

Question: 1 (a) Solve the system of linear equations by Gaussian Jordan method [5+5]

$$2x + y + z = 2$$

$$-x + y + z = -1$$

$$4x - y + z = 2$$

(b) $A = \begin{bmatrix} 1 & -1 & 2 \\ 2 & 1 & -1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 1 \\ -1 & 1 \\ 2 & 1 \end{bmatrix}$ find $(AB)^{-1}$ and $(BA)^{-1}$, if they exists.

Question: 2.(a) If $A = \begin{bmatrix} 3 & 0 & 1 \\ -1 & -2 & -3 \\ 1 & -1 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 1 \\ -1 & 1 \\ 2 & 1 \end{bmatrix}$ find the matrix X by using A^{-1} that

[8+3+4] satisfies $AX = B$.

(b) For what value of a is

$$\begin{vmatrix} 2 & 1 & 0 \\ 0 & -1 & 3 \\ 0 & 0 & a \end{vmatrix} + \begin{vmatrix} 0 & a & 1 \\ 0 & 3a & 0 \\ -2 & a & 2 \end{vmatrix} = 16.$$

(c) Let A be a 3×3 matrix and $\det(A) = 4$, compute $\det(3A) + \det(3A^{-1}) + \det(3A)^{-1}$.

Question: 3(a). If $P(1,-1,1)$, $Q(0,1,1)$ and $R(1,2,3)$ are three points.

[10+5]

(i) Find the angle $\angle PQR$,

(ii) Find $\text{Comp}_{\vec{PQ}} \vec{PQ}$

(iii) Find the area of the triangle ΔPQR ,

(iv) Find the unit vector orthogonal to the plane of the triangle ΔPQR .

(b) Find the work done by the force $F = 3i - 2j + k$ in moving the particle from the position $A(1,-1,1)$ to the position $B(0,1,1)$.

Question: 4(a). Show that the points $A(2,-1,0)$, $B(1,-1,1)$, $C(-1,1,1)$ and $D(-1,-1,3)$ are coplanar.

[5+5]

(b) Find the equation of the plane containing the line $\frac{x-1}{1} = \frac{y-1}{-1} = \frac{z-1}{-2}$

and the point $P(0,0,1)$.