

(1) [5 points] Compute the following matrix product:

$$\begin{bmatrix} 1 & -1 & 6 \\ 2 & 0 & -1 \\ 3 & 1 & 2 \end{bmatrix} \begin{bmatrix} 3 & 2 \\ 0 & 1 \\ 1 & 0 \end{bmatrix}$$

$$= \begin{bmatrix} 9 & 1 \\ 5 & 4 \\ 11 & 7 \end{bmatrix}$$

(2) [5 points]

The matrix $A = \begin{bmatrix} 1 & 1 & -1 \\ 2 & 1 & 1 \\ 1 & 0 & 1 \end{bmatrix}$ has inverse $A^{-1} = \begin{bmatrix} 1 & -1 & 2 \\ -1 & 2 & -3 \\ -1 & 1 & -1 \end{bmatrix}$.

Use this information to solve the system

$$\begin{aligned} x + y - z &= 3 \\ 2x + y + z &= -2 \\ x + z &= 0 \end{aligned}$$

System is $A\mathbf{X} = \mathbf{B}$ where $\mathbf{X} = \begin{bmatrix} x \\ y \\ z \end{bmatrix}$ and $\mathbf{B} = \begin{bmatrix} 3 \\ -2 \\ 0 \end{bmatrix}$.

$$\therefore \mathbf{X} = A^{-1}\mathbf{B} = \begin{bmatrix} 1 & -1 & 2 \\ -1 & 2 & -3 \\ -1 & 1 & -1 \end{bmatrix} \begin{bmatrix} 3 \\ -2 \\ 0 \end{bmatrix}$$

$$\therefore \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 5 \\ -7 \\ -5 \end{bmatrix}$$

$$\therefore x = 5, y = -7, z = -5$$

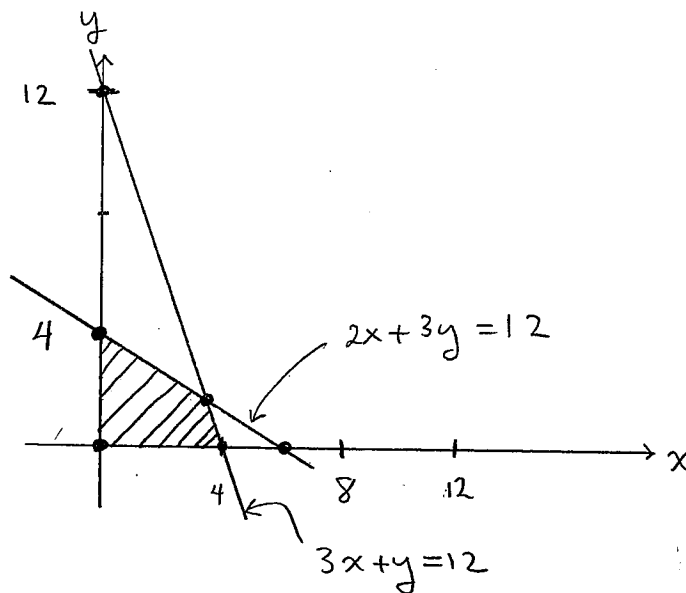
(3) [5 points] Graph the following system of inequalities and determine the corner points:

$$2x + 3y \leq 12$$

$$3x + y \leq 12$$

$$x \geq 0$$

$$y \geq 0$$



$$\textcircled{1} \quad 2x + 3y = 12$$

$$\textcircled{2} \quad 3x + y = 12$$

$$\textcircled{1} - 3\textcircled{2}: \quad -7x = -24$$
$$x = \frac{24}{7}$$

$$3x + y = 12$$

$$3\left(\frac{24}{7}\right) + y = 12$$

$$\frac{72}{7} + y = 12$$

$$y = 12 - \frac{72}{7}$$

$$= \frac{84 - 72}{7}$$

$$= \frac{12}{7}$$

\therefore corner points are
 $(0,0), (4,0), (0,4), \left(\frac{24}{7}, \frac{12}{7}\right)$.