COLLEGE REVIEW MATH
SECTION 3C

GRAPHING INEQUALITIES

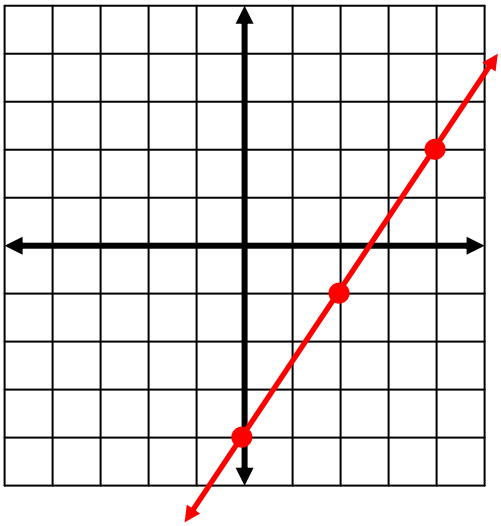
Time to check your memories.
Do you remember how to graph linear equations? How about absolute values? Quadratics? Let's find out.

LINEAR: Find the slope and y-intercept for each example, and then graph it.

1) $2y = 3x - 8$ $y = 3/2x - 4$

slope = 3/2

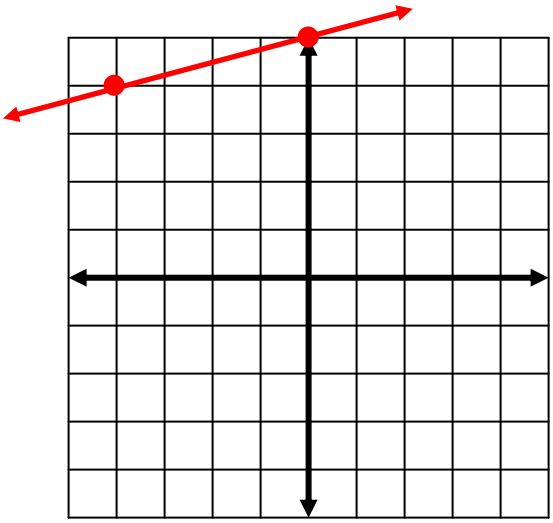
y-int = -4



2) $x - 4y - 20 = 0$ $-4y = -x - 20$ $y = x/4 + 5$

slope = 1/4

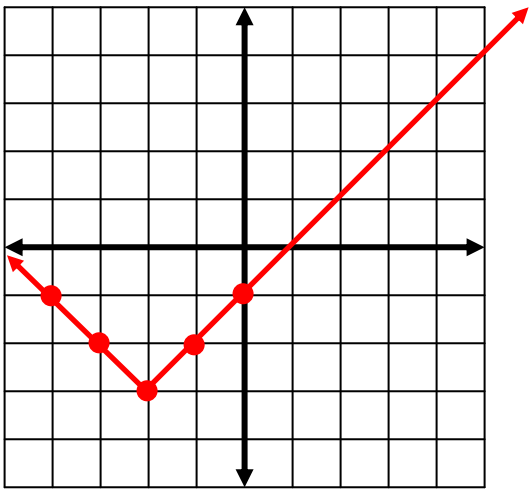
y-int = 5



ABSOLUTE VALUES: Find the vertex for each problem, and then graph it.

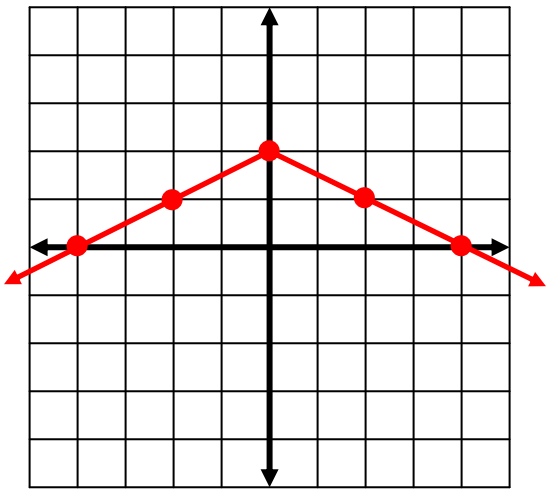
3) $y = |x + 2| - 3$

vertex = (-2, -3)



4) $y - 2 = -\frac{1}{2}|x|$ $y = -\frac{1}{2}|x| + 2$

vertex = (0, 2)

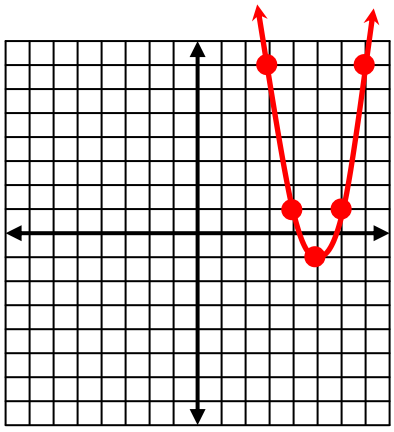


QUADRATICS: Find the vertex (using "graphing" form or the formula; $x = \frac{-b}{2a}$), then graph it.

