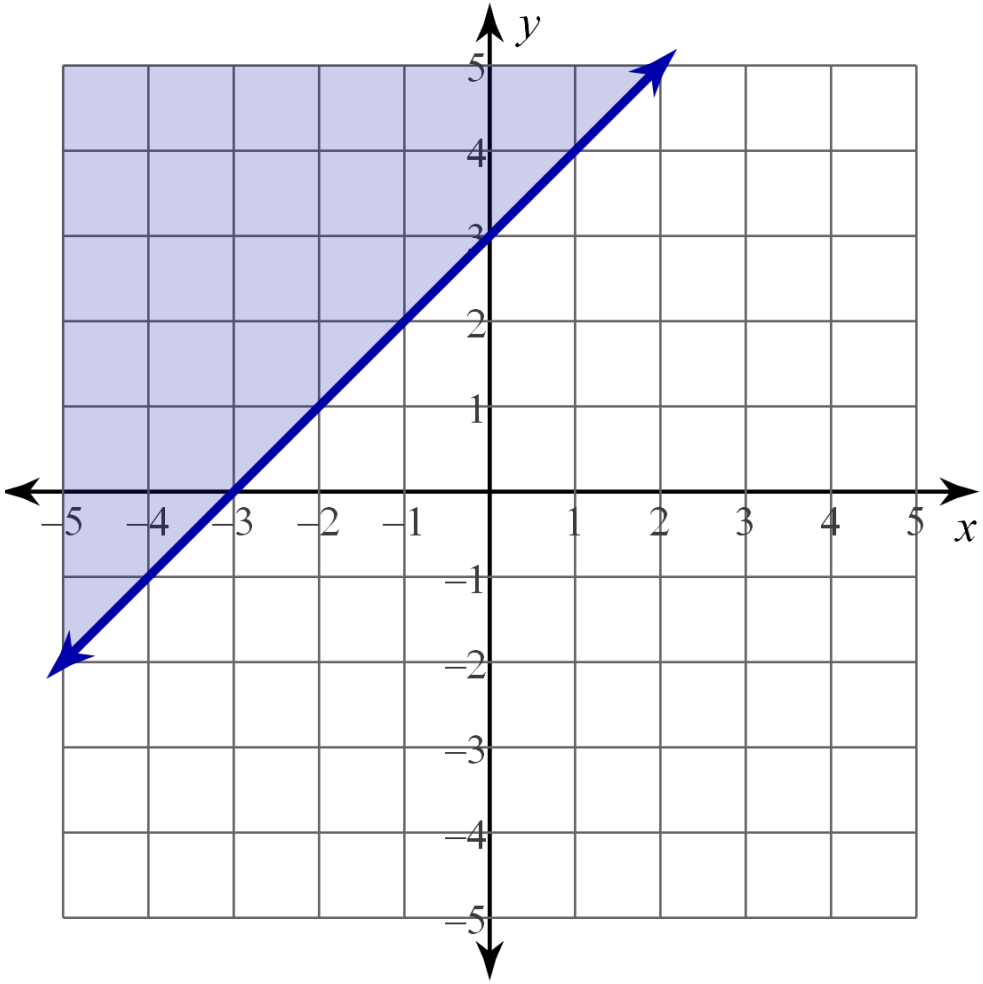
Math-2A
Lesson 6-9

Systems of Inequalities

$$y \geq x + 3$$

The line: y = x + 3
Divides the x-y plane into two halves.

