ASSIGNMENT 8

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Download all python codes from

https://github.com/Y.Nagarani/ASSIGNMENT8/tree/main/CODES

and latex-tikz codes from

https://github.com/Y.Nagarani/ASSIGNMENT8/tree/main

1 Question No 2.49

Solve x+y $\geq$ 4 , 2x-y $\leq$ 0.

2 SOLUTION

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

$$\mathbf{u} = \begin{pmatrix} u_1 \\ u_2 \end{pmatrix} \geq \mathbf{0} \tag{2.0.1}$$

Now ,we have

$$\begin{pmatrix} 1 & 1 \\ -2 & 1 \end{pmatrix} \mathbf{x} \geq \begin{pmatrix} 4 \\ 0 \end{pmatrix} \tag{2.0.2}$$

$$\begin{pmatrix} 1 & 1 \\ -2 & 1 \end{pmatrix} \mathbf{x} \geq \begin{pmatrix} 4 \\ 0 \end{pmatrix} + \mathbf{u} \tag{2.0.3}$$

$$\mathbf{x} = \begin{pmatrix} 1 & 1 \\ -2 & 1 \end{pmatrix}^{-1} \begin{pmatrix} 4 \\ 0 \end{pmatrix} + \begin{pmatrix} 1 & 1 \\ -2 & 1 \end{pmatrix}^{-1} \mathbf{u} \tag{2.0.4}$$

$$\mathbf{x} = \frac{1}{3} \begin{pmatrix} 4 \\ 8 \end{pmatrix} + \frac{1}{3} \begin{pmatrix} 1 & -1 \\ 2 & 1 \end{pmatrix} \mathbf{u} \tag{2.0.5}$$

$$\mathbf{x} = \begin{pmatrix} \frac{4}{3} \\ \frac{8}{3} \end{pmatrix} + \frac{1}{3} \begin{pmatrix} 1 & -1 \\ 2 & 1 \end{pmatrix} \mathbf{u} \tag{2.0.6}$$

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

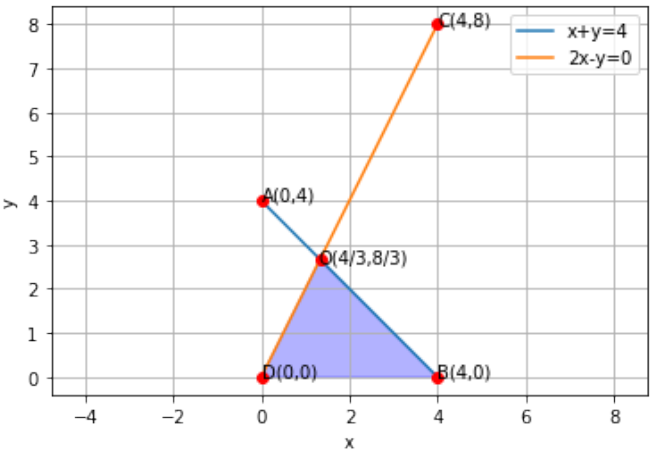

Fig. 2.1: Graphical Solution