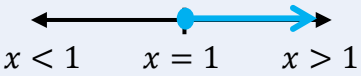
TOPIC: SYSTEMS OF INEQUALITIES
Graphing Linear Inequalities

◆ You'll have to plot inequalities on a ***2D graph*** instead of a ***1D number line***.

- To graph an inequality, graph the line and _____ side of graph with points that make inequality _____.

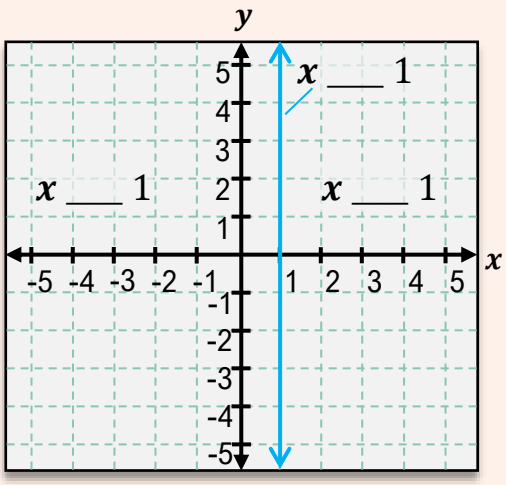
Recall — 1D Inequality

$x \geq 1$



New — 2D Linear Inequality

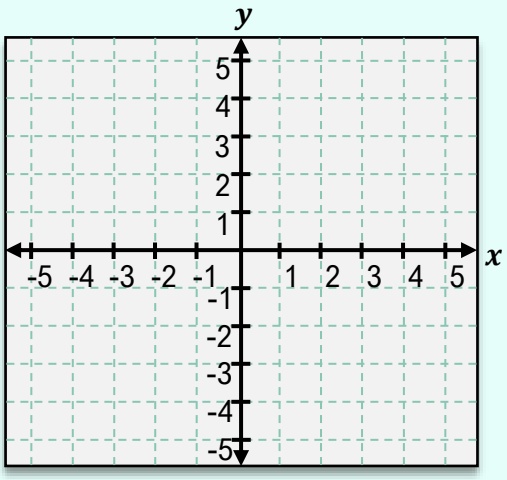
$y < x$ $x \geq 1$



For equations with ≥ & ≤, draw a SOLID line

For equations with > & <, draw a DASHED line

EXAMPLE Graph $y > 2x - 4$



HOW TO: Graph Linear Inequalities

1) Graph the solid/dashed line by switching inequality symbol with an __ sign

2) Test a point on either side of line by _____ (x, y) into inequality (*Best to use a point on x or y axis*)

3) If point makes ineq. **[TRUE | FALSE]**, shade side _____ that point

If point makes ineq. **[TRUE | FALSE]**, shade side _____ that point

◆ Shortcut: Isolate y to left side of inequality, then:

- If $y > \cdots$ or $y \geq \cdots$ shade **[ABOVE | BELOW]** line
- If $y < \cdots$ or $y \leq \cdots$ shade **[ABOVE | BELOW]** line

TOPIC: SYSTEMS OF INEQUALITIES

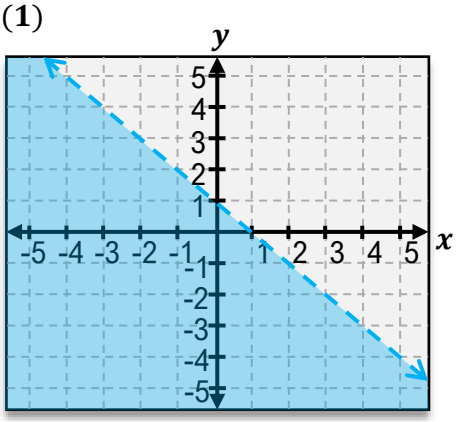
EXAMPLE Match the inequality with its graph.

(A) $y > -3x + 4$

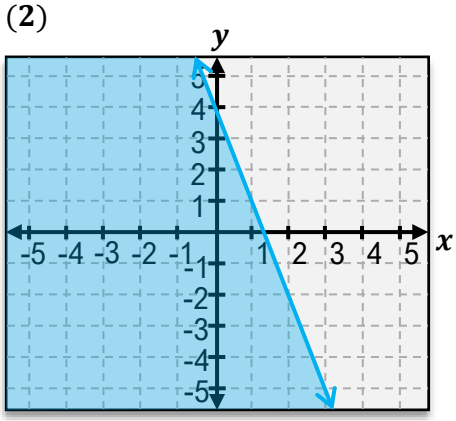
(B) $x + y < 1$

(C) $-3x - y \geq -4$

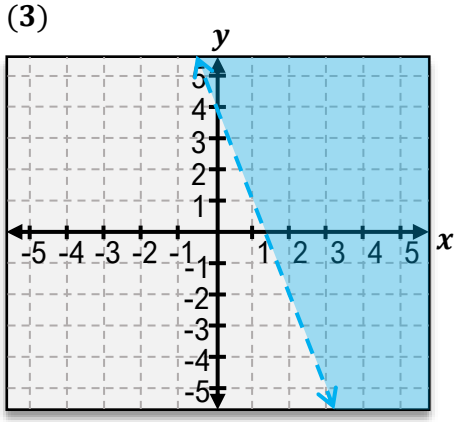
(1)



