

Using MATLAB to Solve Systems of Inequalities¹

PART ONE – Doing The Problem By Hand

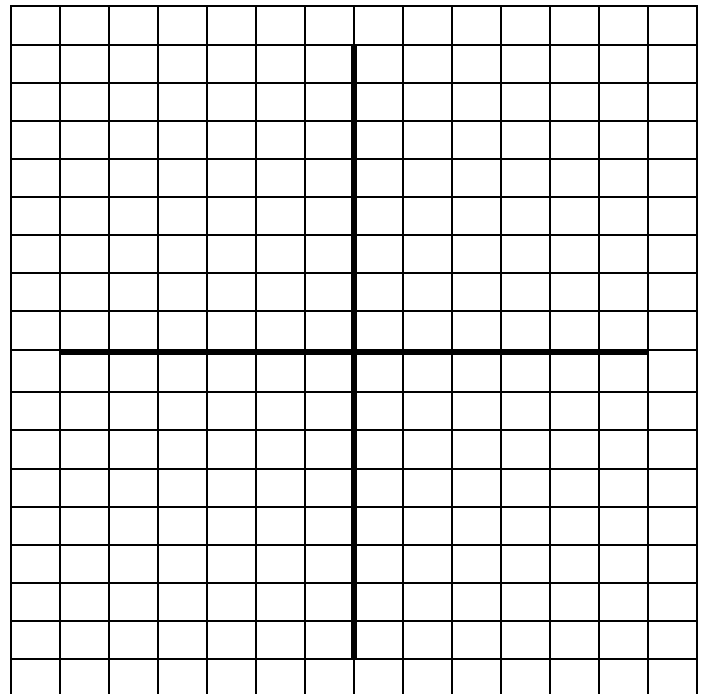
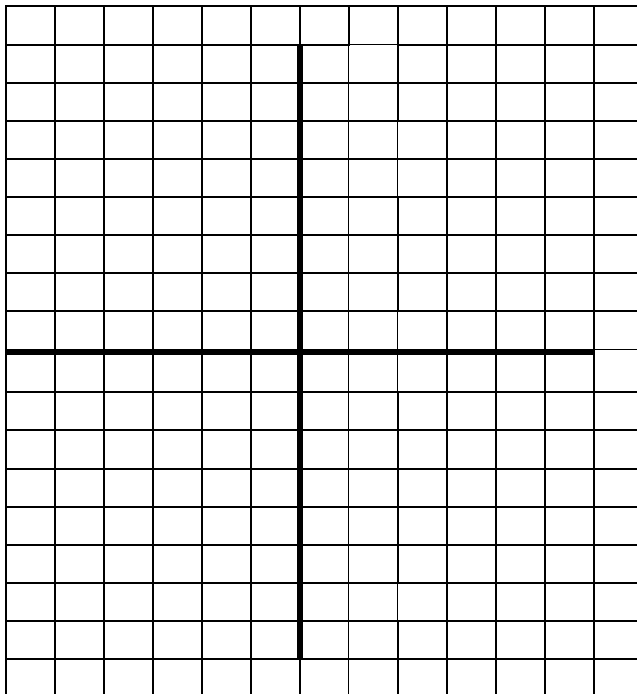
In the first part of this lesson we are going to review solving systems of inequalities by hand. We have seen that the steps for this process are as follows:

Step 1. Solve each inequality individually.	Solving individual inequalities was addressed in the previous lesson. If you are unsure of yourself, stop here and refer to that lesson.
Step 2. Shade the region where the solutions overlap.	Often when two lines are involved, this region will be vertical to the unshaded part of the graph.

Directions: Solve the following linear systems by hand. Heavily darken the region that contains the solution to the system.

$$\begin{cases} y \leq 2x + 1 \\ y > -\frac{2}{3}x - 4 \end{cases}$$

$$\begin{cases} 9x - 3y > 6 \\ y > -x \\ x \leq 4 \end{cases}$$



¹ Vsystemslab.doc \T. Vizza

PART TWO – Solving The Problem Using MATLAB

In this section we are going to following the same procedures that we did in the previous lesson while using the **inequalities program** with one exception. We are going to use the fill button at the bottom right of the figure to "fill in" the solution region to the system.

