Mth501 current papers 202

Mcqs

Waqar sey 10 baqi concept base matrix key uppr teh or determinant sath main juanid ke bhe file krlyna

Subjective:

A+B=B+A asey aye teh aik 2 short main or aik long main long main transpose ley ker addition krna tah or short main bhe aik short asa tah or dosra short multiple wala tah or 3rd short vector jeysa tah woh mhe kiya

Baqi determinant ka tah long 3 by 3 matrix per equal to krna tah unhy bhe

Or dosra 3rd long tah jacobi method sey krna tah

Paper 2

Quizzes:

Mostly quizzes from waqar file.

1: Let A be the matrix of order 2x3 B be the matrix of order 3x4 and C be the matrix of order 4x5, and then which

of the following is the order of the matrix AB?

Ans: 2**x5**

2. 7x is an algebraic term in which 7 is a ___ and x is a ___.

Ans: coefficient, variable

3. If v1=(2,2,2), v2=(0,0,3), and v3=(0,1,1) span R3
, then which of the following is true for any
R3?

Ans: (b1,b2,b3) = k1(2,2,2)+k2(0,0,3)+k3(0,1,1)

4. Which of the following is a linear equation?
Ans:

5. Which of the following is true for the matrix

1 0 0

0 2 0

0 0 3

Ans: It is a diagonal matrix.

6. If the determinant of the matrix

2 3 4

1 2 2

3 4 5

is -1 and the matrix B is obtained

by adding 2 times of the second row in the first row of the matrix A, then which of

the following is true for the matrix B?

Ans: Its determinant is 1.

7. If a system of equations is solved using the Jacobi's method , then which of the

following is the most appropriate answer about the matrix M that is derived from

the coefficient matrix ?

Ans: All of its entries above the diagonal must be zero.

8. Let TV W : → be a linear transformation. Then T is said to be one-one if for any

uv V , ∈ with u v ≠ implies Tu Tv ≠ . Equivalently if Tu Tv = then u v = .

Ans: one-to-one or bijective

9. Free variables

10. If

a b

c d

, then which of the following is

Ans: ad-bc

11. A matrix as the product of a lower triangular matrix and an upper triangular matrix .

Ans: LU-decomposition

12. c(u + v) = cu + cv

Ans: Scalar Distribution over Vector Addition

13. What is the maximum possiblle number of pivots in a 4 × 7 matrix?

4

14. If A is an invertible matrix, then A-1 is invertible and

Ans: $(A^{-1})^{-1} = A$

Subjective part

Short questions

Q: Find the minor of M13 and cofactor C12 from given matrix?

Minor of an element

If A is a square matrix, then the **Minor** of entry a_{ij} (called the ijth minor of A) is denoted by M_{ij} and is defined to be the determinant of the sub matrix that remains when the *ith* row and *jth* column of A are deleted.

Solution Here $$A = \begin{bmatrix} 3 & 1 & -4 \\ 2 & 5 & 6 \\ 1 & 4 & 8 \end{bmatrix}$$

The minor of entry a_{11} is

$$M_{11} = \begin{vmatrix} 3 & 1 & -4 \\ 2 & 5 & 6 \\ 1 & 4 & 8 \end{vmatrix} = \begin{vmatrix} 5 & 6 \\ 4 & 8 \end{vmatrix} = 5\times8-6\times4 = 40 - 24 = 16$$

and the corresponding cofactor is

$$C_{11} = (-1)^{1+1}M_{11} = M_{11} = 16$$

Q: Write Coefficient, variables and constant of 5x+3y-12. Also mention is it linear or not?

Coefficient are 5 and 3 variables are x and y and constant is -12 and it's a linear equation

a linear equation is an equation in which the variables are raised to the power of 1 and do not involve any other operations such as multiplication or division between the variables.

Q: Linearly dependent or not?

