Using MATLAB to Solve Linear Inequalities[1]

PART ONE – Doing The Problem By Hand

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

Step 1. **Graph** the linear inequality.	We have done this using the slope-intercept form of a line (y=mx+b), or by evaluating the equation for random x's.
Step 2. **Test** a point **that is not on the line..**	(0, 0) is a great point to choose because it allows you to simplify the expression using inspection.
Step 3. **Shade** the side of the line that is true.	If your test point yielded a true statement, shade the side of the line that contains the test point. If the test point yielded a false statement, shade the side of the line that does not contain the test point.

Directions: Use the steps above to solve the following linear inequalities.

$$y \le \frac{3}{2}x - 2 \qquad\qquad\qquad\qquad y > -3x$$
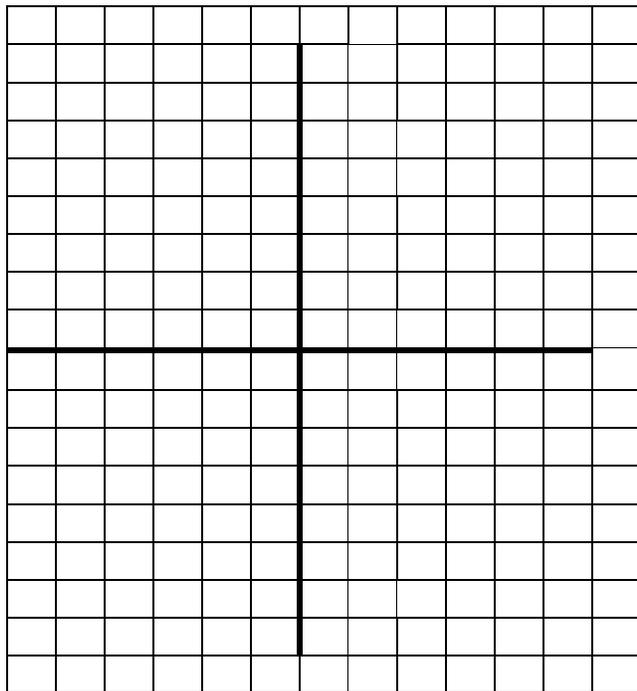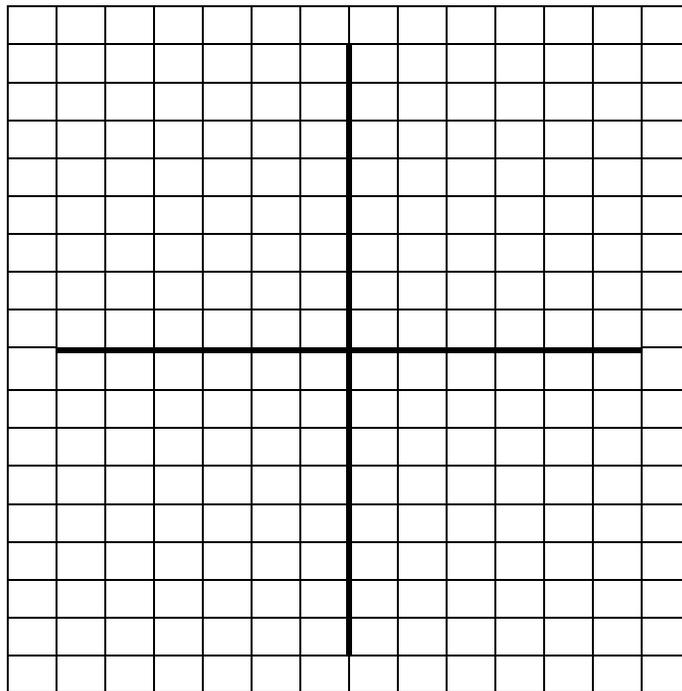
PART TWO – Solving The Problem Using MATLAB

In this section we will be using an interactive MATLAB program to <u>assist </u>us in solving linear inequalities. To access this program, open the MATLAB application and type the word **inequalities** at the MATLAB prompt. When you do this, the figure below appears without the annotations in the boxes.

