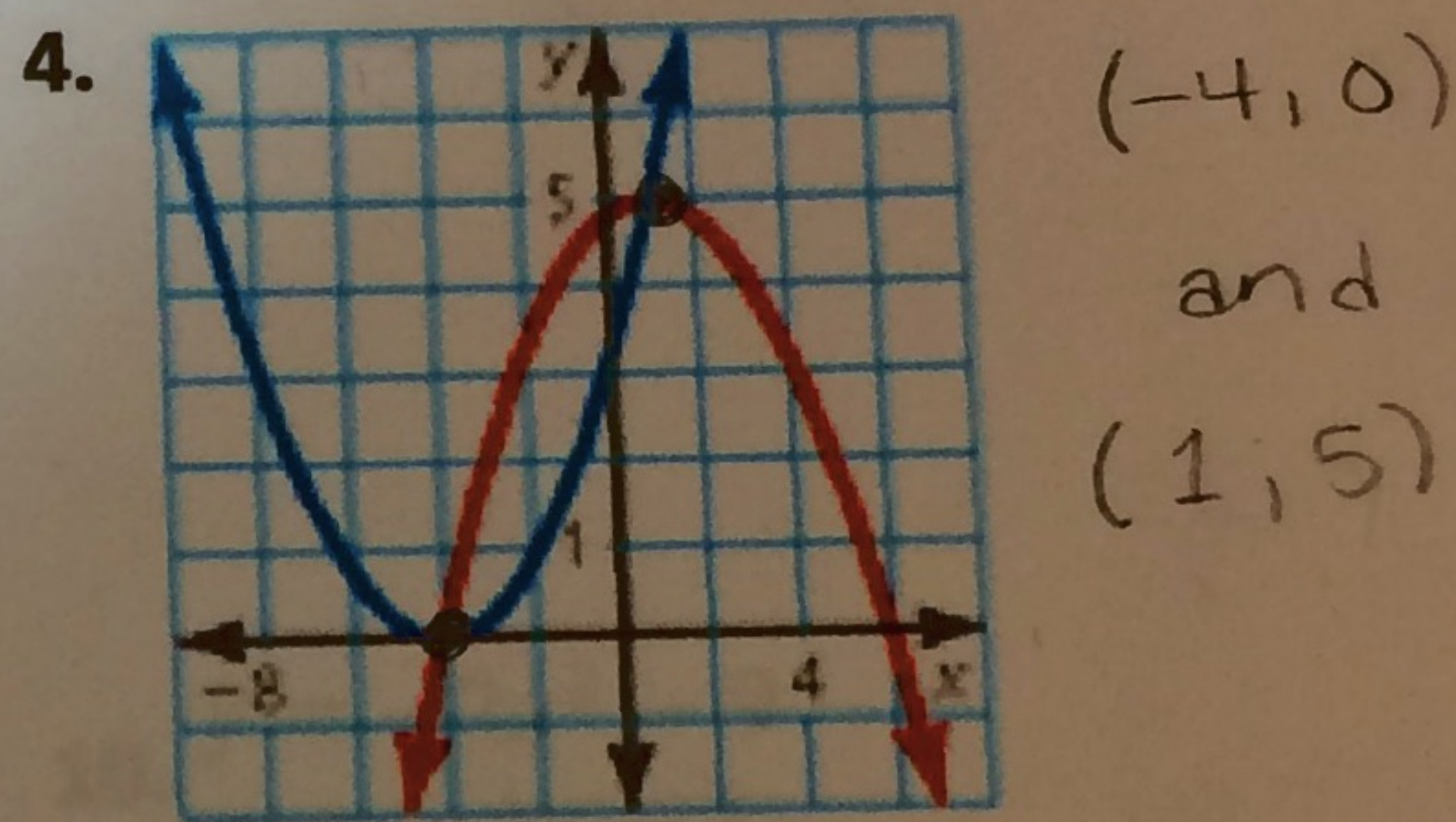
