

Group A.

Ex. 1 Solve the following system of equations using Gaussian elimination. You may not use any other method.

$$\begin{cases} x + 2y - z - t = 1 \\ x + y + z + 3t = 2 \quad (3 \text{ points}) \\ 3x + 5y - z + t = 3 \end{cases}$$

Ex. 2 Perform spectral decomposition of the following matrix $\begin{bmatrix} 4 & 2 \\ 2 & 1 \end{bmatrix}$. (3 points)

Ex. 3 Using an appropriate product calculate the area of a triangle having vertices in points $P = (1, 2, 0)$, $Q = (2, 1, 0)$ and $R = (1, 1, 0)$. Make a drawing in a 3-dimensional coordinate system in which the horizontal arrow is named x and the vertical arrow is named z . (3 points)

Ex. 4 Write parametric, general and segment equations for a plane that contains point $P = (1, 1, 1)$ and is span by two vectors: $\vec{u} = (1, 2, 3)$ and $\vec{v} = (4, 3, 5)$. (3 points)

Ex. 5 Mixed product may be used to calculate volumes of space figures span by vectors. List formulas for calculating volume of two distinct space figures, draw their diagrams. (3 points)

Group B.

Ex. 1 Solve the following system of equations using Gaussian elimination. You may not use any other method.

$$\begin{cases} x + 2y - z - t = 1 \\ 6x + 10y - 2z + 2t = 6 \quad (3 \text{ points}) \\ x + y + z + 3t = 2 \end{cases}$$

Ex. 2 Perform spectral decomposition of the following matrix $\begin{bmatrix} 10 & 3 \\ 3 & 2 \end{bmatrix}$. (3 points)

Ex. 3 Using an appropriate product calculate the area of a triangle having vertices in points $P = (1, 0, 3)$, $Q = (3, 0, 1)$ and $R = (1, 0, 1)$. Make a drawing in a 3-dimensional coordinate system in which the horizontal arrow is named x and the vertical arrow is named y . (3 points)

Ex. 4 Write parametric, general and segment equations for a plane that contains point $P = (1, 2, 3)$ and is span by two vectors: $\vec{u} = (1, 1, 1)$ and $\vec{v} = (-2, 3, 4)$. (3 points)

Ex. 5 What does it mean if three vectors are coplanar? Write the formula for checking if three vectors are coplanar. (3 points)