Second-Degree Inequalities; Nonlinear Systems of Inequalities

Objectives: Graph the solution set of second degree inequalities
Graph the solution set of a system of non-linear inequalities

In this worksheet, nonlinear inequalities in two variables and nonlinear *systems* of inequalities in two variables will be considered. The methods for graphing their solution sets are similar to those used to graph linear inequalities. Because inequalities in general have an infinite number of solutions (linear equations have at most 1 solution, quadratic equations have at most 2 solutions, etc.), shading on a coordinate plane is the method used to show the solution set.

You may recall from Topic 5.3 that the solution of linear inequalities in two variables was found using the four step method:

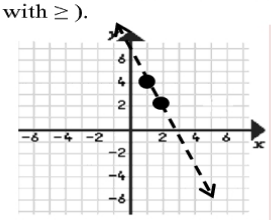
1. Graph the corresponding equation.
2. Use a solid line for ≤ or ≥ and a dashed line for < or >.
3. Use a test point to determine the region for which points the inequality is True.
4. Shade the appropriate region that contain the points for which the inequality is true.

An example of this method is: Graph the solution set of the system: $2x + y > 6$

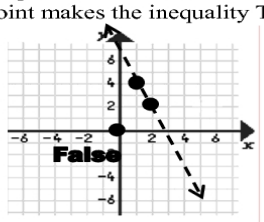
1. Graph the equality $2x + y = 6$ by using an x-y table or any other method.

x	y
1	4
2	2

2. Graph $2x + y > 6$ with a dashed line because of the > (a solid line would be used with ≥).

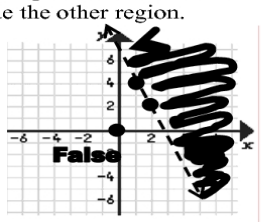


3. Choose any point NOT on the graph - say (0, 0). Substitute x = 0 and y = 0 into the original inequalities to see if the coordinates of the test point makes the inequality True of False.



$2x + y > 6$ is $2(0) + (0) > 6$
$0 > 6$ which is FALSE

4. If the test point is TRUE, shade the region that contains the test point. If the test point is FALSE, then shade the other region.



In this case the test point is FALSE, so the region which does NOT contain the test point is shaded.