

# ASSIGNMENT-8

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Download all python codes from

<https://github.com/ThurpuNaveena/Assignment8/tree/main/Assignment8>

and latex-tikz codes from

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## 1 QUESTION No-2.48(INEQUALITIES)

Solve:  $2x+y \geq 6$ ,  $3x+4y \leq 12$ .

## 2 SOLUTION

$$2x + y \geq 6, -3x - 4y \geq -12 \quad (2.0.1)$$

Let  $u_1 \geq 0, u_2 \geq 0$ . This may be expressed as

$$\mathbf{u} = \begin{pmatrix} u_1 \\ u_2 \end{pmatrix} \geq \mathbf{0} \quad (2.0.2)$$

Now we have,

$$\begin{pmatrix} 2 & 1 \\ -3 & -4 \end{pmatrix} \mathbf{x} \geq \begin{pmatrix} 6 \\ -12 \end{pmatrix} + \mathbf{u} \quad (2.0.3)$$

$$\mathbf{x} = \begin{pmatrix} 2 & 1 \\ -3 & -4 \end{pmatrix}^{-1} \begin{pmatrix} 6 \\ -12 \end{pmatrix} + \begin{pmatrix} 2 & 1 \\ -3 & -4 \end{pmatrix}^{-1} \mathbf{u} \quad (2.0.4)$$

$$\Rightarrow \mathbf{x} = \begin{pmatrix} \frac{4}{5} & \frac{1}{5} \\ \frac{3}{5} & \frac{2}{5} \end{pmatrix} \begin{pmatrix} 6 \\ -12 \end{pmatrix} + \frac{1}{5} \begin{pmatrix} 4 & 1 \\ -3 & -2 \end{pmatrix} \mathbf{u} \quad (2.0.5)$$

$$\mathbf{x} = \begin{pmatrix} \frac{12}{5} \\ \frac{6}{5} \end{pmatrix} + \frac{1}{5} \begin{pmatrix} 4 & 1 \\ -3 & -2 \end{pmatrix} \mathbf{u} \quad (2.0.6)$$

Thus the solution of the system of inequalities can be determined graphically and the desired region is the shaded triangle. Which is represented in the below fig 2.1

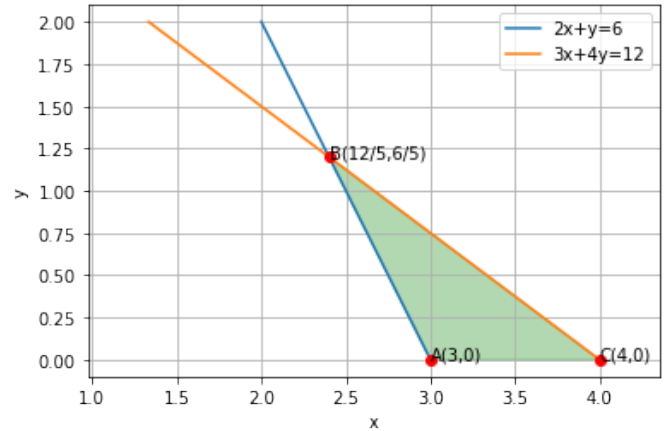


Fig. 2.1: Graphical solution