The solution to the inequality is <u>all of the points in one of the “half planes”.</u>



$$y > x + 3$$

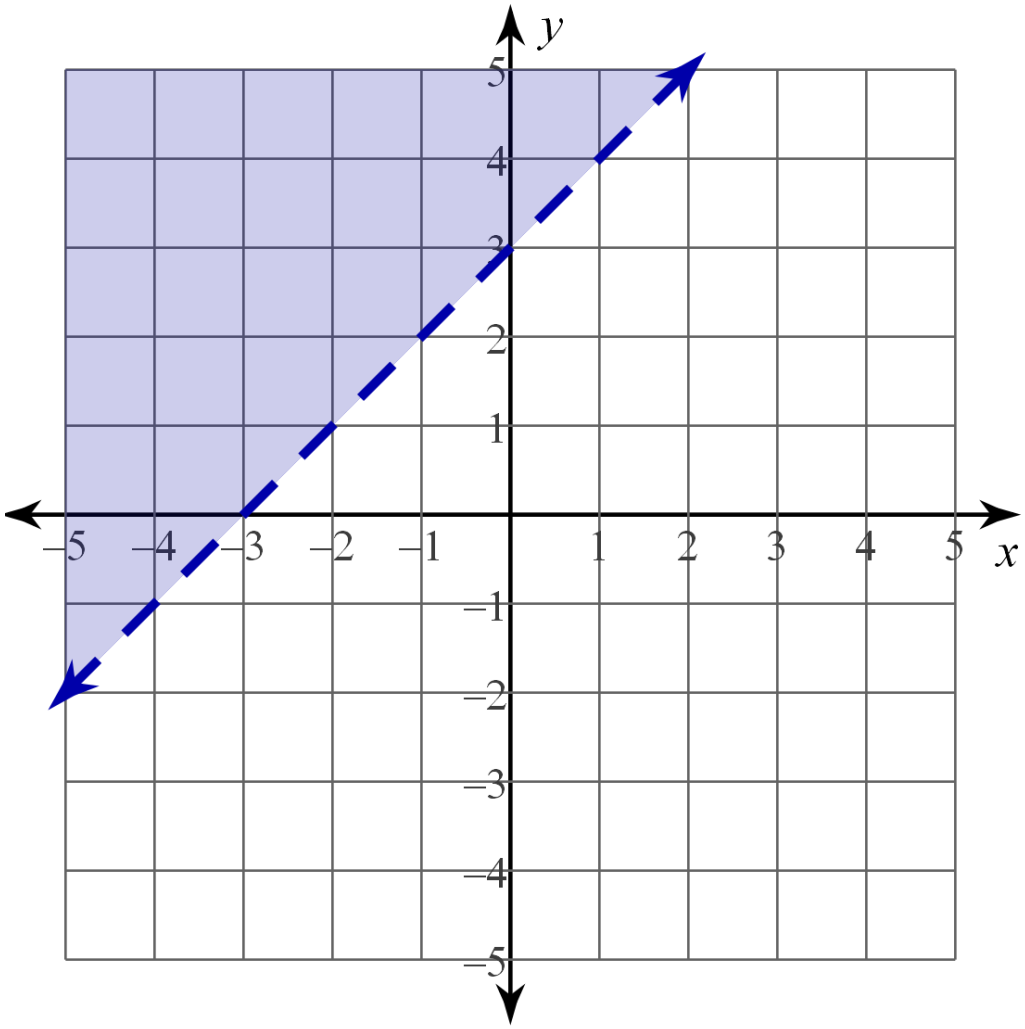
Now it is just “>” not “≥”

Test two points:
(0, 3)
(-1, 2)

Do the points on the line make the inequality true?

no

How do we show that on the graph?



Let's write a procedure on how to graph 2-variable inequalities.