5) $y = 2(x - 5)^2 - 1$

x	y
5	-1
6	1
7	7

vertex = (5, -1)

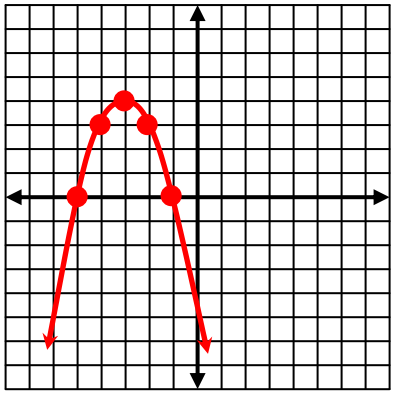


6) $y = -x^2 - 6x - 5$

x = -(-6) / 2(-1)
= 6 / -2
= -3

vertex = (-3, 4)

x	y
-3	4
-2	3
-1	0



QUESTION? IF THE TITLE OF THIS SECTION (3-3) IS POLYNOMIAL ***INEQUALITIES*** IN TWO VARIABLES, then why are all 6 graphs we did incorrect?

They need to be shaded with the possibility of a dashed line as well.

Let's fix 'em. Change each problem to…

1) $2y \leq 3x - 8$

Solid line, shade below.

2) $x - 4y - 20 < 0$

-4y < -x – 20
y > x/4 + 5
Dashed line, shade above.

3) $y > |x + 2| - 3$

Dashed line, shade above.

4) $y - 2 \geq -\frac{1}{2}|x|$

Solid line, shade above.

5) $y \leq 2(x - 5)^2 - 1$

Solid line, shade below (or outside of the U).

6) $y < -x^2 - 6x - 5$

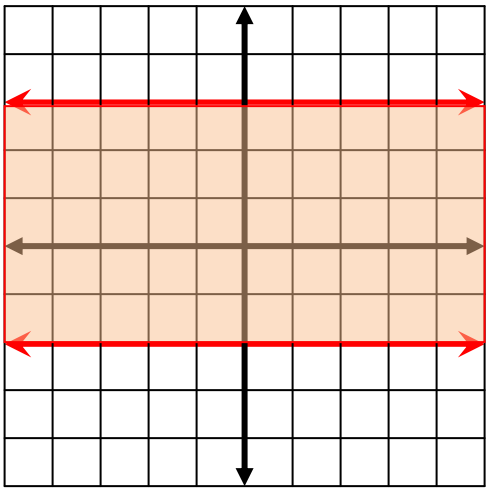
Dashed line, shade below (or inside of the U).

NEW ONES: Compound inequalities.

First, see if you remember how to graph a constant function.

1) Graph y = 3 and y = -2 on the same grid

"y"-only equations produce horizontal lines.



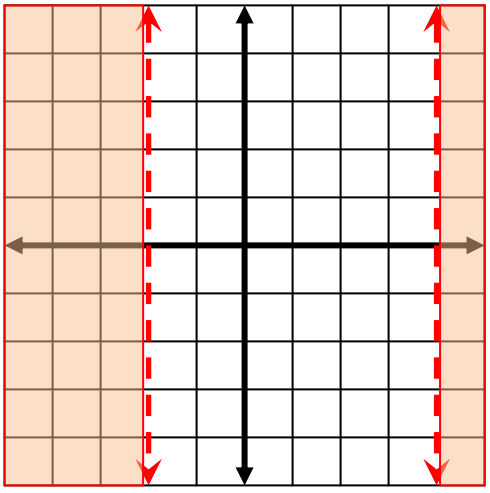
Now graph $-2 \leq y \leq 3$

2) Solve $|x - 1| > 3$ like you normally would, then graph it.

