

Question: 1 (a) Solve the system of linear equations by Gaussian Elimination method [8]

$$x - 2y - 2z = 3$$

$$2x - 3y = 3$$

$$3x - 6y - 4z = 7$$

(b) Solve the determinantal equation [6]

$$\begin{vmatrix} x & 2 & 0 \\ 2 & x+3 & 0 \\ 3 & 4 & x+6 \end{vmatrix} = 0$$

Question: 2 (a) Find condition on a, b, and c for which the following system is consistent, [8]

$$x - 2y + 5z = a$$

$$4x - 5y + 8z = b$$

$$-3x + 3y - 3z = c$$

(b) Let A be a 3x3 matrix and $\det A = 4$, use properties evaluate, $\det(2A) + \det(2A^{-1}) + \det(2A)^{-1}$ [6]

Question: 3. (a) Find the angle between the lines:

$$l_1: x = 1 + t, y = 2, z = 3t \quad \text{and} \quad [6]$$

$$l_2: x = 1, y = 1 + 2t, z = -1 + t$$

(b) Determine whether the following lines

$$x = 3 + t, y = 5 - t, z = -2 + 2t, \quad [8]$$

$$\text{and } x = 2 + v, y = 3 - 2v, z = -1 + 3v$$

are parallel or do they intersect. if the lines intersect, find the point of intersection.

Question: 4. (a) If P(0,4,4), Q(2,-6,-5) and R(-3,-5,6) are three points. [12]

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

(ii) Find $\text{Com}_{\overline{PR}} \overline{PQ}$

(iii) Find the area of the triangle ΔPQR ,

(iv) Find the distance from R to \overline{PQ} .

(b) Name the surface $\frac{x^2}{4} + \frac{y^2}{9} - \frac{z^2}{16} = 1$, describe its traces and sketch the graph. [6]