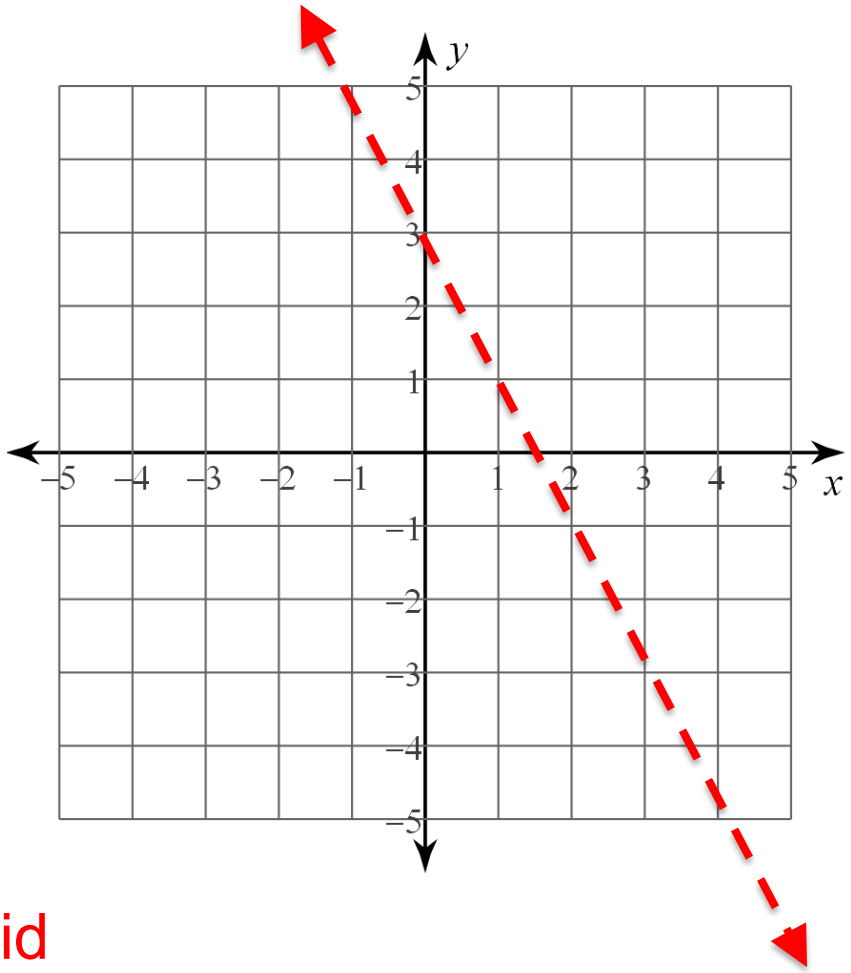
$$y > -2x + 3$$

1. Graph the line.

$$y = -2x + 3$$

2. If the inequality is ">" or "<" (not "≥" nor "≤)", the line will be dotted (not shaded).

3. If it is "≥" the line will be solid (shaded).



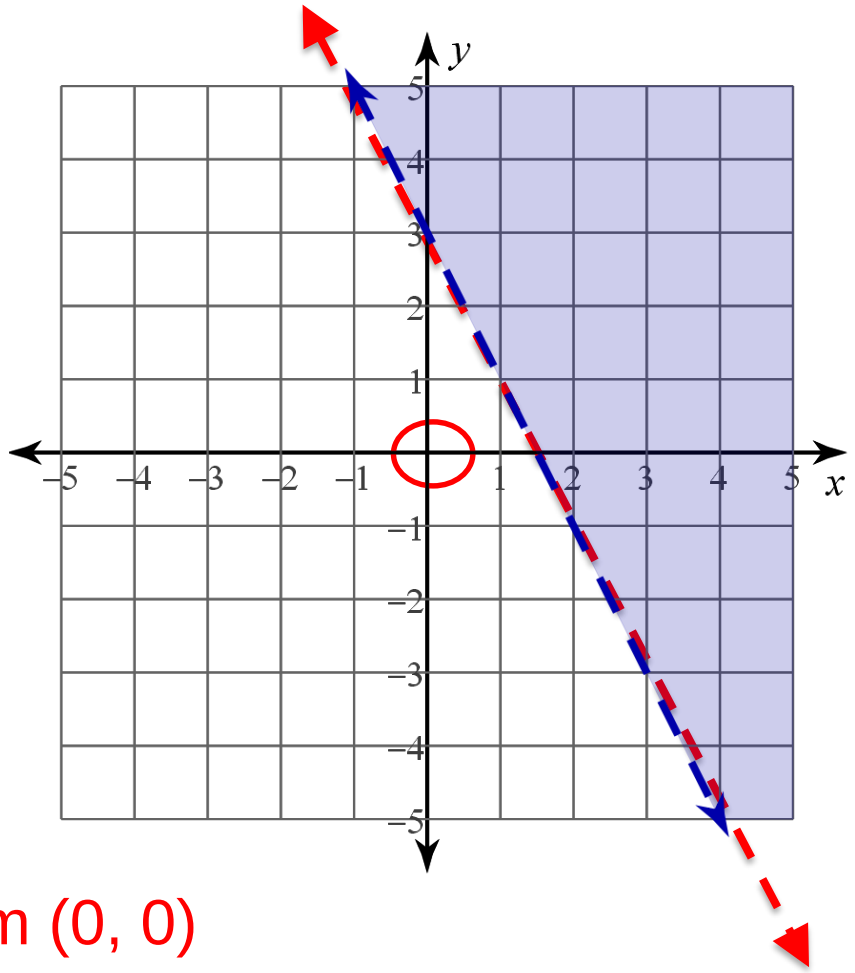
$$y > -2x + 3$$

