

System of Two-Variable Inequalities

The solution region of a system of two-variable inequalities consists of all points (a, b) such that when $x = a$ and $y = b$, all inequalities in the system are true. To solve two-variable inequalities, the inequalities must be manipulated to isolate the y variable and enter the other side of the inequality as a function. The calculator will only accept functions of the form $y = \underline{\hspace{1cm}}$. (where y is defined explicitly in terms of x).

Example

Solve a system of two-variable inequalities by shading the solution region.

$$2x + y \geq 1$$

$$x^2 + y \leq 1$$

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.

Set the zoom to the decimal window: ZOOM A (ENTER 2nd F ∇) 7

Step & Key Operation

(When using EL-9650/9600c)

*Use either pen touch or cursor to operate.

Display

(When using EL-9650/9600c)

Notes

1 Rewrite each inequality in the system so that the left-hand side is y :

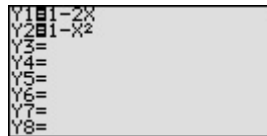
$$2x + y \geq 1 \rightarrow y \geq 1 - 2x$$

$$x^2 + y \leq 1 \rightarrow y \leq 1 - x^2$$

2 Enter $y = 1 - 2x$ for Y1 and $y = 1 - x^2$ for Y2.

Y= 1 - 2 X/□/□/□ ENTER*

1 - X/□/□/□ x²



3 Access the set shade screen

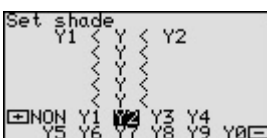
2nd F DRAW G*

1*



4 Shade the points of y -value so that $Y1 \leq y \leq Y2$.

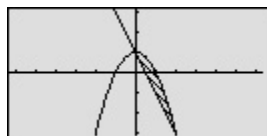
- * > * - - *



5 Graph the system and find the intersections.

GRAPH

2nd F CALC 2 * 2nd F CALC 2 *



The intersections are $(0, 1)$ and $(2, -3)$

6 Solve the system.

The solution is $0 \leq x \leq 2$.

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-9650/9600c/9450/9400 allows the solution region to be indicated visually using the Shade feature. Also, the points of intersection can be obtained easily.