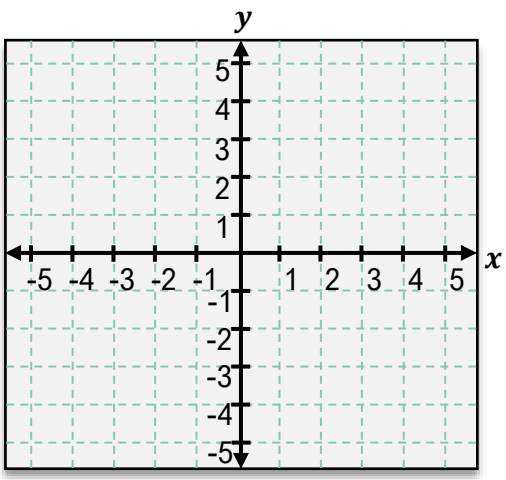
(2)



(3)



PRACTICE Graph the inequality $2x + 3y < 6$.



HOW TO: Graph Linear Inequalities

1) Graph the solid/dashed line by switching inequality symbol with an **=** sign

2) Test a point on either side of line by plugging (x, y) into inequality (*Best to use a point on* x *or* y *axis*)

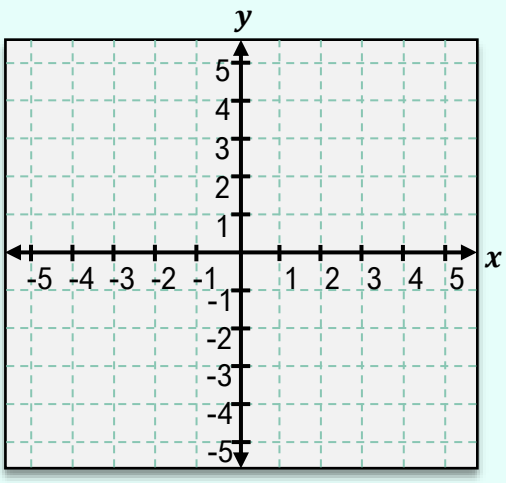
3) If point makes ineq. **TRUE**, shade side **WITH** that point

If point makes ineq. **FALSE**, shade side **WITHOUT** that point

TOPIC: SYSTEMS OF INEQUALITIES
Graphing Nonlinear Inequalities

◆ Graphing *nonlinear* inequalities is *exactly* like graphing linear inequalities!

EXAMPLE Graph $y \geq x^2 - 1$



HOW TO: Graph Nonlinear Inequalities

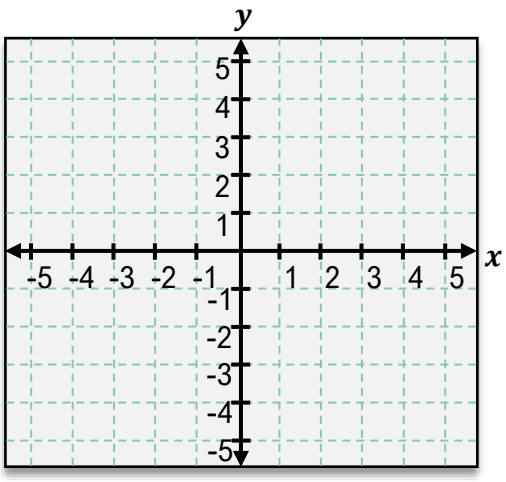
1) Graph the solid/dashed curve by switching inequality symbol with an **=** sign

2) Test a point on either side of curve by plugging (x, y) into inequality (*Best to use a point on x or y axis*)

3) If point makes ineq. **TRUE**, shade side **WITH** that point

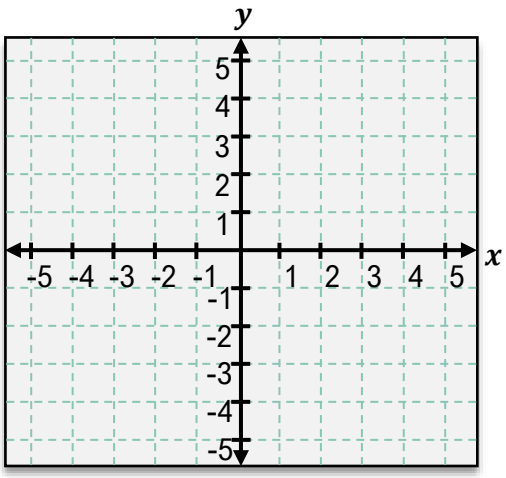
If point makes ineq. **FALSE**, shade side **WITHOUT** that point

