

MTh501 paper 29th may 2013

Question1:-

determine the matrix A when decomposed in $L = \begin{bmatrix} 2 & 0 \\ 3 & -1 \end{bmatrix}$ and $U = \begin{bmatrix} 1 & -7 \\ 0 & 1 \end{bmatrix}$
by LU factorization?

Question2:-

Find the determinant of $A = \begin{bmatrix} 1 & 4 & 5 \\ 0 & 0 & 7 \\ 0 & 3 & -4 \end{bmatrix}$ from echelon form.

Question3:-

$A = \begin{bmatrix} 2 & -4 & -3 \\ 3 & 4 & -5 \end{bmatrix}$ and $B = \begin{bmatrix} 4 & -5 & -6 \\ 2 & 7 & 10 \end{bmatrix}$, then calculate $(A+B)^t$.

Question4:-

Determine the value(s) of ‘ s ’ for which the following system of linear equations does not has a unique solution :

$$\begin{aligned} s x_1 + 2 x_2 &= 10 \\ 5 x_1 + 7 x_2 &= 20 \end{aligned} \quad ; \text{ where ‘ } s \text{ ’ is a parameter}$$

Question5:-

If $L = \begin{bmatrix} 1 & 0 \\ 3 & -2 \end{bmatrix}$, $U = \begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix}$ and $U \vec{x} = \begin{bmatrix} 4 \\ 3 \end{bmatrix}$; then solve the following system of linear equations by LU - decomposition method :

$$\begin{aligned} x_1 + 2x_2 &= 4 \\ 3x_1 + 4x_2 &= 6 \end{aligned}$$

Question6:-

Show that $\begin{vmatrix} a+h & a-h & d \\ b+k & b-k & e \\ c+l & c-l & f \end{vmatrix} = 2 \begin{vmatrix} a & a-h & d \\ b & b-k & e \\ c & c-l & f \end{vmatrix}$.

Another current paper

Q4. With T defined by $T(x) = Ax$, find a vector x whose image under T is b , and determine whether x is unique.

$$T = \begin{bmatrix} 1 & -5 & -7 \\ -3 & 7 & 5 \end{bmatrix}, b = \begin{bmatrix} -2 \\ -2 \end{bmatrix}$$

Q5. Find that it is invertible or not

$$T(X_1, X_2) = T(6X_1 + 8X_2, 5X_1 - 8X_2)$$

Q5. Find the volume of parallelogram of the vertices $(1,2,4)$, $(2,4,-7)$ and $(-1,-3,20)$.

Q6. Let

$$\begin{bmatrix} 1 \\ 0 \\ -2 \end{bmatrix}, \begin{bmatrix} 3 \\ 2 \\ -4 \end{bmatrix}, \begin{bmatrix} -3 \\ -5 \\ 1 \end{bmatrix} \text{ is this in } \mathbb{R}^3 \text{ or not?}$$

Q7. justify that

$$A^2 = I$$

if

$$A = \begin{bmatrix} 1 & 0 \\ 3 & -1 \end{bmatrix}$$

if and only $M^2 = I$

justify your answer by partitioned matrix of M

$$M = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 3 & -1 & 0 & 0 \\ 1 & 0 & -1 & 0 \\ 0 & 1 & -3 & 1 \end{bmatrix}$$