

Solving Double Inequalities

The solution to a system of two inequalities in one variable consists of all values of the variable that make each inequality in the system true. A system $f(x) \geq a$, $f(x) \leq b$, where the same expression appears on both inequalities, is commonly referred to as a “double” inequality and is often written in the form $a \leq f(x) \leq b$. Be certain that both inequality signs are pointing in the same direction and that the double inequality is only used to indicate an expression in x “trapped” in between two values. Also a must be less than or equal to b in the inequality $a \leq f(x) \leq b$ or $b \geq f(x) \geq a$.

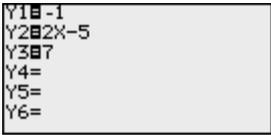
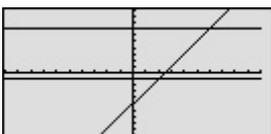
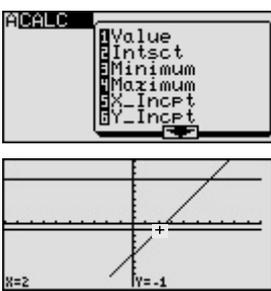
Example

Solve a double inequality, using graphical techniques.

$$2x - 5 \geq -1$$

$$2x - 5 \leq 7$$

Before Starting There may be differences in the results of calculations and graph plotting depending on the setting. Return all settings to the default value and delete all data.

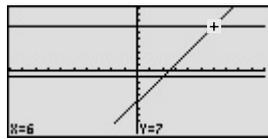
<u>Step & Key Operation</u>	<u>Display</u>	<u>Notes</u>
<p>1 Enter $y = -1$ for Y1, $y = 2x - 5$ for Y2, and $y = 7$ for Y3.</p> <p>Y= (-) 1 ENTER</p> <p>2 X/θ/T/∥ - 5 ENTER 7</p>		<p>The “double” inequality given can also be written to $-1 \leq 2x - 5 \leq 7$.</p>
<p>2 View the lines.</p> <p>GRAPH</p>		
<p>3 Find the point of intersection.</p> <p>2nd F CALC 2</p>		<p>$y = 2x - 5$ and $y = -1$ intersect at $(2, -1)$.</p>

Step & Key Operation

Display

Notes

4 Move the tracer and find another intersection.



$y = 2x - 5$ and $y = 7$ intersect at $(6, 7)$.

5 Solve the inequalities.

The solution to the “double” inequality $-1 \leq 2x - 5 \leq 7$ consists of all values of x in between, and including, 2 and 6 (i.e., $x \geq 2$ and $x \leq 6$). The solution is $2 \leq x \leq 6$.



Graphical solution methods not only offer instructive visualization of the solution process, but they can be applied to inequalities that are often difficult to solve algebraically. The EL-9900 allows the solution region to be indicated visually using the Shade feature. Also, the points of intersection can be obtained easily.