PRACTICE Graph the inequality $y < 2^x$



TOPIC: SYSTEMS OF INEQUALITIES

PRACTICE Graph the inequality $x^2 + (y-1)^2 \leq 9$



HOW TO: Graph Nonlinear Inequalities

1) Graph the solid/dashed curve by switching inequality symbol with an = sign

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TOPIC: SYSTEMS OF INEQUALITIES
Graphing Systems of Inequalities

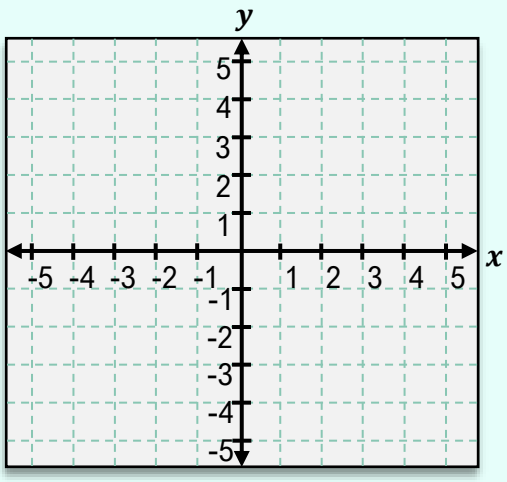
◆ To graph **Systems of Ineq's**, plot ALL lines/curves & shade region containing points that make _____ ineq's **TRUE.**

- Use different colors, different styles of shading, or arrows to shade each curve first, then find the overlap.

EXAMPLE Graph the system of inequalities.

$$y \leq -x + 4$$

$$y > 2x + 1$$



HOW TO: Graph Systems of Inequalities

For each inequality:

1) Graph the solid/dashed curve by switching inequality symbol with an **=** sign

2) Test a point on either side of curve by plugging (x, y) into inequality (*Best to use a point on* x *or* y *axis*)

3) If point makes ineq. **TRUE**, *lightly* shade side **WITH** that point
If point makes ineq. **FALSE**, *lightly* shade side **WITHOUT** that point

Finally,

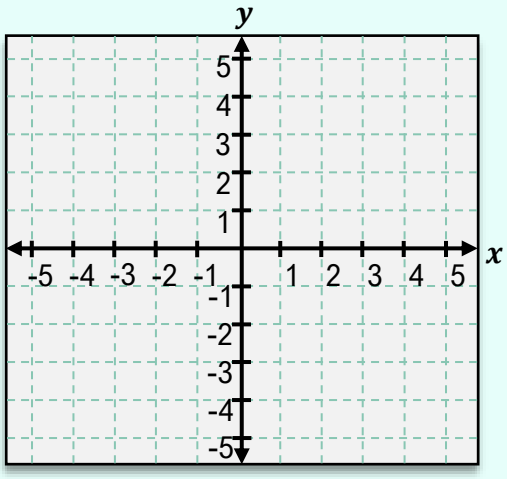
4) Shade the overlap of all shaded regions

◆ One (or more) equations may be non-linear (*parabolas, circles, etc.)* instead of lines.

EXAMPLE Graph the system of inequalities.

$$y \geq x^2 - 4$$

$$y \leq -x + 3$$



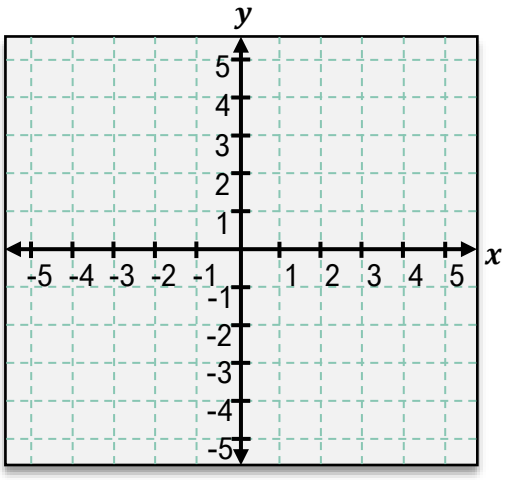
Note: Some systems of inequalities may have NO solutions.

TOPIC: SYSTEMS OF INEQUALITIES

PRACTICE Graph the system of inequalities and indicate the region (if any) of solutions satisfying all equations.

$3x - 2y > 6$

$3x - 2y < -4$



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3) If point makes ineq. **TRUE**, *lightly* shade side **WITH** that point
If point makes ineq. **FALSE**, *lightly* shade side **WITHOUT** that point

Finally,

4) Shade the overlap of all shaded regions

PRACTICE Graph the system of inequalities and indicate the region (if any) of solutions satisfying all equations.

$x + y \leq 4$

$y \geq 1$

$x > 0$