4. Pick a point in one of the ½ planes. See if it is the solution. If so, shade that side of the line, (otherwise shade the other side).

(0, 0)

$$0 > -2(0) + 3$$

no

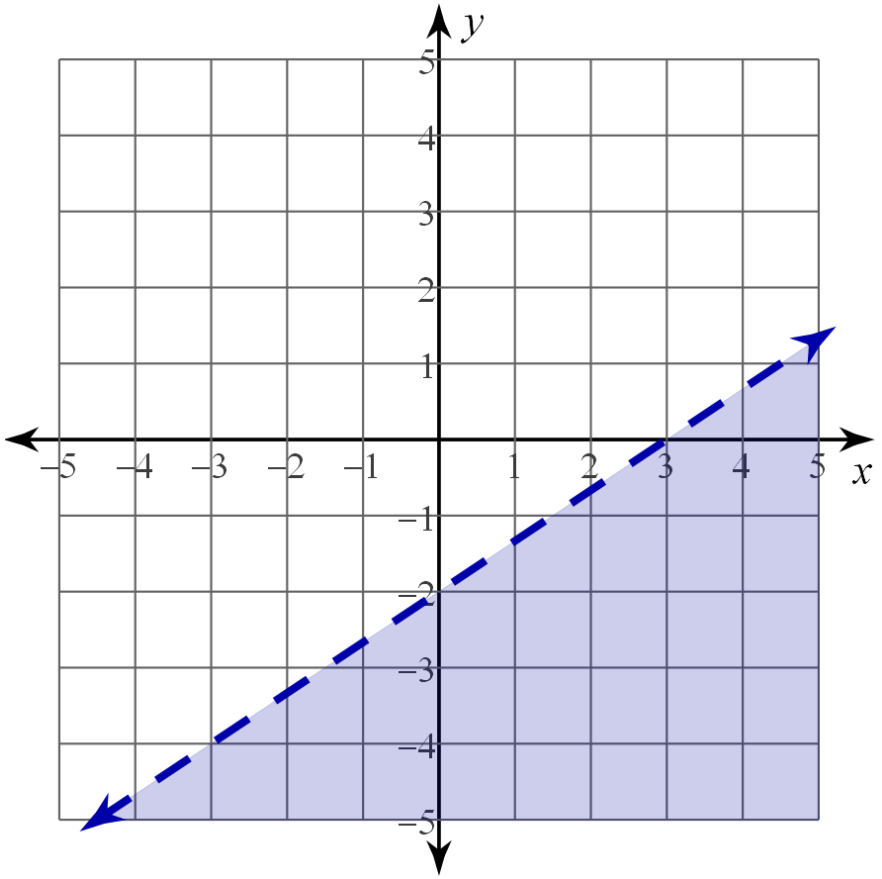


Shade other side of line from (0, 0)

Graph the following inequality.

