ASSIGNMENT NO.1
COURSE CODE-AI1110
Probability And Random Variables

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Question 1a

Solve the following inequation and write down the solution set:

$$11x - 4 < 15x + 4 \leq 13x + 14, x \in W$$

Represent the solution on number line .

Solution

There are two inequatilities.

$$11x - 4 < 15x + 4 \leq 13x + 14, x \in W \tag{1}$$

Lets solve for left inequation.

$$\begin{aligned} 11x - 4 &< 15x + 4 \\ \Rightarrow -8 &< 15x - 11x \\ \Rightarrow -2 &< x \end{aligned} \tag{2}$$

Lets solve for right inequation.

$$\begin{aligned} 15x + 4 &\leq 13x + 14 \\ \Rightarrow 2x &\leq 10 \\ \Rightarrow x &\leq 5 \\ -2 < x &\leq 5, \\ x &\in W \end{aligned} \tag{3}$$

$$\Rightarrow x = 0, 1, 2, 3, 4, 5$$

VECTOR WAY TO FIND INTERSECTION POINTS

vector equations of lines:

$$\text{L1} \equiv 11x - 4 - y1 = 0 \tag{4}$$

$$\text{L2} \equiv 15x + 4 - y2 = 0 \tag{5}$$

$$\mathrm{L3} \equiv 13x + 14 - y3 = 0 \qquad (6)$$

$$\mathrm{L1} \equiv \begin{pmatrix} 11 & -1 \end{pmatrix} \mathbf{p1} = 4 \qquad (7)$$
$$\Rightarrow \begin{pmatrix} 11 & -1 \end{pmatrix} \begin{pmatrix} x \\ y1 \end{pmatrix} = 4$$

$$L2 \equiv \begin{pmatrix} 15 & -1 \end{pmatrix} \mathbf{p2} = -4 \qquad (8)$$
$$\Rightarrow \begin{pmatrix} 15 & -1 \end{pmatrix} \begin{pmatrix} x \\ y2 \end{pmatrix} = -4$$

$$L3 \equiv \begin{pmatrix} 13 & -1 \end{pmatrix} \mathbf{p3} = -14 \qquad (9)$$
$$\Rightarrow \begin{pmatrix} 13 & -1 \end{pmatrix} \begin{pmatrix} x \\ y3 \end{pmatrix} = -14$$

$$y1 = y2 \qquad (10)$$
$$\Rightarrow \begin{pmatrix} 11 & -1 \end{pmatrix} \begin{pmatrix} x \\ 1 \end{pmatrix} = \begin{pmatrix} 15 & 4 \end{pmatrix} \begin{pmatrix} x \\ 1 \end{pmatrix}$$
$$\Rightarrow -8 = 4x$$
$$\Rightarrow -2 = x$$

$$y2 = y3 \qquad (11)$$
$$\Rightarrow \begin{pmatrix} 15 & 4 \end{pmatrix} \begin{pmatrix} x \\ 1 \end{pmatrix} = \begin{pmatrix} 13 & 14 \end{pmatrix} \begin{pmatrix} x \\ 1 \end{pmatrix}$$
$$\Rightarrow 2x = 10$$
$$\Rightarrow x = 5$$

