Difficulty level- Easy

Bloom’s Taxonomy- Evaluate

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**Q391) What is the probability of rolling an even number on a fair six-sided die?**

a)

b)

c)

d)

Correct Answer: Option (b)

Explanation: The probability of rolling an even number on a fair six-sided die can be calculated by finding the number of possible outcomes that result in an even number, and then dividing that by the total number of possible outcomes.

There are three even numbers on a six-sided die:

So the probability of rolling an even number is 3 out of 6

Thus, the correct answer is option (b).

Difficulty level- Easy

Bloom’s Taxonomy- Evaluate

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**Q392) If two fair coins are flipped, what is the probability of getting two heads?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: When two fair coins are flipped, there are four possible outcomes: HH, HT, TH, and TT, where H represents heads and T represents tails. Each of these outcomes is equally likely, so the probability of any one outcome is .

The probability of getting two heads on two coin flips is the probability of getting heads on the first flip multiplied by the probability of getting heads on the second flip ,

Thus, the correct answer is option (a).

Difficulty level- Easy

Bloom’s Taxonomy- Analyze

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**Q393) A bag contains 5 red balls and 3 blue balls. If one ball is drawn at random, what is the probability of getting a red ball?**

a)

b)

c)

d)

Correct Answer: Option (b)

Explanation: If a ball is drawn randomly from a bag containing 5 red balls and 3 blue balls, the probability of getting a red ball can be calculated as follows:

The total number of balls in the bag is

The probability of drawing a red ball is the number of red balls in the bag divided by the total number of balls in the bag.

So, the probability of getting a red ball is .

Thus, the correct answer is option (b).

Difficulty level- Easy

Bloom’s Taxonomy- Evaluate

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**Q394) If a fair six-sided die is rolled twice, what is the probability of getting a 4 on the first roll and a 2 on the second roll?**

a)

b)

c)

d)

Correct Answer: Option (b)

Explanation: When a fair six-sided die is rolled twice, there are 36 possible outcomes (6 outcomes for the first roll times 6 outcomes for the second roll).

The probability of getting a 4 on the first roll is , since there are six possible outcomes and only one of them results in a 4.

The probability of getting a 2 on the second roll is also , since there are six possible outcomes and only one of them results in a 2.

To calculate the probability of both events happening we multiply their individual probabilities:

Thus, the correct answer is option (b).

Difficulty level- Medium

Bloom’s Taxonomy- Evaluate

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**Q395) A bag contains 4 red balls and 6 green balls. If two balls are drawn at random without replacement, what is the probability that both balls are red?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: There are 10 balls in the bag, and the probability of drawing a red ball on the first draw is Since the ball is not replaced, there are only 9 balls left in the bag, and the probability of drawing a red ball on the second draw is . The probability of both of these events occurring is

Thus, the correct answer is option (a).

Difficulty level- Easy

Bloom’s Taxonomy- Evaluate

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**Q396) A coin is flipped 4 times. What is the probability of getting exactly 2 heads?**

a)

b)

c)

d)

Correct Answer: Option (b)

Explanation: There are 16 equally likely outcomes when flipping a coin 4 times, and the number of ways to get exactly 2 heads is given by the binomial coefficient C(4,2) = 6.

Each of these outcomes has probability

so the probability of getting exactly 2 heads is .

Thus, the correct answer is option (b).

Difficulty level- Easy

Bloom’s Taxonomy- Analyze

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**Q397) What is the probability of rolling a number less than 3 on a fair six-sided die?**

a)

b)

c)

d)

Correct Answer: Option (b)

Explanation: When a fair six-sided die is rolled, there are six possible outcomes: 1, 2, 3, 4, 5, or 6.There are two possible outcomes (1 and 2) out of six, so the probability of rolling a number less than 3 is

Thus, the correct answer is option (b).

Difficulty level- Medium

Bloom’s Taxonomy- Evaluate

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**Q398) A bag contains 7 black balls and 5 white balls. If two balls are drawn at random, what is the probability that both balls are black?**

a)

b)

c)

d)

Correct Answer: Option (b)

Explanation: The probability of drawing a black ball on the first draw is . If a black ball is drawn on the first draw, then the probability of drawing another black ball on the second draw is . Therefore, the probability of both balls being black is

Thus, the correct answer is option (b).

Difficulty level- Medium

Bloom’s Taxonomy- Evaluate

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**Q399) A bag contains 8 red balls and 6 green balls. If two balls are drawn at random, what is the probability that both balls are green?**

a)

b)

c)

d)

Correct Answer: Option (b)

Explanation: The probability of drawing a green ball on the first draw is . After the first ball is drawn, there are 13 balls left in the bag, of which 5 are green. The probability of drawing a green ball on the second draw, given that the first ball was green and not replaced in the bag, is . Therefore, the probability of both balls being green is

Thus, the correct answer is option (b).

Difficulty level- Medium

Bloom’s Taxonomy- Analyze

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**Q400) A jar contains 10 blue marbles and 8 red marbles. If one marble is drawn at random, what is the probability of getting a blue marble?**

a)

b)

c)

d)

Correct Answer: Option (a)

Explanation: The probability of drawing a blue marble from the jar is the number of blue marbles divided by the total number of marbles in the jar. Therefore:

We are given that the jar contains 10 blue marbles and 8 red marbles, so the total number of marbles in the jar is:

Therefore, the probability of drawing a blue marble is:

Thus, the correct answer is option (a).

Difficulty level- Medium

Bloom’s Taxonomy- Evaluate

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