Inequalities Lesson 2: Systems of Inequalities

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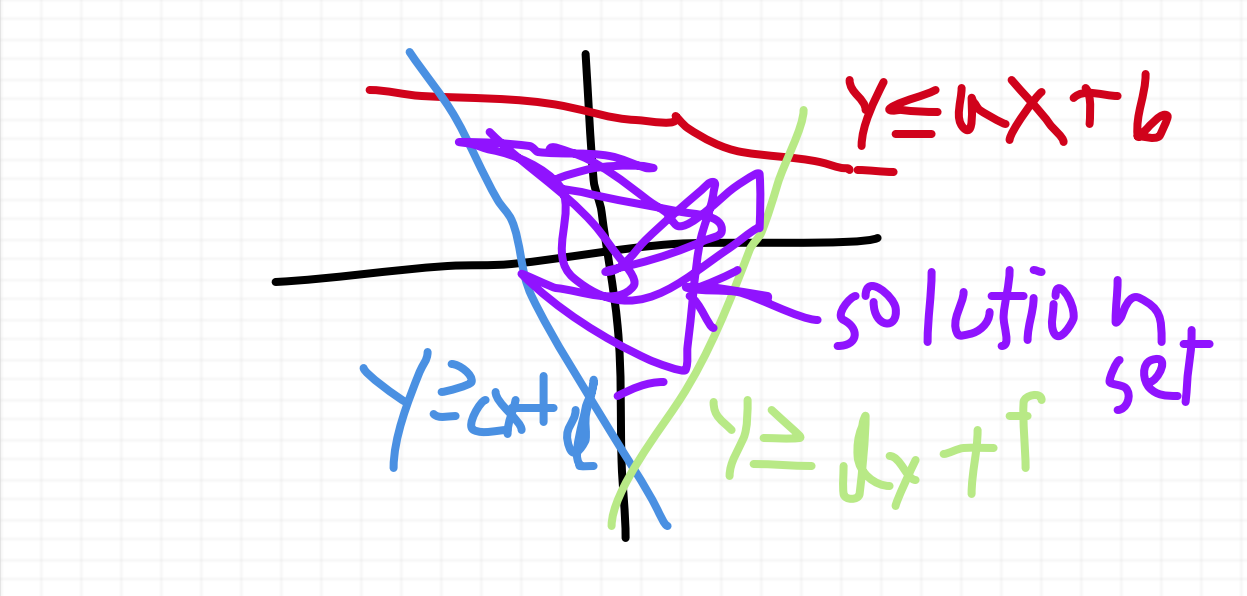
Graphing Systems of Linear Inequalities

A **system of linear inequalities** is a collection of linear inequalities (just as system of equations is a collection of equations)

The **solution set** of a system of linear equations is all the points that satisfy all of the of conditions of the inequality



4.4 Example 1. Graph the solution of

$x + y \leq 1$

$2x - y > 2$

First, we graph the lines of both of those inequalities, i.e. $x + y = 1$ and $2x - y = 2$

Using the general form, we have y-intercept $(0, 1)$ and slope of -1 for the line $x + y = 1$ and we have y-intercept $(0, -2)$ and slope of 2 for the line $2x - y = 2$