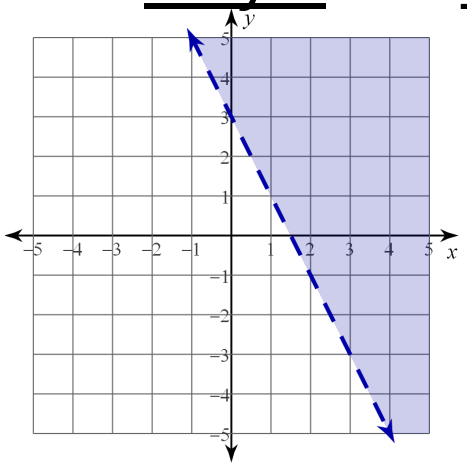
$$2x - 3y > 6$$

Why does “>” end up being shaded below the line?



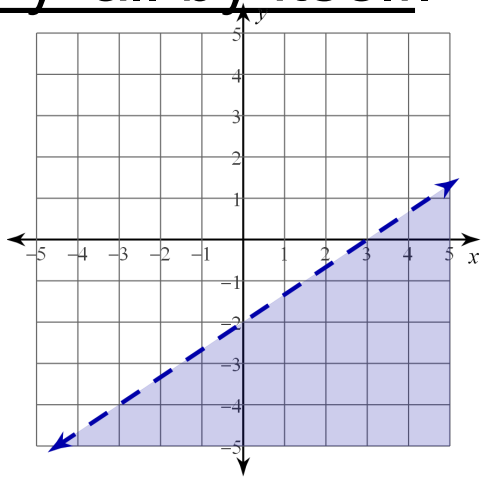
You can use the direction of the Inequality to determine the side to shade only if the inequality has ‘y’ all by itself.

$y > -2x + 3$



“y > “ or “y ≥” → shade above

$y < \frac{2}{3}x - 2$



“y < “ or “y ≤” → shade below

System of Inequalities: More than one 2-variable inequality graphed on the same x-y plot.

