ASSIGNMENT 9

ATLA KEERTHANA

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1 QUESTION No 2.39

Solve $3x+4y \leq 12$.

2 SOLUTION

Let $\begin{pmatrix} 3 & 4 \end{pmatrix} \mathbf{x} = 12$ intersects the x-axis and y-axis at $\mathbf{A}$ and $\mathbf{B}$ respectively.

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

   Put $\mathbf{A}$ in equation

$$\begin{pmatrix} 3 & 4 \end{pmatrix}\begin{pmatrix} x \\ 0 \end{pmatrix} = 12 \tag{2.0.1}$$

$$\implies x = 4 \tag{2.0.2}$$

$$\therefore \mathbf{A} = \begin{pmatrix} 4 \\ 0 \end{pmatrix} \tag{2.0.3}$$

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

   Put $\mathbf{B}$ in equation

$$\begin{pmatrix} 3 & 4 \end{pmatrix}\begin{pmatrix} 0 \\ y \end{pmatrix} = 12 \tag{2.0.4}$$

$$\implies y = 3 \tag{2.0.5}$$

$$\therefore \mathbf{B} = \begin{pmatrix} 0 \\ 3 \end{pmatrix} \tag{2.0.6}$$

3) Origin $= \begin{pmatrix} 0 \\ 0 \end{pmatrix}$ satisfy the equation $\begin{pmatrix} 3 & 4 \end{pmatrix} \mathbf{x} \leq 12$

   $\implies$ The solution is the right side of the line $\begin{pmatrix} 3 & 4 \end{pmatrix} \mathbf{x} = 12$

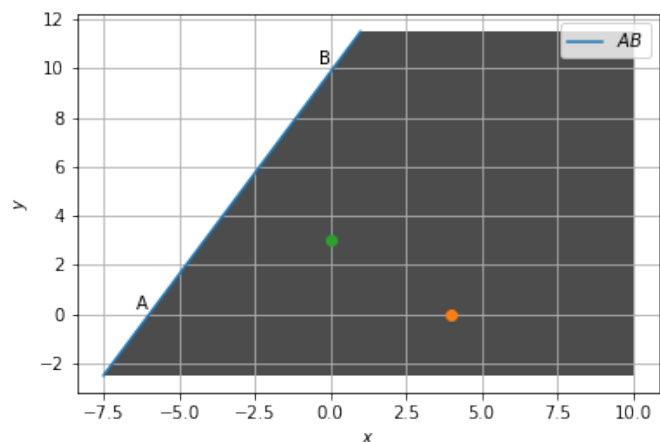4) The following python code is the diagrammatic representation of the solution in Fig. 2.1

Solution of $3x+4y \leq 12$

Fig. 2.1: Graphical Solution