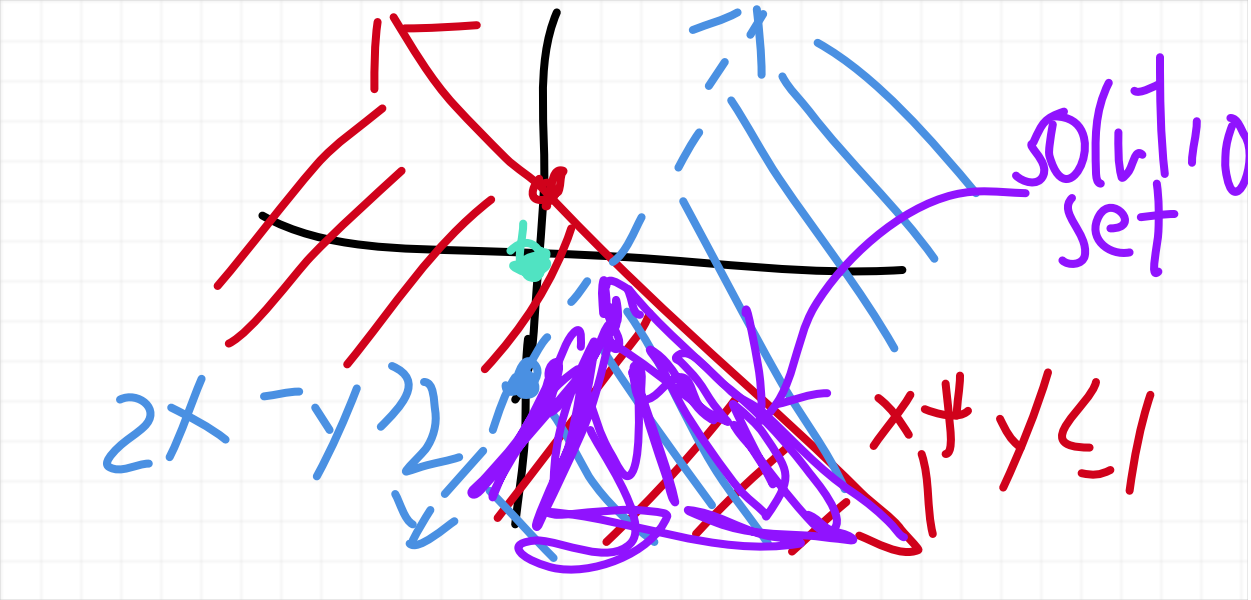
To figure out which direction the inequalities go graphically, we choose a random point, and

plot it, and shade the area accordingly. So let's plug in the origin for both lines

We find that $(0)+(0)=0\ \leq 1$, so shade where the origin is (below the line) for $x+y\leq 1$

We find that $(0)+(0)=0\not< 2$, so we shade where the origin isn't (also below the line) for $2x-y>2$

The solution set (shaded in purple) is then everything that is below both lines



Example. Question 7a of Fall I Attempt 1, we are asked to graph the solution set for the following system of inequalities

$x+y\geq 8$
$y\geq x+2$
$x\geq -2$

First, let's graph the following three lines:
$x+y=8$
$y=x+2$
$x=-2$

For $y\geq x+2$ if we plug in $(0,5)$
$(5)\geq (0)+2$

For the $y \geq x + 2$, we find that
$(0) + (0) \not\geq 8$

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Questions on Homework 3

Question 17 (page 246).

NOTE: The exam will NOT have any systems systems of inequalities with parabolas.

