ASSIGNMENT 9

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Download all python codes from

https://github.com/BOJJAVOYINAANUSHA/ASSIGNMENT9/tree/main/CODES

and latex-tikz codes from

https://github.com/BOJJAVOYINAANUSHA/ASSIGNMENT9/tree/main

1 Question No 2.50

Solve $2x - y > 1, x - 2y < -1$.

2 SOLUTION

Let $2x - y = 1$ intersects the x-axis and y-axis at **A** and **B** respectively.

1) Let $\mathbf{A} = \begin{pmatrix} x \\ 0 \end{pmatrix}$

$$2x = 1 \tag{2.0.1}$$
$$\implies x = \frac{1}{2} \tag{2.0.2}$$
$$\mathbf{A} = \begin{pmatrix} \frac{1}{2} \\ 0 \end{pmatrix} \tag{2.0.3}$$

2) Let $\mathbf{B} = \begin{pmatrix} 0 \\ y \end{pmatrix}$

$$-y = 1 \tag{2.0.4}$$
$$\implies y = -1 \tag{2.0.5}$$
$$\mathbf{B} = \begin{pmatrix} 0 \\ -1 \end{pmatrix} \tag{2.0.6}$$

3) Origin $= \begin{pmatrix} 0 \\ 0 \end{pmatrix}$ does not satisfy the equation $2x - y < 1$.
$\implies$ The solution is the right side of the line $2x - y = 1$.

4) Let $-x + 2y = 1$ intersects the x-axis and y-axis at **P** and **Q** respectively.

5) Let $\mathbf{P} = \begin{pmatrix} x \\ 0 \end{pmatrix}$

$$-x = 1 \tag{2.0.7}$$
$$\implies x = -1 \tag{2.0.8}$$
$$\mathbf{P} = \begin{pmatrix} -1 \\ 0 \end{pmatrix} \tag{2.0.9}$$

6) Let $\mathbf{Q} = \begin{pmatrix} 0 \\ y \end{pmatrix}$

$$2y = 1 \tag{2.0.10}$$
$$\implies y = \frac{1}{2} \tag{2.0.11}$$
$$\mathbf{Q} = \begin{pmatrix} 0 \\ \frac{1}{2} \end{pmatrix} \tag{2.0.12}$$

7) Origin $= \begin{pmatrix} 0 \\ 0 \end{pmatrix}$ does not satisfy the equation $x - 2y < -1$.
$\implies$ The solution is the left side of the line $x - 2y = -1$

8) 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

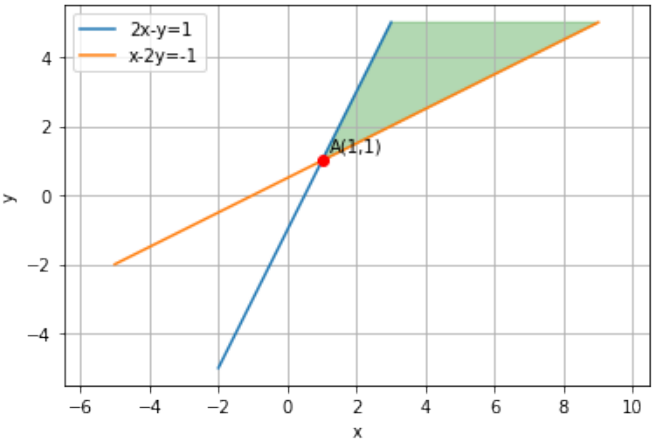

Fig. 8: Graphical Solution