Free variable non trivial solution and linearly **dependent**

No Free variable **trivial solution** and linearly **independent**

Long Question

Q: Find A^{-1} matrix was given

(An Inverse Formula)

nvertible $n \times n$ matrix, then $A^{-1} = \frac{1}{\det A} adj\ A$

Q: Linearly dependent or not? matrices was given (lect 8)

Solution

(a) Row operations on the associated augmented matrix show that

$$\begin{bmatrix} 1 & 4 & 2 & 0 \\ 2 & 5 & 1 & 0 \\ 3 & 6 & 0 & 0 \end{bmatrix}$$

$$\sim \begin{bmatrix} 1 & 4 & 2 & 0 \\ 0 & -3 & -3 & 0 \\ 0 & -6 & -6 & 0 \end{bmatrix} \qquad (-2)R_1 + R_2 \,,\ (-3)R_1 + R_3$$

$$\sim \begin{bmatrix} 1 & 4 & 2 & 0 \\ 0 & -3 & -3 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix} \quad R_2 + R_3 \qquad (2)$$

Clearly, x_1 and x_2 are basic variables and x_3 is free. Each nonzero value of x_3 determines a nontrivial solution.

Hence v_1, v_2, v_3 are linearly dependent (and not linearly independent).

1.. V^1, V^2 and V^3 vectors were given..u have to find the Matrix are linearly independent or not (sol. Donu Vector ik dusre k multiples the so linearly dependent answer hoga)

Check whether $\{\vec{v}_1, \vec{v}_2, \vec{v}_3\}$ is linearly dependent or not?

where $\vec{v}_1 = \begin{bmatrix} -2 \\ 1 \\ 3 \end{bmatrix}$, $\vec{v}_2 = \begin{bmatrix} 1 \\ 0 \\ 2 \end{bmatrix}$ and $\vec{v}_3 = \begin{bmatrix} 2 \\ -2 \\ 1 \end{bmatrix}$

Solution:

The set S = $\{\mathbf{v}_1, \mathbf{v}_2, \mathbf{v}_3\}$ of vectors in R^3 is **linearly independent** if the only solution of

$$c_1\mathbf{v}_1 + c_2\mathbf{v}_2 + c_3\mathbf{v}_3 = 0$$

is $c_1, c_2, c_3 = 0$

Otherwise (i.e., if a solution with at least some nonzero values exists), S is **linearly dependent**.

4. Partitioned matrix diya tha 3x3 and 3x4 ka...unki partition kr k hud hi unka AB nikaalna tha

$$A = \left[\begin{array}{ccc|cc} 1 & 2 & 1 & 0 & 2 \\ -1 & -2 & 3 & 1 & 1 \\ \hline 2 & 1 & -2 & 1 & 3 \end{array}\right] = \begin{bmatrix} A_{11} & A_{12} \\ A_{21} & A_{22} \end{bmatrix}, \quad B = \left[\begin{array}{cc} 3 & 0 \\ -5 & 1 \\ \hline 0 & 8 \\ 0 & 2 \end{array}\right] = \begin{bmatrix} B_{11} \\ B_{21} \end{bmatrix}$$

Solution

Let

$A_{11} = \begin{bmatrix} 1 & 2 & 1 \\ -1 & -2 & 3 \end{bmatrix}$, $A_{12} = \begin{pmatrix} 0 & 2 \\ 1 & 1 \end{pmatrix}$, $A_{21} = \begin{bmatrix} 2 & 1 & -2 \end{bmatrix}$ *and* $A_{22} = \begin{bmatrix} 1 & 3 \end{bmatrix}$;

$B_{11} = \begin{bmatrix} 2 & 1 \\ 3 & 0 \\ -5 & 1 \end{bmatrix}$, $B_{21} = \begin{pmatrix} 0 & 8 \\ 0 & 2 \end{pmatrix}$ *So* $B = \begin{bmatrix} B_{11} \\ B_{21} \end{bmatrix}$

Now

$$AB = \begin{bmatrix} A_{11} & A_{12} \\ A_{21} & A_{22} \end{bmatrix} \begin{bmatrix} B_{11} \\ B_{21} \end{bmatrix} = \begin{bmatrix} A_{11}B_{11} + A_{12}B_{21} \\ A_{21}B_{11} + A_{22}B_{21} \end{bmatrix}$$

