Name: _____ Date: _____ Hour: ___Alg 1___

Unit 7B Day 20: Solving a System with Quadratics

Focus Question: How do I solve a system that involves a quadratic?

A. Systems Review

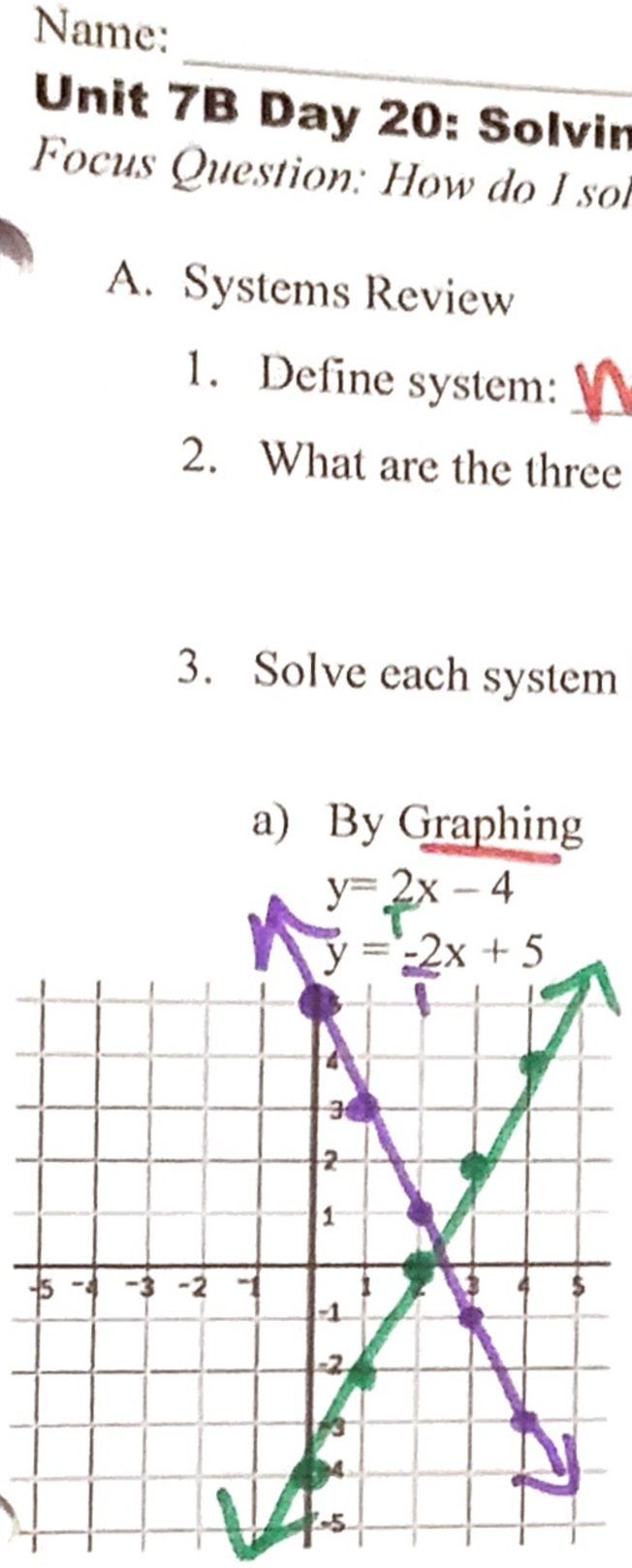
1. Define system: more than 1 function on a graph
2. What are the three methods for solving a system?