Before trying to solve the problems in the next exercise, take a moment to study this figure that you will be using in this lesson. Notice that the steps in the program are the same as doing it by hand.
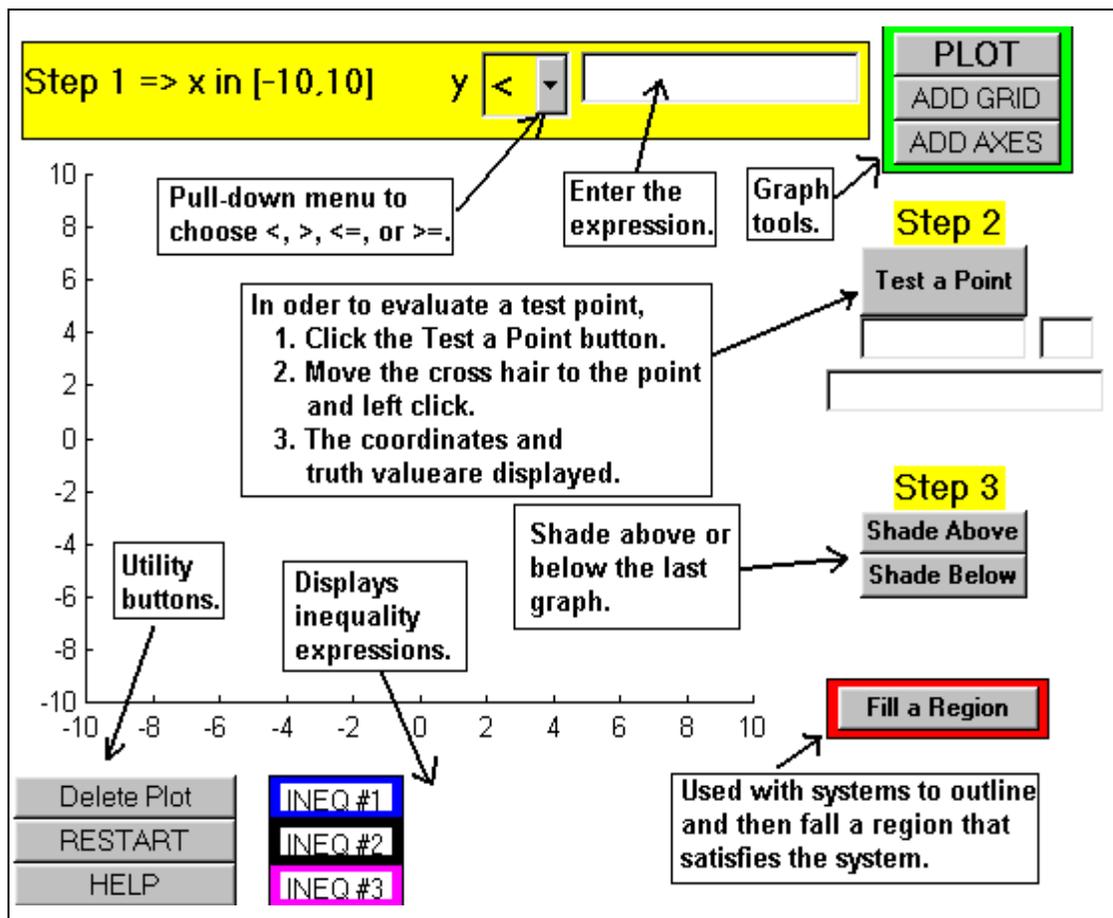
<u>Directions</u>: Please use the **inequalities** program in MATLAB to solve the inequalities below. Be sure to label your printouts with the problem number and your name. (A finished product should look like the following.)