$x - 1 > 3$ or $x - 1 < -3$

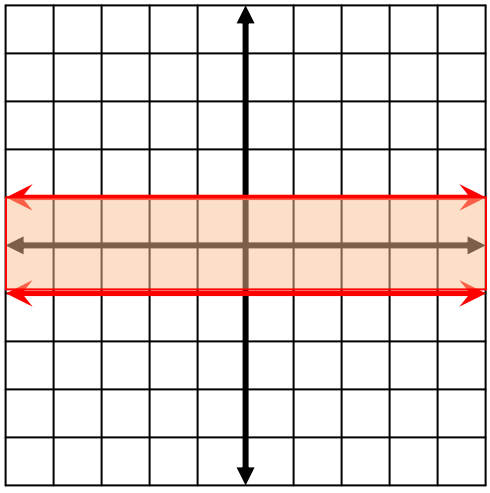
$x > 4$ or $x < -2$

x-only: vertical lines



3) Solve (or set up) $|y| \leq 1$, then graph it.

$y \leq 1$ and $y \geq -1$



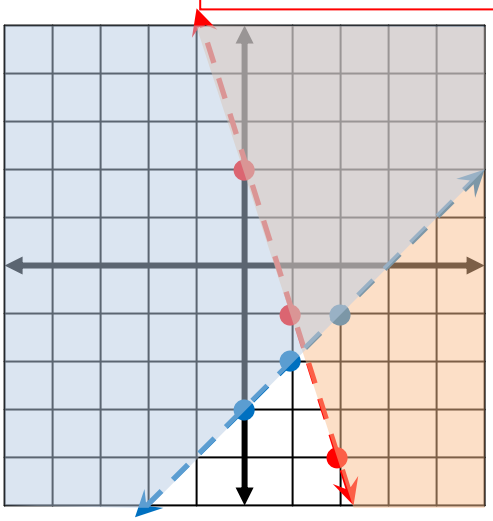
SYSTEMS OF INEQUALITIES:

1) Graph each inequality like you normally would.
2) Shade each graph like you normally would.
3) Find where the shades regions ***intersect***!

Examples:

1) $y > -3x + 2$
$y > x - 3$

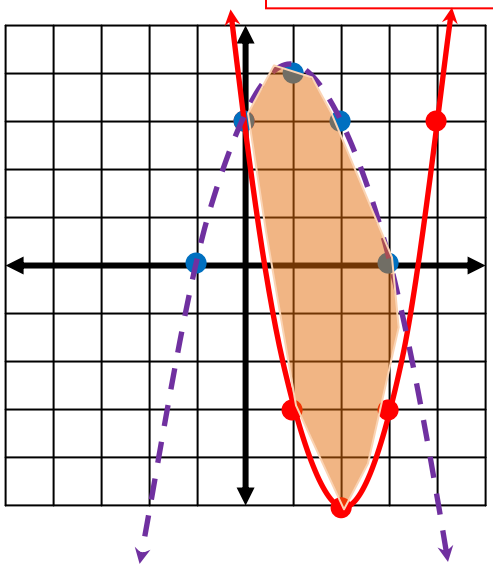
The area where the shaded regions intersect is the solution. The remaining three graphs, I will only show that region.



2) $y \geq 2x^2 - 8x + 3$
$y < -x^2 + 2x + 3$

$x = -(-8) / 2(2) = 2$
plug in: $y = -5$ V(2,-5)

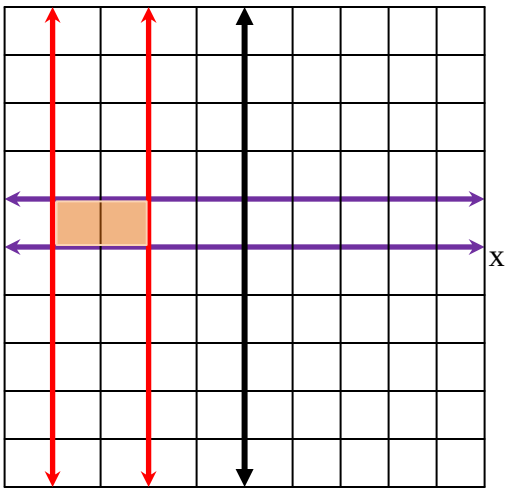
$x = -2 / 2(-1) = 1$
plug in: $y = 4$ V(1,4)



x	y
2	-5
1	-3
0	3

x	y
1	4
2	3
3	0

3) $-4 \leq x \leq -2$
$0 \leq y \leq 1$



4) $y \geq |x + 1| - 4$
$y \leq -(x - 1)^2 + 2$
$1 - y > 3x$

$1 - y > 3x$
$-y > 3x - 1$
$y < -3x + 1$