

Solving Linear Inequalities Using a TI-86

Before you begin, clear all previously saved variables and functions, set the graph mode and viewing window.

$$\text{Solve: } 4x + 7 > 2x - 3$$

Algebraically:

$$\begin{aligned} 4x + 7 &> 2x - 3 \\ 2x &> -10 \\ x &> -5 \\ (-5, \infty) \end{aligned}$$

There are two ways to solve a linear inequality graphically: **Using Root and Using Intersection**

Graphically: Using Zero (Root)

Rewrite the inequality with 0 on one side.

$$4x + 7 - 2x + 3 > 0$$

Let Y1 equal the left side of the inequality.

Graph

F1: y(x)=

$$Y1 = 4x + 7 - 2x + 3$$

Then graph.

Graph

F5: Graph

The solution set for **> inequalities** is the set of all x-values for which the graph is **above** the x-axis.

The solution set for **< inequalities** is the set of all x-values for which the graph is **below** the x-axis.

Find the x-intercept (zero)

More

F1: Math

F1: Root

Left Bound?: - move cursor to the left of the x intercept using the left or right arrows

Enter

Right Bound?: - move cursor to the right of the x intercept using the right arrow

Enter

Guess? - move cursor close to the x-intercept

Enter

The coordinates of the x-intercept are given at the bottom of the screen: (-5, 0)

The graph is above the x-axis for x values greater than -5.

The solution is $(-5, \infty)$.

(This is the other method.)

Graphically: Using Intersection

Let Y1 be the left side of the inequality and Y2 the right side of the inequality.

The inequality will either be $Y1 < Y2$ or $Y1 > Y2$. Graph Y1 and Y2 on the same screen.

If $Y1 < Y2$ determine on what interval Y1 is **below** Y2.

If $Y1 > Y2$ determine on what interval Y1 is **above** Y2.

Solve: $4x + 7 > 2x - 3$

Graph

F1: y(x)=

(Clear functions)

$$Y1 = 4x + 7$$

$$Y2 = 2x - 3$$

Graph

F5: Graph

Change viewing window to see intersection

F2: Wind

$$x_{\min} = -10 \quad y_{\min} = -20$$

$$x_{\max} = 1 \quad y_{\max} = 1$$

$$x_{\text{scl}} = 1 \quad y_{\text{scl}} = 1$$

F5: Graph

To find the point of intersection

More

F1: Math

More

F3: Isect

1st Curve: (The cursor should be blinking on one line and the equation number will appear in the upper right hand corner of the window. If you can't see the cursor, use the left or right arrows to bring it into view.)

Enter

2nd Curve: (The cursor should move to the next line and the number will change to 2)

Enter

Guess?: - move cursor to the point of the intersection using the right or left arrow keys

Enter

The calculator shows the intersection is at (-5, -13).

Y1 is above Y2 to the right of the point of intersection. Therefore, $4x + 7 > 2x - 3$ for values of x in the interval $(-5, \infty)$.