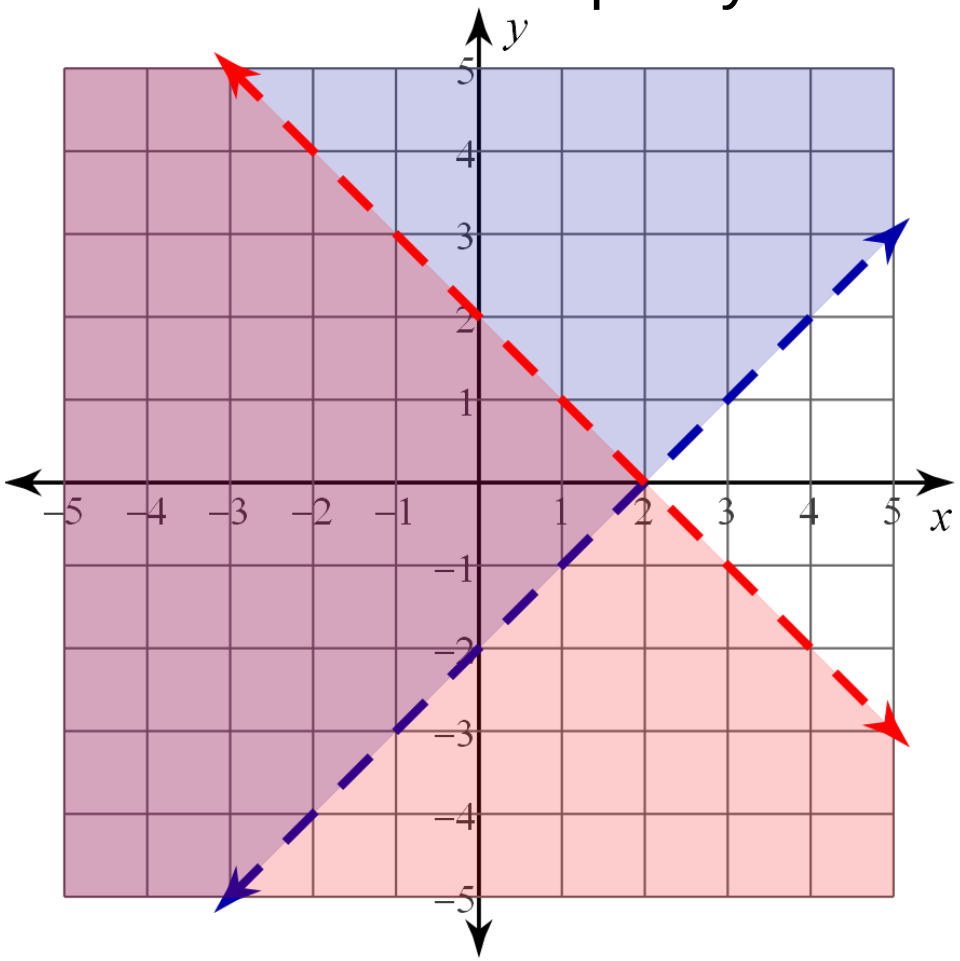
y > x - 2

y < -x + 2

Two lines that cross divide the plane into 4 regions. Which region contains the points that are the solution to the system of inequalities?

y > x – 2 AND y < -x + 2

Solution: the points in the "overlap" region.



Non-linear 2 Variable inequality

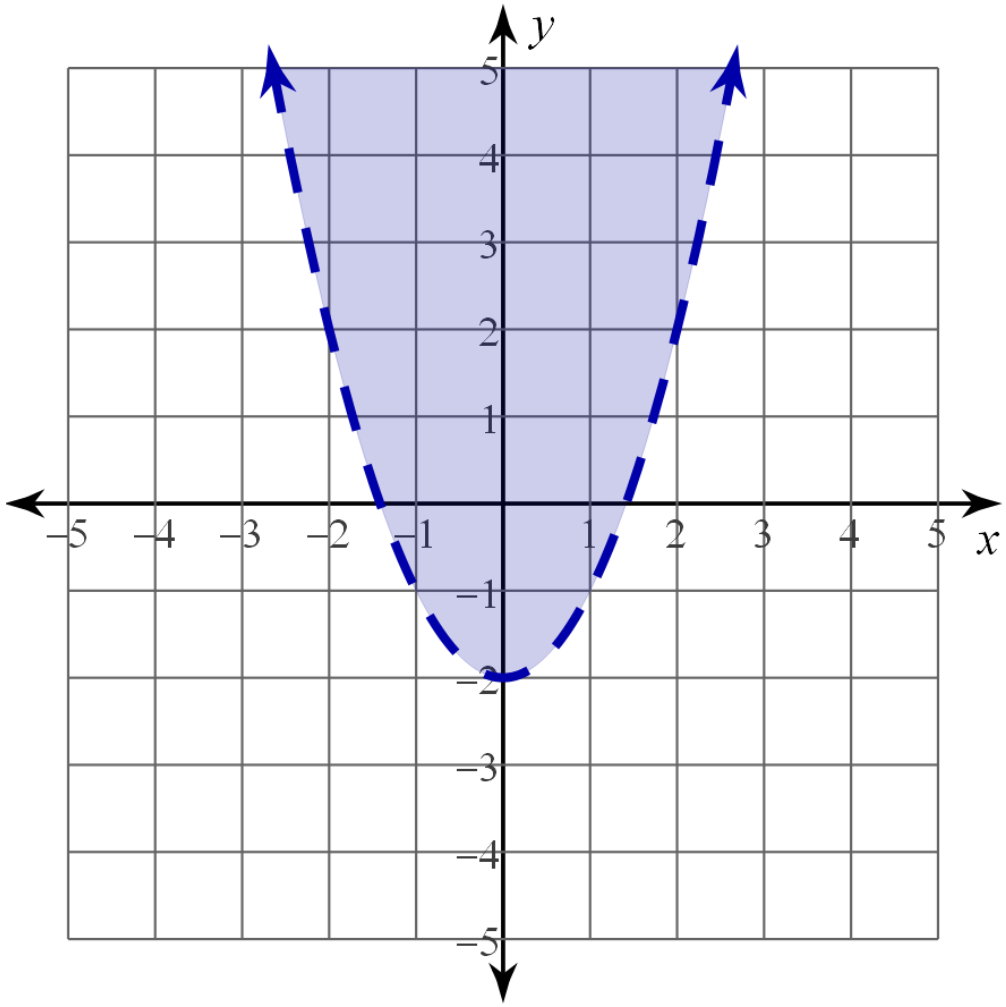
$$y > x^2 - 2$$

Is the parabola solid or dotted?