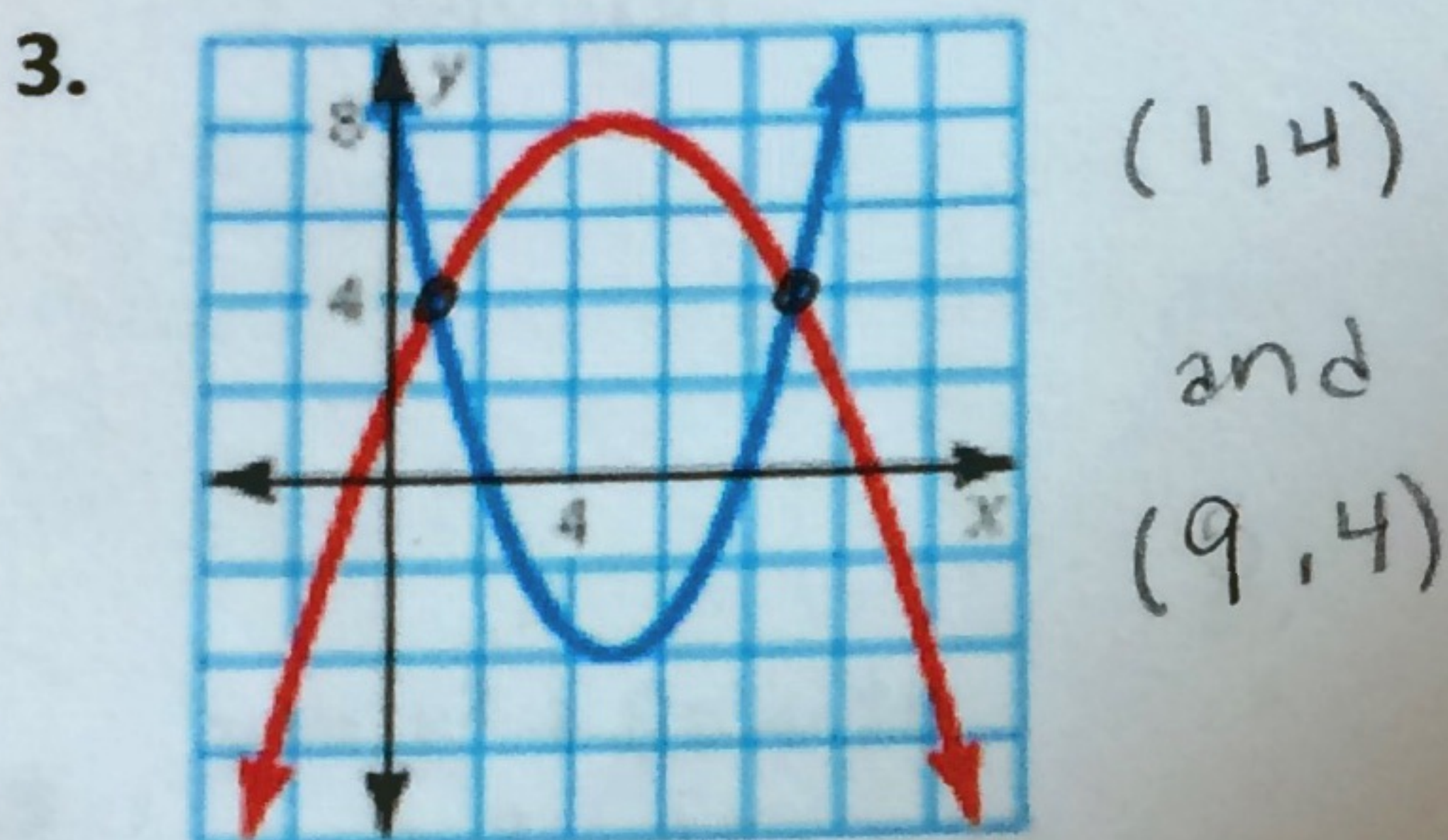