3. Solve each system below using the indicated method:

a) By Graphing

$y = 2x - 4$

$y = -2x + 5$



b) By Substitution

$f(x) = 3x + 2$

$g(x) = -2x - 8$

$f(-2) = 3(-2)+2$

$= -6+2$

$= -4$

$-2x - 8 = 3x + 2$

$+2x \quad +2x$

$-8 = 5x + 2$

$-2 \quad -2$

$\frac{-10}{5} = \frac{5x}{5}$

$-2 = x$

$(-2, -4)$

c) By elimination

$5x - 2y = 10$ $\rightarrow 10x - 4y = 20$

$2x - 4y = 16$ $\rightarrow 2x - 4y = 16$

$\frac{8x}{8} = \frac{4}{8}$

$x = \frac{1}{2}$

$(\frac{1}{2}, \frac{15}{-4})$

$2(\frac{1}{2}) - 4y = 16$

$1 - 4y = 16$

$-1 \quad -1$

$\frac{-4y}{-4} = \frac{15}{-4}$

4. Why is graphing not always the best method?
b/c answers aren't always integers

5. To use elimination on quadratics requires knowledge of matrices. Therefore, you'll learn that in a later math class. So, which method are we left to use? Substitution!

B. Systems with quadratics

1. Look at all of the equations below, how are the different from the ones we solved yesterday?
yest. one side of = was zero (found x int)

$6x^2 + 4x - 5 = -7x - 3$ — quad, line

$x^2 + 5x - 7 = 2$ — quad, const

$2x^2 - 4x + 7 = x^2 + 2x - 2$ — quad, quad

$-3x^2 + 2x - 1 = x$ — quad, line

2. Tell what you are finding when you solve each equation above.
when do line & parabola cross
where does a horiz. line meet a parabola
where do 2 parabolas cross
where line & parabola cross

3. **What will you have to do first?**
Get one side to = zero!

4a $6x^2+4x-5 = -7x-3$ (quad = line)

