5.1 Quadratic in-equalities

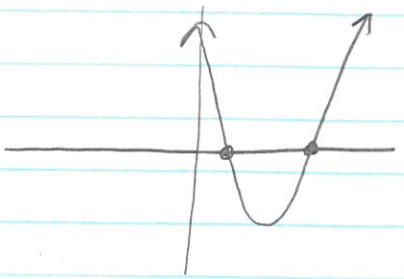
* treat the same way as a regular quadratic → move to left side & factor

ex 1 $2x^2 - 7x > -3$
$+3 \quad +3$

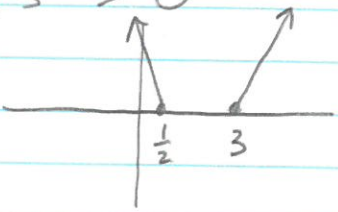
$2x^2 - 7x + 3 > 0$

① $(2x-1)(x-3)$
$x = \frac{1}{2}, 3$

② Sketch



③ ASK what part is > 0



$0 \leq \geq$
$0 > <$

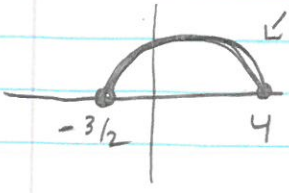
④ define where > 0
$x < \frac{1}{2}$ and $x > 3$

⑤ put on a number line

ex 2 $5x \geq 2(x^2 - 6) \Rightarrow 5x \geq 2x^2 - 12$

① move to left side & factor
$-2x^2 + 5x + 12$
$-(2x^2 - 5x - 12) \Rightarrow -(2x+3)(x-4)$
$x = -\frac{3}{2}, 4$

② Sketch



③ this part ≥ 0

④ $x \geq -\frac{3}{2}$ and $x \leq 4$

⑤

5.2 Linear Inequalities

* $>$ means above the line
  $<$ means below the line

① rearrange to $y=mx+b$ form so it is easier to graph.

ex) $5x-2y \leq 10$

$-5x \quad -5x$

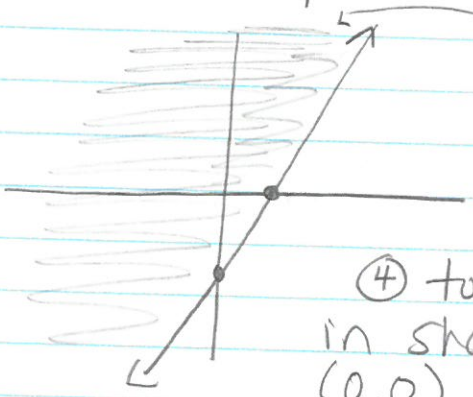
$-2y \leq -5x+10$

$\div -2 \quad \div -2 \quad \div -2$

$y \geq \frac{5}{2}x-5$

* remember if you x or ÷ by a negative; flip the sign

② graph using a solid line because $\geq$ it is equal + greater than



③ Shade above the line because $>$

④ to check - plug a point in shaded area into equation (0,0)

$(0) \geq \frac{5}{2}(0)-5$

$0 \geq -5$ yes - so shading is correct

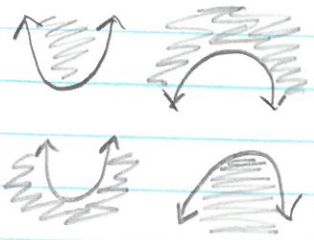
* $\geq$ and $\leq$ are solid lines (——)

  $>$ and $<$ are broken lines (- - - -)