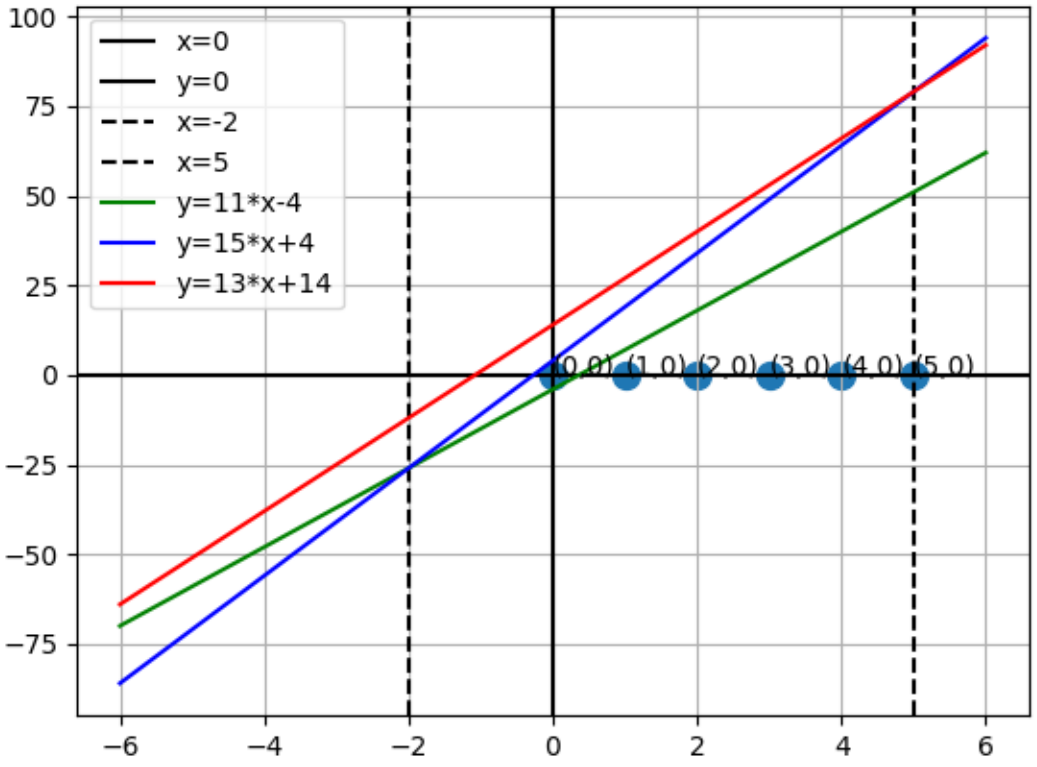

Figure 1: THREE LINES

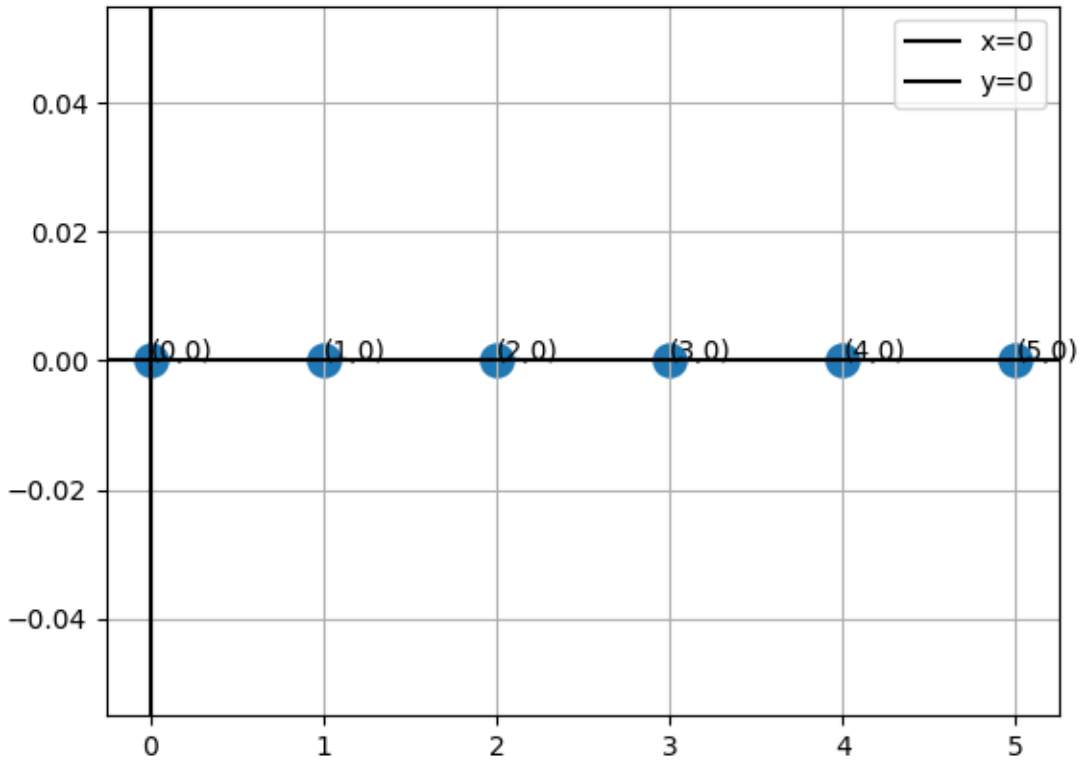

Figure 2: REQUIRED POINTS