$+7x+3 \quad +7x+3$

$6x^2+11x-2=0$

$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

where does a parabola & a line intersect

b^2-4ac

$a=6$ $11^2-4(6)(-2)$

$b=11$ $121+48$

$c=-2$ 169

$-7x-3$ $-7(\frac{1}{6})-3$

$-7(-2)-3$ $-\frac{7}{6}-\frac{18}{6}$

$14-3$ $-\frac{25}{6}$

11

$x = \frac{-11 \pm \sqrt{169}}{2(6)}$

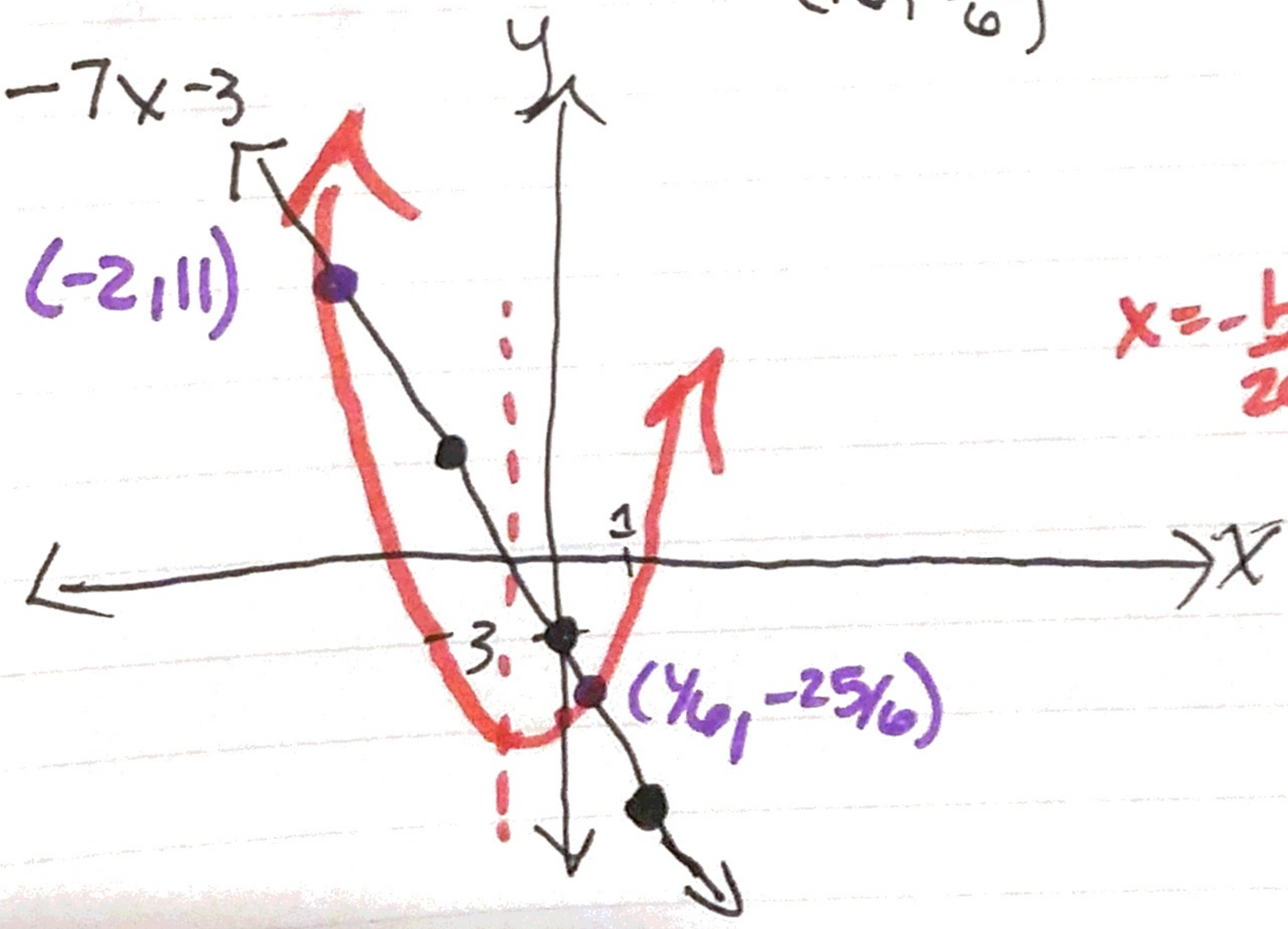
$x = \frac{-11 \pm 13}{12}$

$x = \frac{-11+13}{12}$ or $x = \frac{-11-13}{12}$

$x = \frac{2}{12}$ $x = \frac{-24}{12}$

$x = \frac{1}{6}$ $x = -2$

$(\frac{1}{6}, -\frac{25}{6})$ $(-2, 11)$



$x = \frac{-b}{2a} = \frac{-4}{2(6)} = \frac{-4}{12}$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

4b $x^2 + 5x - 7 = 2$ (Quad, const.)