5.3 Graphing Quadratic Inequalities w 2 variables

** $>$ and $\geq$ up

$<$ and $\leq$ down



① rearrange so y is alone on left side then factor

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

$$y \geq -2x^2 + 8$$
$$-2(x^2 - 4)$$
$$-2(x+2)(x-2)$$

x int = $-2, +2$

② find the vertex by

completing the square

$-2(x+0)^2 + 8$

$V = (0, 8)$

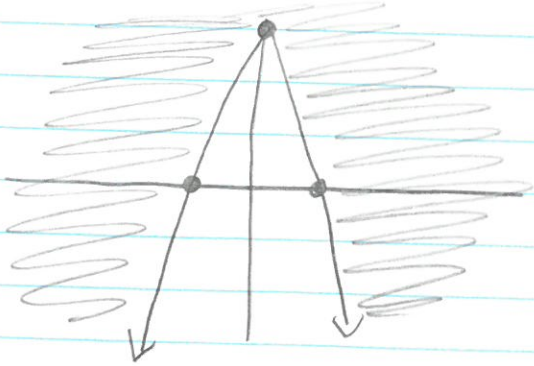
or using x intercepts

$\frac{-2+2}{2} = 0$

$-2(0)^2 + 8 = 8$

$V(0, 8)$

③ sketch graph with a solid line ($\geq$) & shade above



④ check with point in shaded area

(3, 0)

$0 \geq -2(3)^2 + 8$

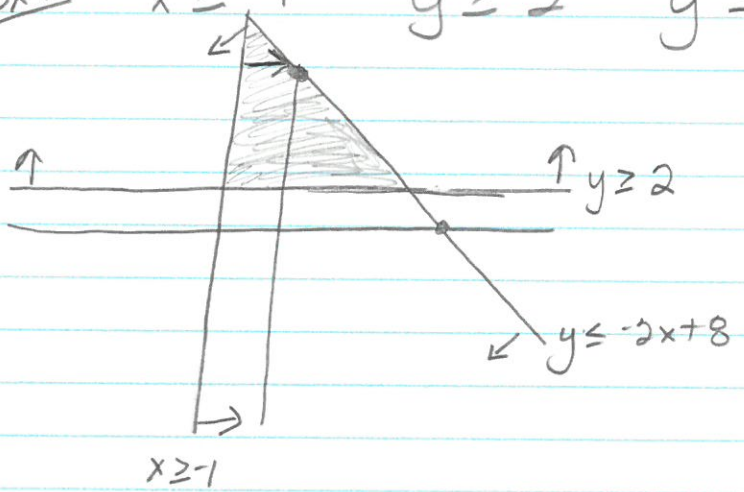
$0 \geq -10$

yes shading is correct

5.4 Solving Systems of Equations by graphing

① graph each line
② shade both lines
③ where shading overlaps is the answer

ex 1 $x \geq -1$ $y \geq 2$ $y \leq -2x+8$



5.5 Solve Systems Algebraically

① rearrange one equation so you can substitute it into the other

$x^2 - y = 5$

$-y = -x^2 + 5$

$y = x^2 - 5$

$x = y - 7$

② plug in

$x = (x^2 - 5) - 7$

③

$x = x^2 - 12$

$0 = x^2 - x - 12$

* move to 1 side & factor

$(x-4)(x+3)$ $x = 4$ and -3

④ plug back into one of the equations to find y.

$x = y - 7$ → (A) $4 = y - 7$; $y = 11$ (B) $-3 = y - 7$; $y = 4$

SOLUTION
(4, 11)
(-3, 4)

ex 2 make equal to each other by rearranging for y

$y = 2x^2 + x - 1$ $\qquad$ $y - 1 = -x^2 + 2x$

$y = -x^2 + 2x + 1$

① $2x^2 + x - 1 = -x^2 + 2x + 1$

② move to 1 side & factor

$2x^2 + x - 1 = -x^2 + 2x + 1$

$+x^2 \quad -2x \quad -1 \quad +x^2 \quad -2x \quad -1$

$3x^2 - x - 2 = (3x + 2)(x - 1)$

$x = -\frac{2}{3}$ or 1

③ plug back into one of the equations to find y

$-\frac{2}{3}$ $\qquad 2\left(-\frac{2}{3}\right)^2 + -\frac{2}{3} - 1$

$2\left(\frac{4}{9}\right) + -\frac{2}{3} - 1$

$\frac{8}{9} + -\frac{2}{3} - 1$

change into all fractions of 9

$\frac{8}{9} + -\frac{6}{9} - \frac{9}{9} = -\frac{7}{9}$

$\left(-\frac{2}{3}, -\frac{7}{9}\right)$

1 $\qquad 2(1)^2 + 1 - 1$

$2 + 1 - 1$

$= 2$

$(1, 2)$