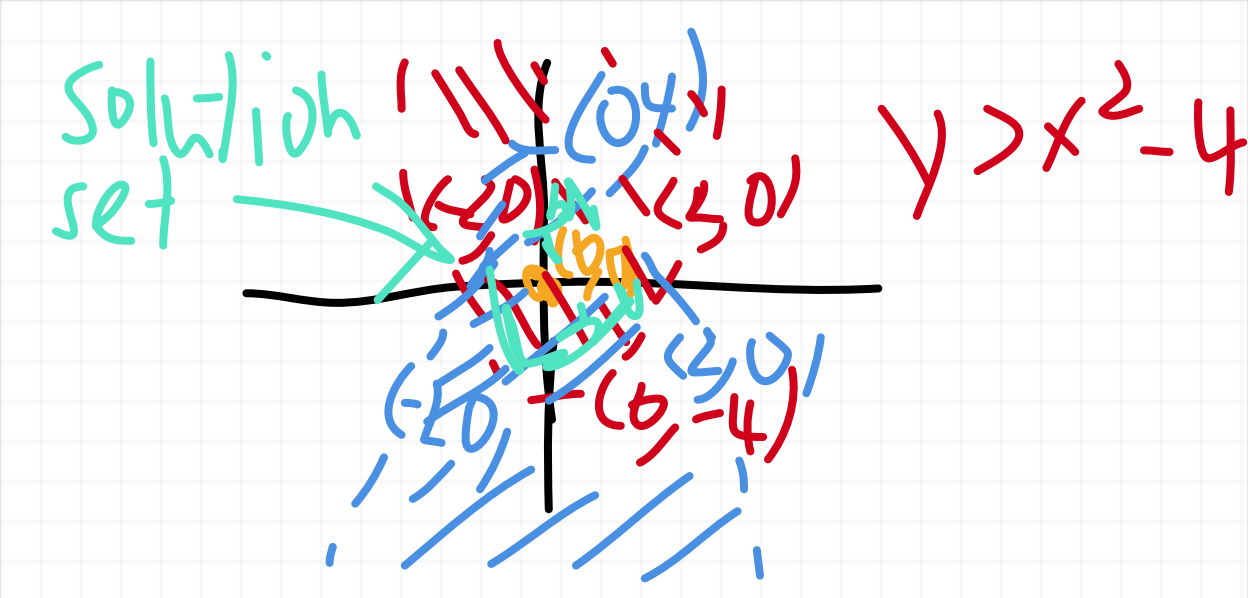
$y > x^2 - 4$
$y < -x^2 + 4$

First, we have to graph, i.e., trace (since the inequalities are strict) the parabolas $y = x^2 - 4$ and $y = -x^2 + 4$

$0 = x^2 - 4 = (x + 2)(x - 2)$

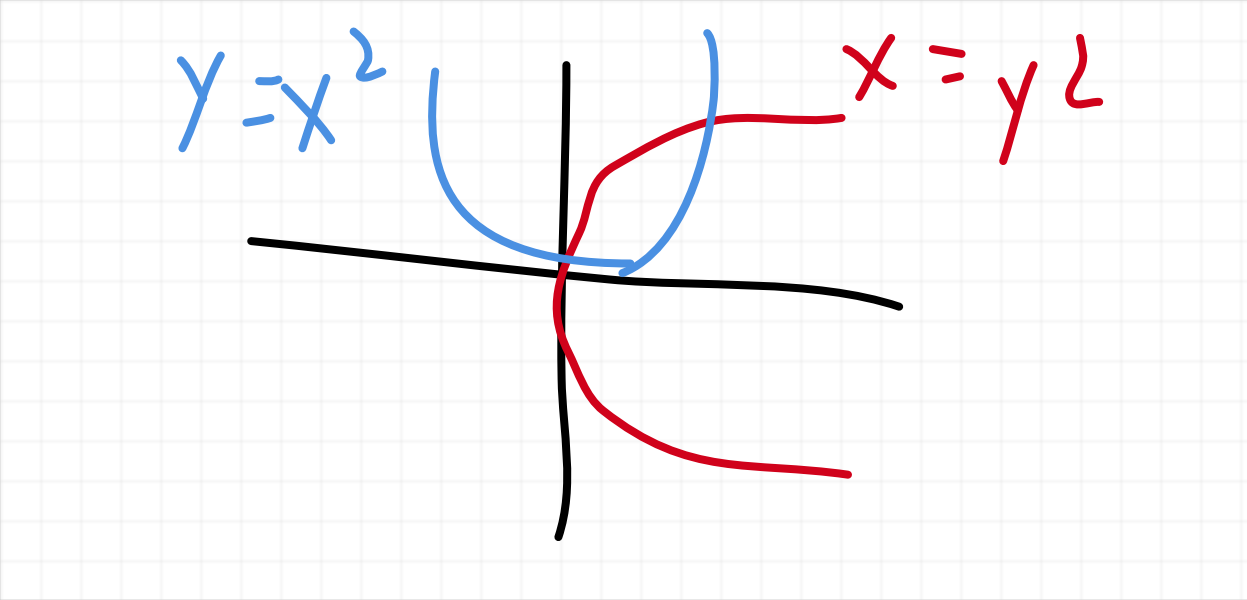
$0 = -x^2 + 4 = -(x+2)(x-2)$

$(0) > (0)^2 - 4$? yes because $0 > -4$
$(0) < -(0)^2 + 4$? yes because $0 < 4$



Question 18 (page 246).

$x \geq y^2$
$y \geq x^2$


y = x²
x = y²