$-2 \quad -2$

$x^2 + 5x - 9 = 0$

where does a parabola meet a horizontal line

$a = 1$
$b = 5$
$c = -9$

$b^2 - 4ac$
$5^2 - 4(1)(-9)$
$25 + 36$
61

$x = \frac{-5 \pm \sqrt{61}}{2(1)}$

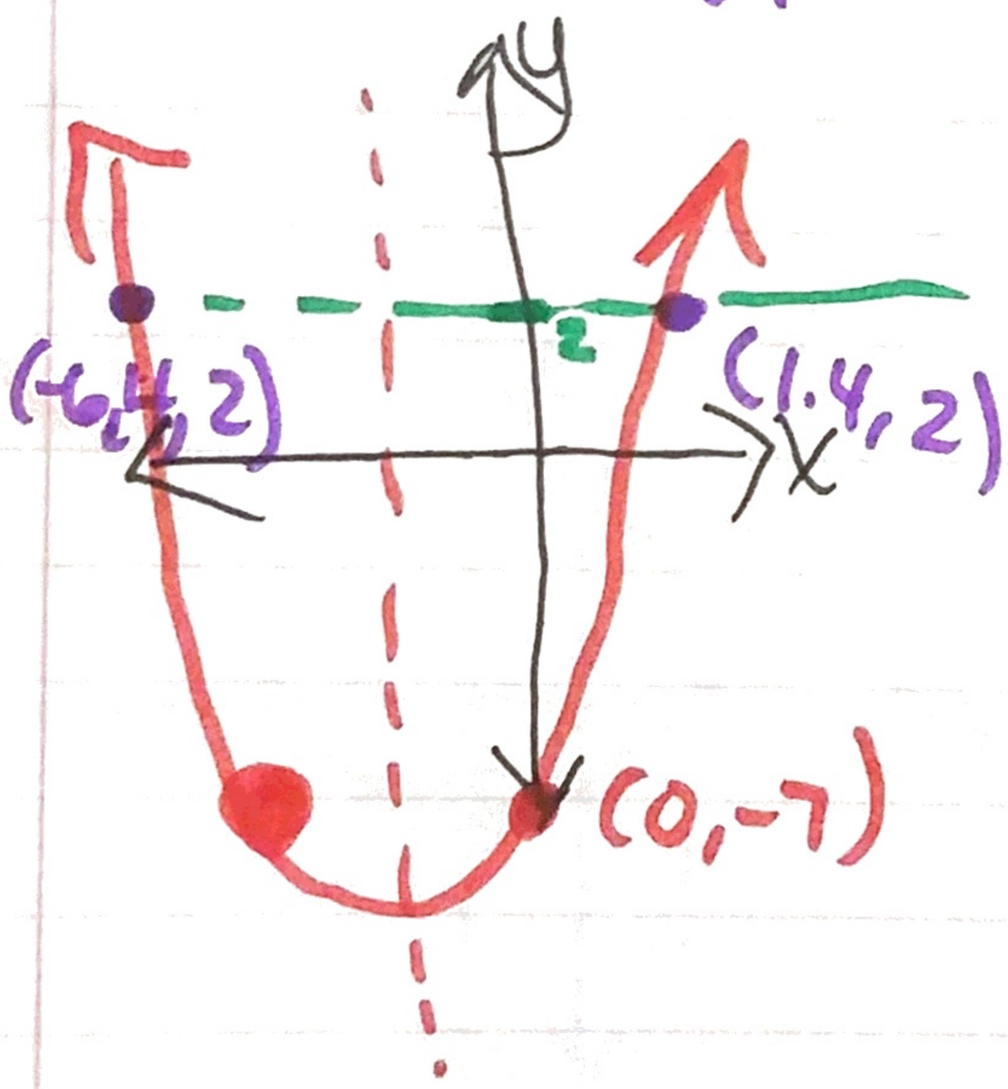
$x = \frac{-5 \pm \sqrt{61}}{2}$

$\left(\frac{-5 \pm \sqrt{61}}{2}, 2\right)$

$\left(\frac{-5 - \sqrt{61}}{2}, 2\right)$

$\approx (1.4, 2)$

$(-6.4, 2)$



$x = \frac{-b}{2a} \quad \frac{-5}{2(1)} = -\frac{5}{2}$

4c

Quad $2x^2-4x+7$ = Quad x^2+2x-2

