1. Perform operations on matrices:

a) $\begin{bmatrix} -1 & -4 & 5 \\ 2 & 2 & -1 \\ 3 & 2 & 2 \\ 2 & 5 & 0 \end{bmatrix} - 2 \cdot \begin{bmatrix} 2 & -4 & 3 \\ 0 & 2 & 4 \\ 1 & 2 & 2 \\ 2 & 6 & 1 \end{bmatrix} = \begin{bmatrix} -5 & 4 & -1 \\ 2 & -2 & -9 \\ 1 & -2 & -2 \\ -2 & -7 & -2 \end{bmatrix}$

b) $\begin{bmatrix} 1 & 2 & -1 & 4 \end{bmatrix} \cdot \begin{bmatrix} 4 \\ 3 \\ 2 \\ 0 \end{bmatrix} = [8]$

c) $\begin{bmatrix} 1 & 3 & 2 \\ 1 & 2 & -2 \end{bmatrix} \cdot \begin{bmatrix} 3 & 4 \\ 1 & 3 \\ 1 & 2 \end{bmatrix} - \begin{bmatrix} 2 & 1 \\ -1 & 1 \end{bmatrix} = \begin{bmatrix} 6 & 16 \\ 4 & 5 \end{bmatrix}$

d) $\begin{bmatrix} 2 & -1 \\ 5 & 2 \end{bmatrix}^T \cdot \begin{bmatrix} 3 & 5 \\ 2 & 7 \end{bmatrix}^T = \begin{bmatrix} 31 & 39 \\ 7 & 12 \end{bmatrix}$

2. Calculate determinants

a) $\begin{vmatrix} 2 & 1 \\ -1 & 1 \end{vmatrix} = 3$

b) $\begin{vmatrix} 2 & 3 & 1 \\ 1 & -1 & 1 \\ 3 & 1 & -2 \end{vmatrix} = 21$

c) $\begin{vmatrix} 5 & 1 & 2 \\ 4 & 11 & 0 \\ 10 & 0 & 4 \end{vmatrix} = -16$

3. Write down the system of equations in matrix form. Solve a system of equations using Cramer's formulas:

a) $\begin{cases} x - 4y + 5z = 2 \\ 2y - z = 1 \\ 4x + 2y + z = 0 \end{cases}$ $X = \begin{bmatrix} \frac{-22}{20} \\ \frac{27}{20} \\ \frac{34}{20} \end{bmatrix}$

b) $\begin{cases} x - 2y + 3z = -7 \\ 3x + y + 4z = 5 \\ 2x + 5y + z = 18 \end{cases}$ $X = \begin{bmatrix} 2 \\ 3 \\ -1 \end{bmatrix}$