This is a valid formula because the sizes of the blocks are such that all of the operations can be performed:

$$A_{11}B_{11} + A_{12}B_{21} = \begin{bmatrix} 1 & 2 & 1 \\ -1 & -2 & 3 \end{bmatrix} \begin{bmatrix} 2 & 1 \\ 3 & 0 \\ -5 & 1 \end{bmatrix} + \begin{pmatrix} 0 & 2 \\ 1 & 1 \end{pmatrix} \begin{bmatrix} 0 & 8 \\ 0 & 2 \end{bmatrix} = \begin{bmatrix} 3 & 4 \\ -23 & 14 \end{bmatrix}$$

$$A_{21}B_{11} + A_{22}B_{21} = \begin{bmatrix} 2 & 1 & -2 \end{bmatrix} \begin{bmatrix} 2 & 1 \\ 3 & 0 \\ -5 & 1 \end{bmatrix} + \begin{bmatrix} 1 & 3 \end{bmatrix} \begin{bmatrix} 0 & 8 \\ 0 & 2 \end{bmatrix}$$

$$= \begin{bmatrix} 17 & 0 \end{bmatrix} + \begin{bmatrix} 0 & 14 \end{bmatrix} = \begin{bmatrix} 17 & 14 \end{bmatrix}$$

$$AB = \begin{bmatrix} A_{11}B_{11} + A_{12}B_{21} \\ A_{21}B_{11} + A_{22}B_{21} \end{bmatrix} = \begin{bmatrix} 3 & 6 \\ -23 & 12 \\ 17 & 14 \end{bmatrix}$$

Mcqs

Assume A is an $m \times n$ matrix that can be row reduced to echelon form, without row interchanges. Then A can be written in the form A = LU, where L is an $m \times m$ lower triangular matrix with 1's on the diagonal and U is an $m \times n$ echelon form of A. Fo

Definition If $T : V \rightarrow W$ is a linear transformation, then the set of vectors in V that T maps into **0** is called the **kernel** of ***T***; it is denoted by ***ker(T)***. The set of all vectors in ***W*** that are images under ***T*** of at least one vector in ***V*** is called the **range** of ***T***; it is denoted by ***R(T)***.

one-to-one.

Theorem Let $T : R^n \rightarrow R^m$ be a linear transformation. Then ***T*** is one-to-one if and only if the equation ***T (x) = 0*** has only the trivial solution.

*An $n \times n$ matrix A is said to be **strictly diagonally dominant** if the absolute value of each diagonal entry exceeds the sum of the absolute values of the other entries in the same row.*

Equation $0 = 1$ cannot be solved, therefore, the system has **no solution** (i.e. the system is **inconsistent**).

Theorem

a. If ***A*** is an invertible matrix, then A^{-1} is invertible and $(A^{-1})^{-1} = A$

This implies that a 2×2 matrix ***A*** is invertible if and only if $\det A \neq 0$.

Let ***A*** be an $n \times n$ invertible matrix. For any $b \in R^n$, the equation $Ax = b$ …..(1) has the unique solution i.e. $x = A^{-1}b$.

Proof

Since A is invertible and $b \in R^n$ be any vector. Then, we must have a matrix $A^{-1}b$ which is a solution of eq. (1) .i.e. $Ax = A\,(A^{-1}b) = Ib = b.$

Toeplitz matrix

A matrix in which each descending diagonal from left to right is constant is called a **Toeplitz matrix** or **diagonal-constant matrix**

Block Upper Triangular Matrices

A partitioned square matrix A is said to be block upper triangular if the matrices on the main diagonal are square and all matrices below the main diagonal are zero; that is, the matrix is partitioned as

Remarks

1) If A is the square matrix of order m, then the order of both L and U will also be m.
2) In general, not every square matrix A has an LU-decomposition, nor is an LU-decomposition unique if it exists.

Theorem **If a square matrix A can be reduced to row echelon form with no row interchanges, then A has an LU-decomposition.**