GRAPHING TWO VARIABLE INEQUALITIES 9.3.1 and 9.3.2

To graph the solutions to an inequality in two variables, first graph the corresponding equation. This graph is know as the boundary line (or curve), since all points that make the inequality true lie on one side or the other of the line. Before you graph the equation, decide whether the line or curve is part of the solution or not, that is, whether it is solid or dashed. If the inequality symbol is either ≤ or ≥, then the boundary line is part of the inequality and it must be solid. If the symbol is either < or >, then the boundary line is dashed.

Next, decide which side of the boundary line must be shaded to show the part of the graph that represent all values that make the inequality true. Choose a point not on the boundary line. Substitute this point into the **original** inequality. If the inequality is true for the test point, then shade the graph on this side of the boundary line. If the inequality is false for the test point, then shade the opposite side of the line.

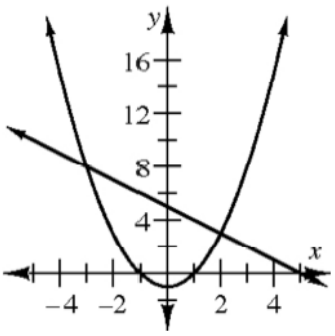
The shaded portion represents all the solutions to the original inequality.

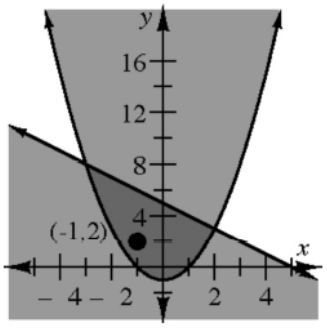
Caution: If you need to rearrange the inequality in order to graph it, such as putting it in slope-intercept form, always use the **original** inequality to test a point, not the rearranged form.

Example 2

Graph the solutions to the system $y \le -x + 5$ and $y \ge x^2 - 1$.

Graph the line $y = -x + 5$ and the parabola $y = x^2 - 1$ with a solid line and curve.





$2 \le -(-1) + 5$, so $2 \le 6$

Test the point (–1, 2) in the first inequality. This inequality is true, so shade on the same side of the boundary line as (–1, 2), that is, below the line.

$2 \ge (-1)^2 - 1$, so $2 \ge 0$

Test the same point in the second inequality. This inequality is also true, so shade on the same side of the boundary curve as (–1, 2), that is, inside the curve.

The solutions are in the overlap of the two shaded regions shown by the darkest shading in the second graph above right.

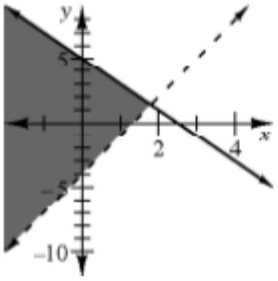
Problems

Graph the solutions to each of the following pairs of inequalities on the same set of axes.

1. $y > 3x - 4$ and $y \leq -2x + 5$
2. $y \geq -3x - 6$ and $y > 4x - 4$
3. $y < -\frac{3}{5}x + 4$ and $y < \frac{1}{3}x + 3$
4. $y < -\frac{3}{7}x - 1$ and $y > \frac{4}{5}x + 1$
5. $y < 3$ and $y > \frac{1}{2}x + 2$
6. $x \leq 3$ and $y < \frac{3}{4}x - 4$
7. $y \leq 2x + 1$ and $y \geq x^2 - 4$
8. $y < -x + 5$ and $y \geq x^2 + 1$
9. $y < -x + 6$ and $y \geq |x - 2|$
10. $y < -x^2 + 5$ and $y \geq |x| - 1$

Answers

1.



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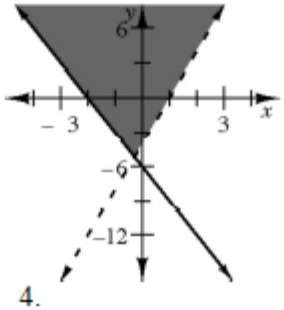

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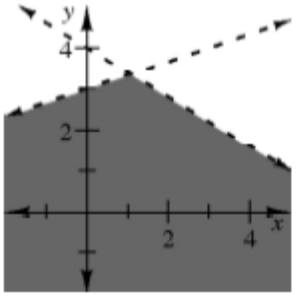

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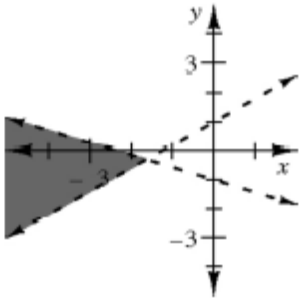

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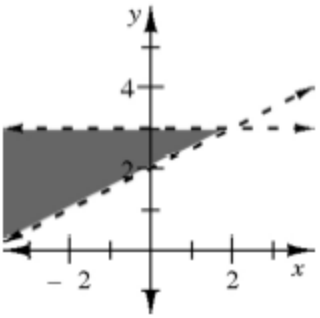

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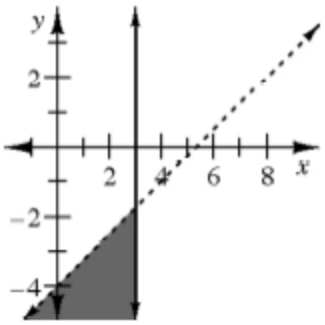

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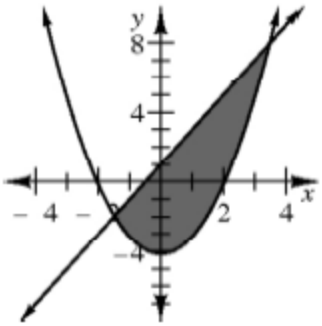

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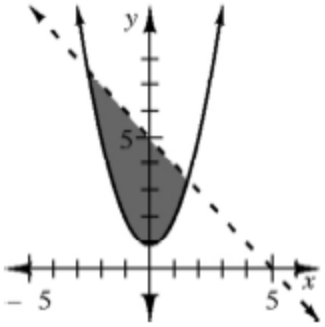

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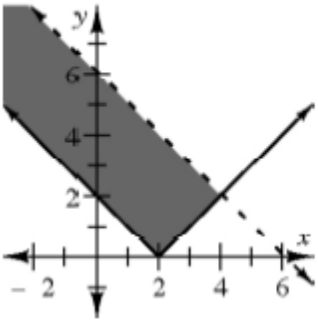
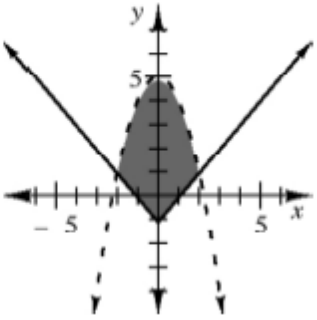
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