Example #1 $y > 2x + 3$
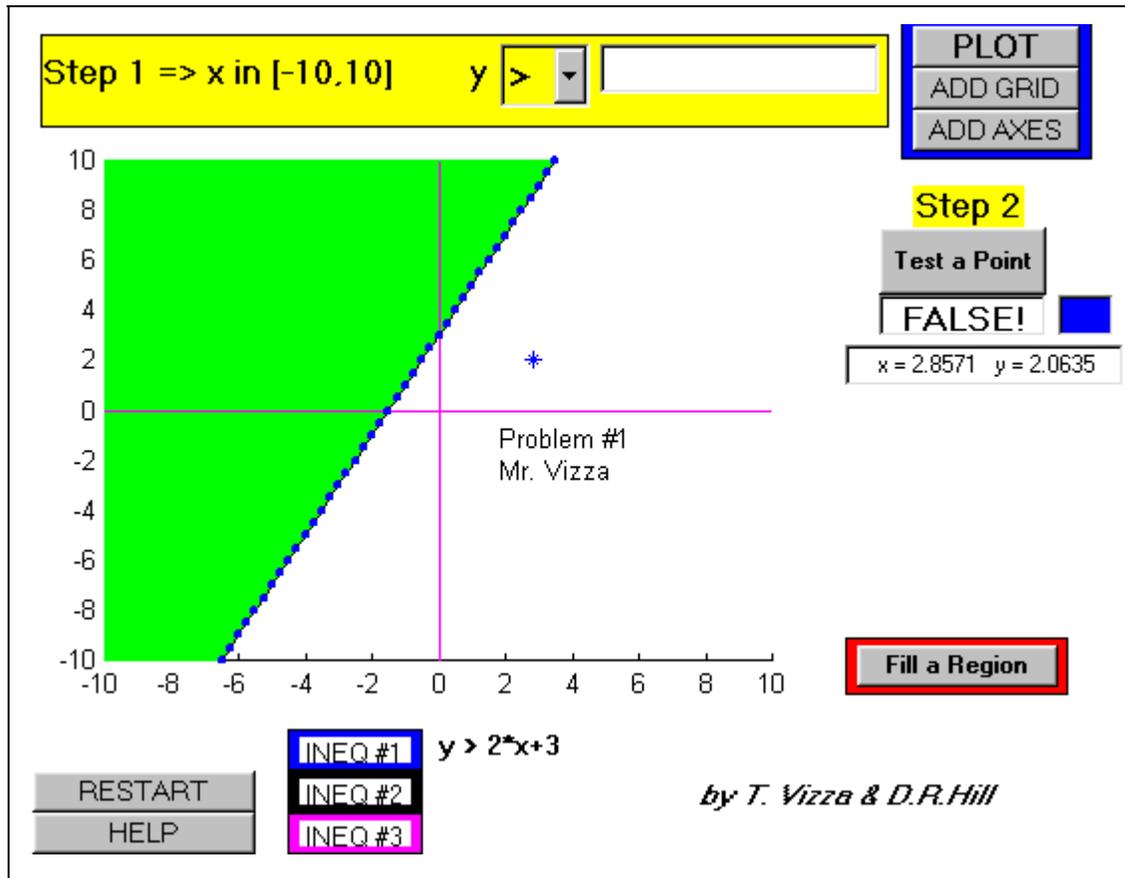
Problem Set

1. $y > \dfrac{1}{3}x + 4$ 2. $y \le x + 4$ 3. $y < 4 - \dfrac{2}{3}x$

4. $y < -3x + \sqrt{7}$ 5. $y \ge x$ 6. $2x + 3y < 4$

7. $-x - 4y < 2$ 8. $y \ge \dfrac{1}{4}x^2$ 9. $y < \dfrac{1}{4}x^3$

Closure Questions

1. Consider the processes of solving linear inequalities by hand and as well as using MATLAB. Compare and contrast step 2 in both these processes.

2. Does MATLAB solve inequalities or does it assist in solving inequalities? Please explain.

3. If you were to redo the above problems by hand, which problems would be most difficult? Why?