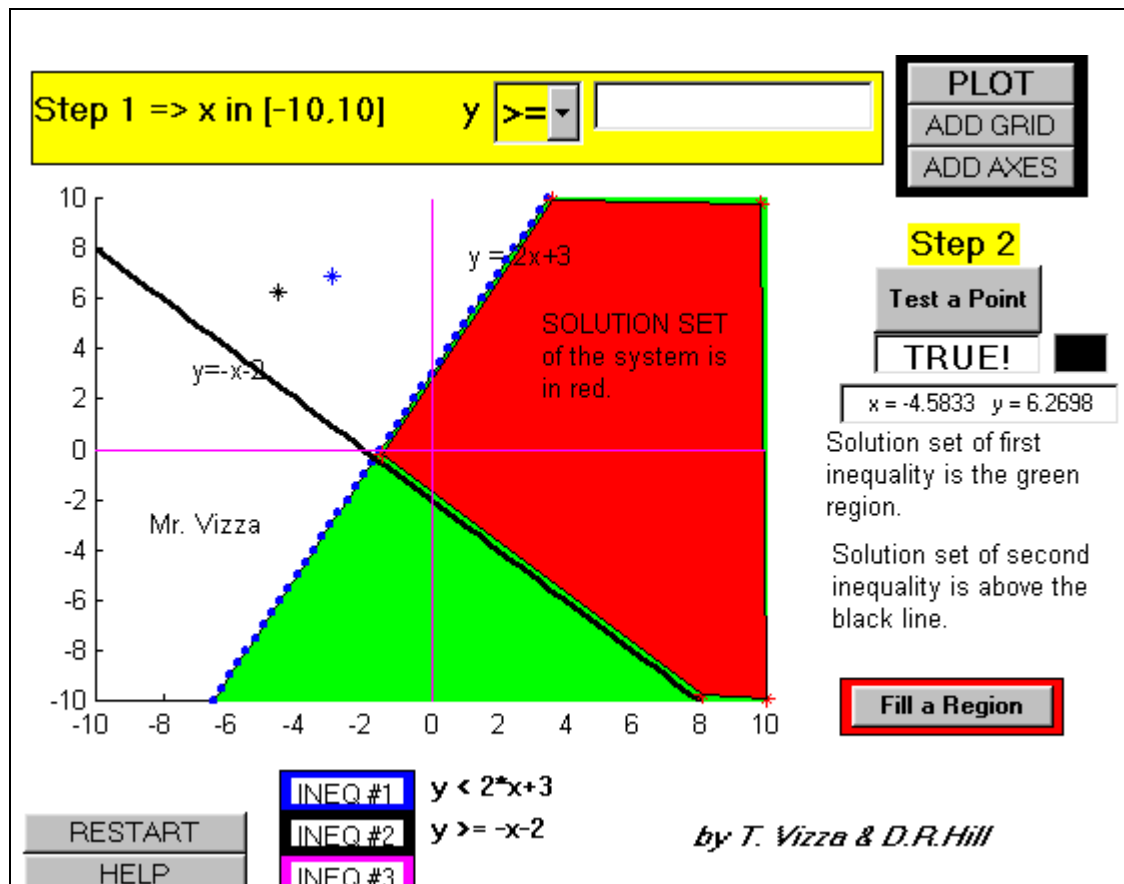
- Step 1.** Solve each individual inequality.
- Step 2.** Click the **fill** button at the bottom right of the figure.
- Step 3.** Click on the vertices of a polygonal region that outlines the solution to the system.²
- Step 4.** Press the enter key. Your solution set to the inequality will be "filled in" as a red region on the graph.

If you need to graph an inequality in one variable, (e.g. $x > 4$, or $y \leq -7$) click on the Tools pull down menu and then click Enable Plot Editing. You will have a line tool and a labeling tool in the toolbar of the figure. The line can be moved around the graph using click and drag. Also, the line style (i.e. dotted or solid) can be edited by double clicking on the line. To delete such lines, select them by single clicking on them, then press delete.

Problem Set

Directions: Please use the inequalities program in MATLAB to solve the systems of inequalities below. Be sure to label your printouts with the problem number and your name. (A finished product should look like the following.)

Example #1
$$\begin{cases} y < 2x + 3 \\ y \geq -x - 2 \end{cases}$$



² If your solution is not a polygonal region, you will have to click additional times along the contour of the region to outline your solution set.

$$1. \begin{cases} y \leq x+5 \\ y > -\frac{2}{5}x-4 \end{cases}$$

$$2. \begin{cases} y < \frac{2}{3}x+4 \\ y < -\frac{2}{3}x+4 \end{cases}$$

$$3. \begin{cases} y > -\frac{2}{7}x+2 \\ y < 2x+1 \end{cases}$$

$$4. \begin{cases} y > x-7 \\ y \leq -\frac{7}{2}x+2 \end{cases}$$

$$5. \begin{cases} y > x+4 \\ x > -3 \\ x < 4 \end{cases}$$

$$6. \begin{cases} y \leq -x \\ y > x \\ x \geq -5 \end{cases}$$

$$7. \begin{cases} y \leq 2 \\ y > -5 \\ x > -4 \\ x < 8 \end{cases}$$

$$8. \begin{cases} y \geq -\frac{4}{7}x-6 \\ y > \frac{5}{7}x-5 \\ y < 2 \end{cases}$$

$$9. \begin{cases} 2x+3y > 6 \\ -x+y < -4 \end{cases}$$

$$10. \begin{cases} y \geq \frac{1}{4}x^2 \\ y < 6 \end{cases}$$

$$11. \begin{cases} y < \frac{1}{4}x^2 \\ y < 6 \end{cases}$$

$$12. \begin{cases} y \leq -\frac{2}{3}x^2+4 \\ y > \frac{2}{3}x^2-4 \end{cases}$$