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

$x^2-6x+9=0$

$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$

where do the parabolas intersect

$a=1$

$b=-6$

$c=9$

b^2-4ac

$(-6)^2-4(1)(9)$

$36-36$

0

$x=\frac{-(-6)\pm\sqrt{0}}{2(1)}$

$x=\frac{b}{2}$

$x=3$

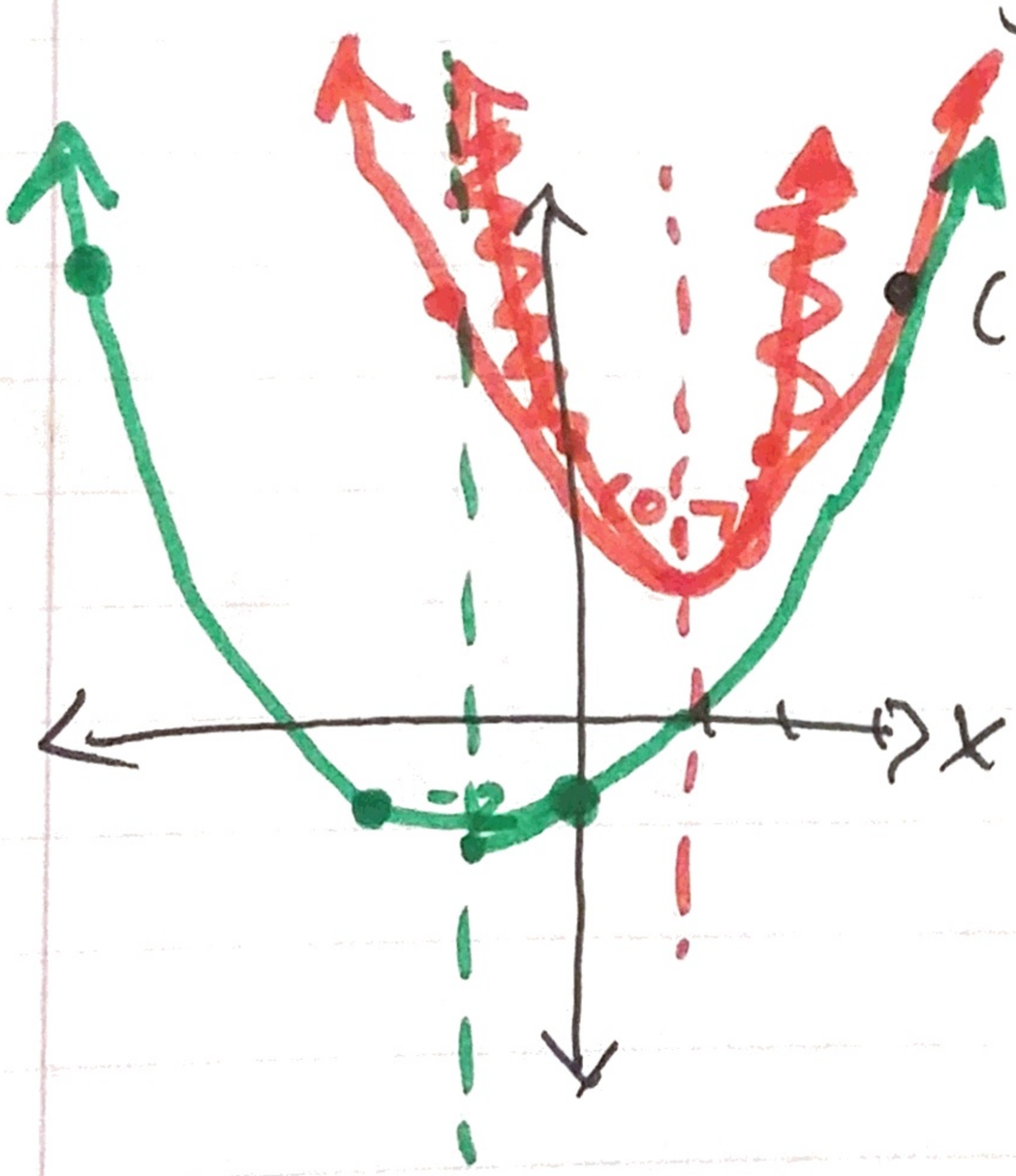
$3^2+2(3)-2$

$9+6-2$

13

$(3,13)$

$(3,13)$



$x=\frac{-(-4)}{2(2)}=\frac{4}{4}$

$x=\frac{-2}{2(1)}=-\frac{2}{2}$

4d

Quad

