

# AI1110 Assignment 1

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## Question 4a

Solve the following inequation, write down the solution set and represent it on the real number line:

$$-2 + 10x \leq 13x + 10 < 24 + 10x, x \in \mathbb{Z}$$

## Solution

$$-2 + 10x \leq 13x + 10 < 24 + 10x$$

There are two inequation in the above expression let us consider each inequation one at a time and find out the set of integers that obey the each inequation

finally the intersection of the two sets gives us the set of integers that obey the entire expression

### First Inequality

$$\begin{aligned} -2 + 10x &\leq 13x + 10 \\ \Rightarrow -2 - 10 &\leq 13x - 10x \\ \Rightarrow -12 &\leq 3x \\ \Rightarrow -4 &\leq x \\ \Rightarrow x &\geq -4 \\ \text{and } x &\in \mathbb{Z} \\ \text{therefore } x &= \{-4, -3, -2, -1, 0, 1, 2, \dots\} \longrightarrow \text{set1} \end{aligned}$$

### Second Inequality

$$\begin{aligned} 13x + 10 &< 24 + 10x \\ \Rightarrow 13x - 10x &< 24 - 10 \\ \Rightarrow 3x &< 14 \\ \Rightarrow x &< 14/3 \\ \Rightarrow x &< 4.6667 \\ \text{and } x &\in \mathbb{Z} \\ \text{therefore } x &= \{4, 3, 2, 1, 0, -1, -2, \dots\} \longrightarrow \text{set2} \end{aligned}$$

Now the intersection of these two sets gives us the actual set of integers that obey the given expression

$$\boxed{set1 \cap set2 = \{-4, -3, -2, -1, 0, 1, 2, 3, 4\}}$$

here is the plot of corresponding points on the real number line

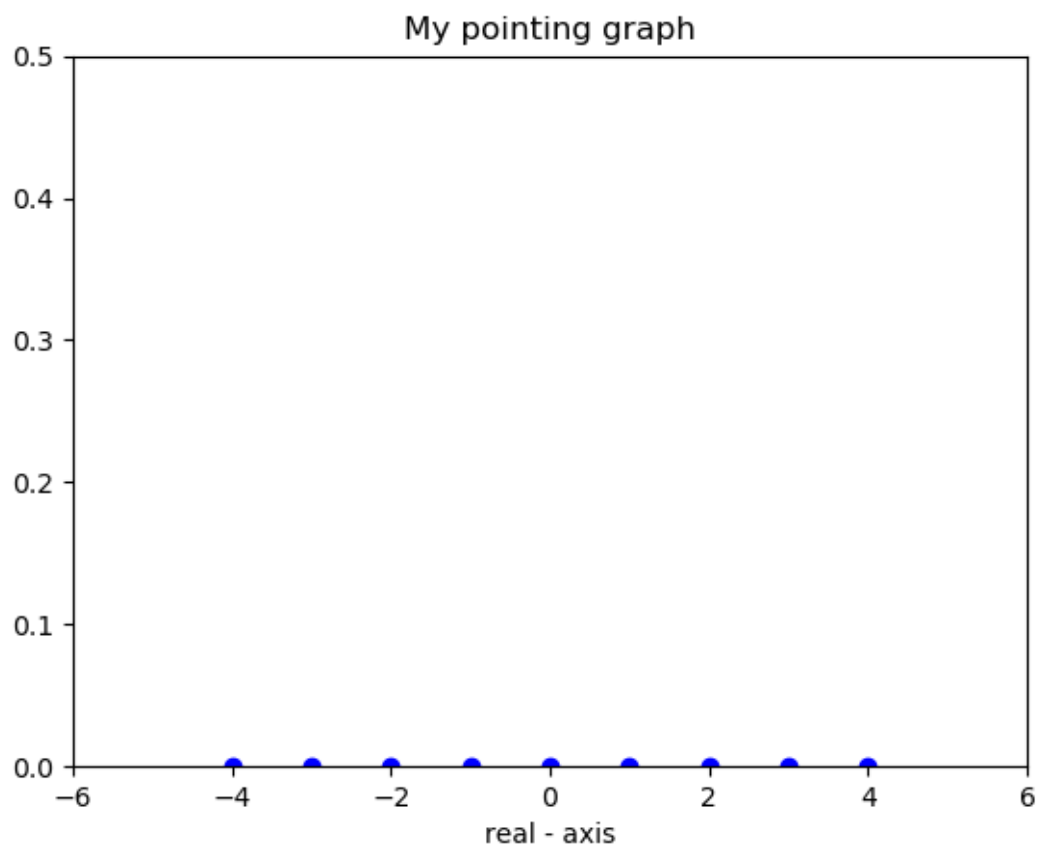


Figure 1: set of points that obey given expression on real number line