Is the solution the region above or below the parabola?

"y > " or "y ≥" → shade above

"y < " or "y ≤" → shade below



Non-linear 2 Variable inequality

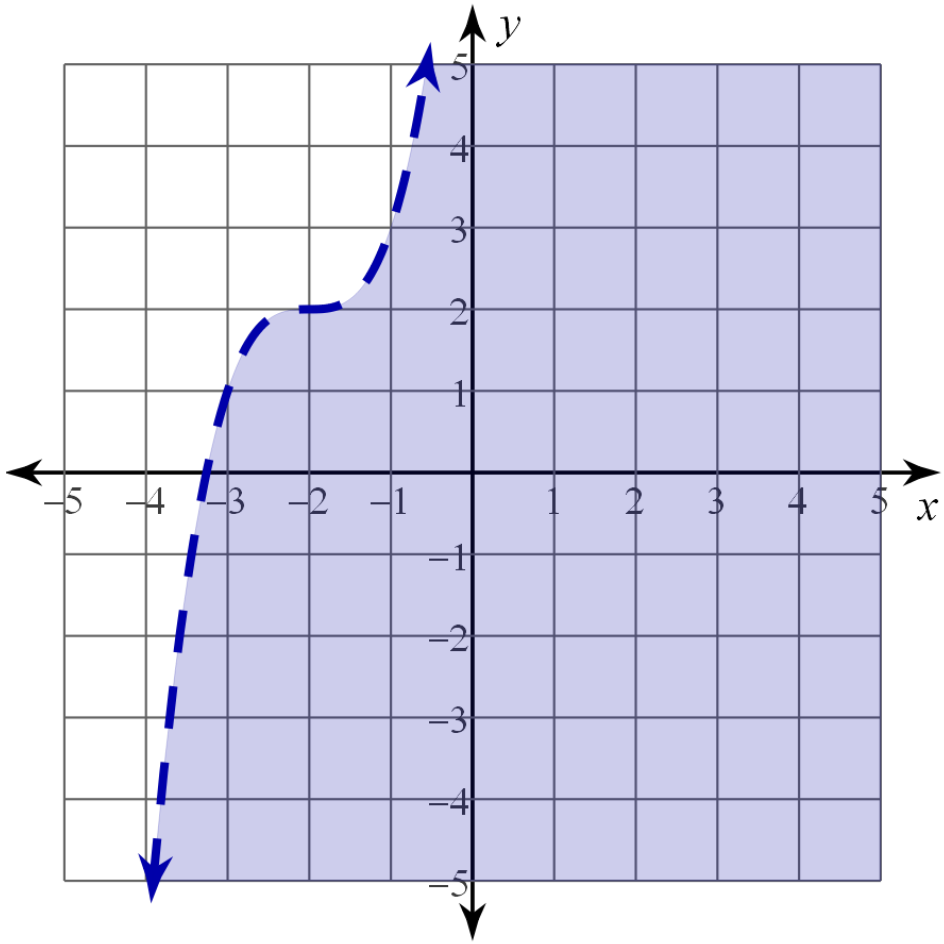
$$y < (x+2)^3 + 2$$

Is the curve solid or dotted?

Is the solution the region above or below the curve?

"y > " or "y ≥" → shade above

"y < " or "y ≤" → shade below



Systems of Non-linear 2 Variable inequalities

$$y < (x+2)^3 + 2$$

$$y > x^2 - 2$$

Which region is the solution?