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

$-x \quad -x$

$-3x^2 + x - 1 = 0$

$a = -3$

$b = 1$

$c = -1$

$b^2 - 4ac$

$1^2 - 4(-3)(-1)$

$1 - 12$

-11

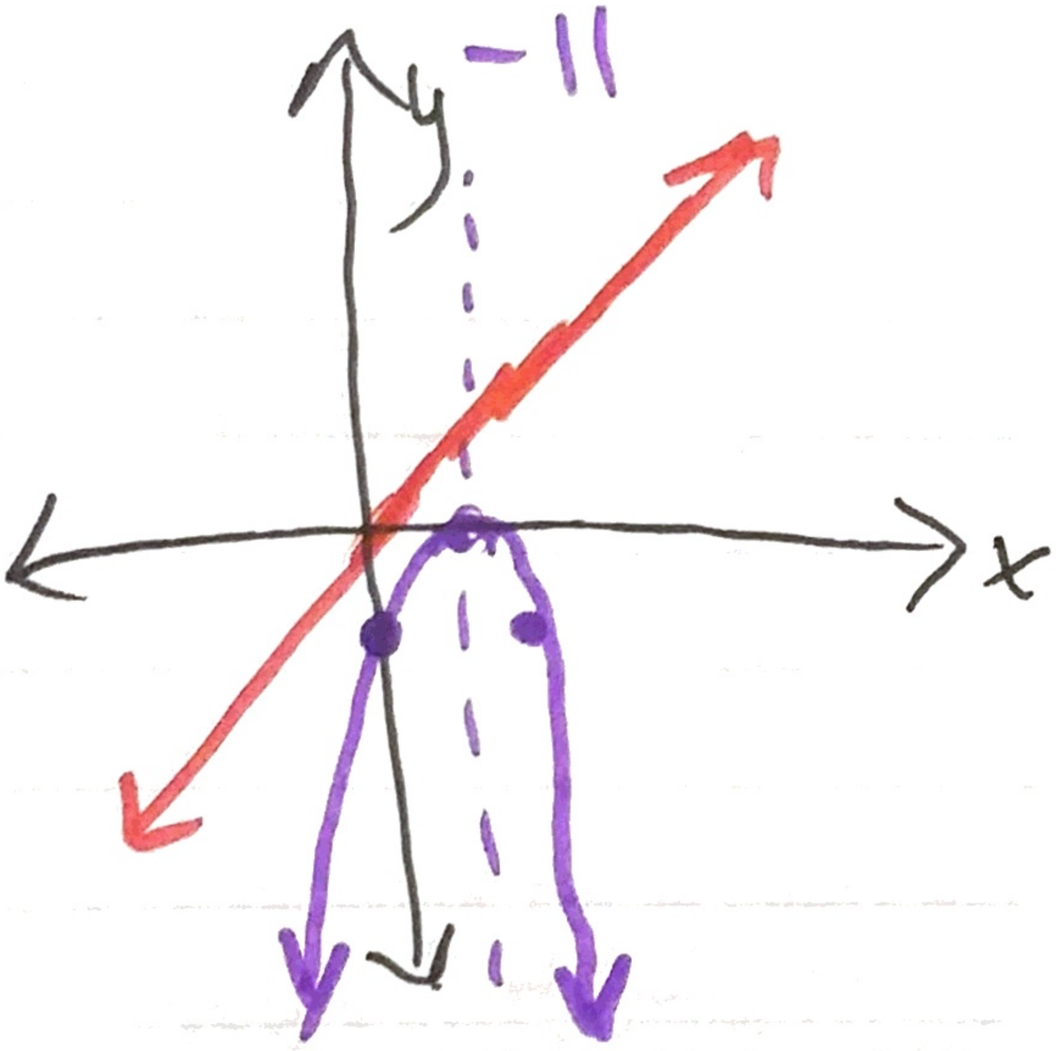
$X = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

where does the line meet the parabola

$x = \frac{-1 \pm \sqrt{-11}}{2(-3)}$

$\sqrt{11} \cdot \sqrt{-1}$

$x = \frac{-1 \pm i\sqrt{11}}{-6}$



$x = \frac{-2}{2(-3)} = \frac{-2}{-6}$

$x = \frac{1}{3}$