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 ≥ 6, 3x+4y ≤ 12.

2 Solution

$$2x + y \geq 6, -3x - 4y \geq -12 \tag{2.0.1}$$

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

$$\mathbf{u} = \begin{pmatrix} u_1 \\ u_2 \end{pmatrix} \geq \mathbf{0} \tag{2.0.2}$$

Now we have,

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

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

$$\implies \mathbf{x} = \begin{pmatrix} \frac{4}{5} & \frac{1}{5} \\ \frac{-3}{5} & \frac{-2}{5} \end{pmatrix} \begin{pmatrix} 6 \\ -12 \end{pmatrix} + \frac{1}{5} \begin{pmatrix} 4 & 1 \\ -3 & -2 \end{pmatrix} \mathbf{u} \tag{2.0.5}$$

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

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

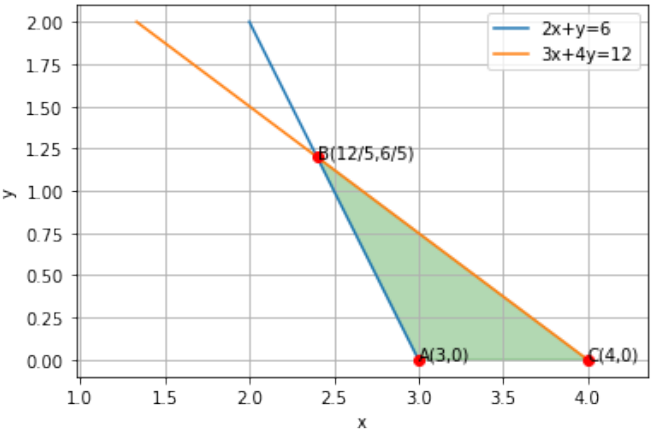

Fig. 2.1: Graphical solution