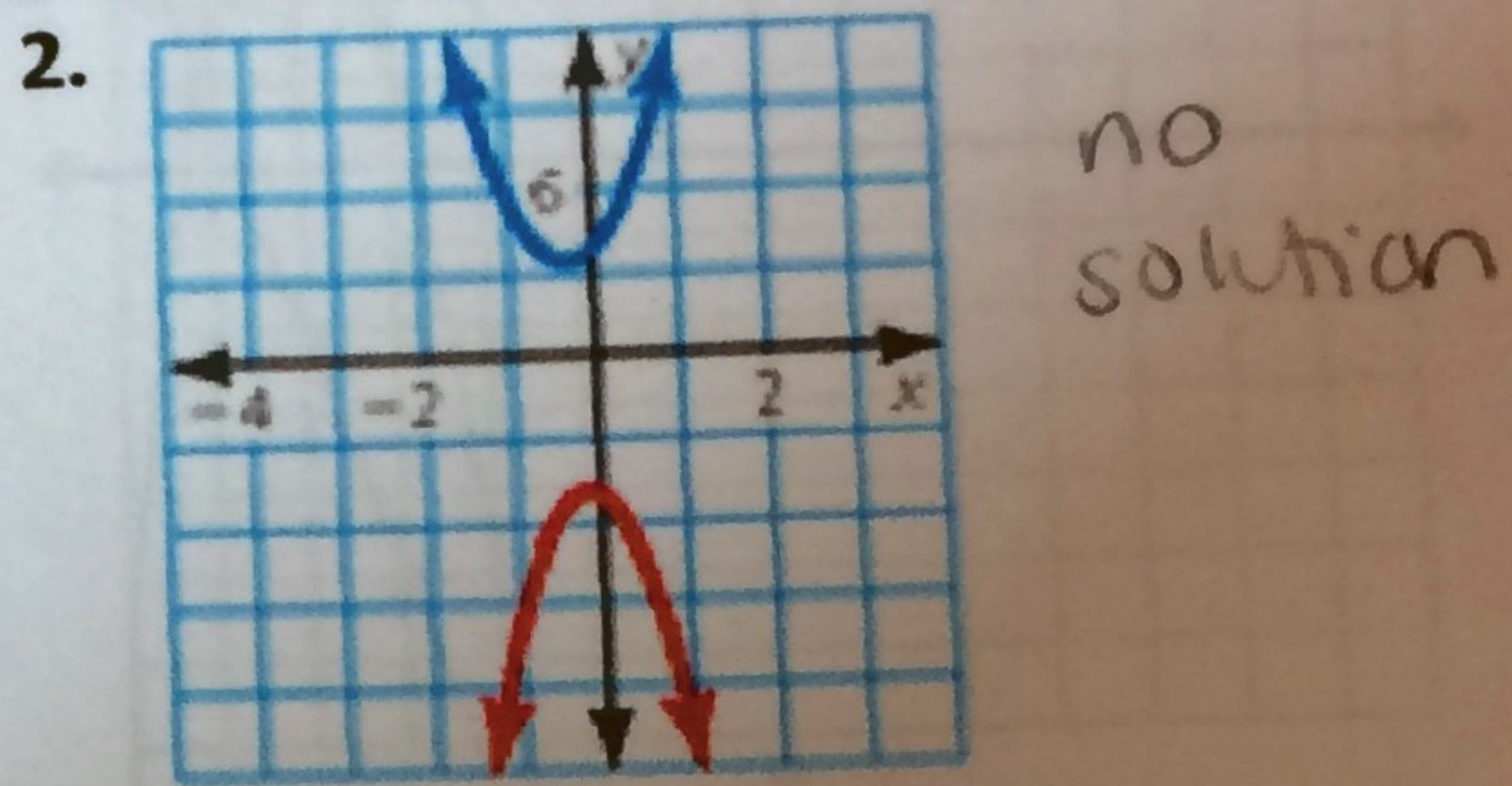
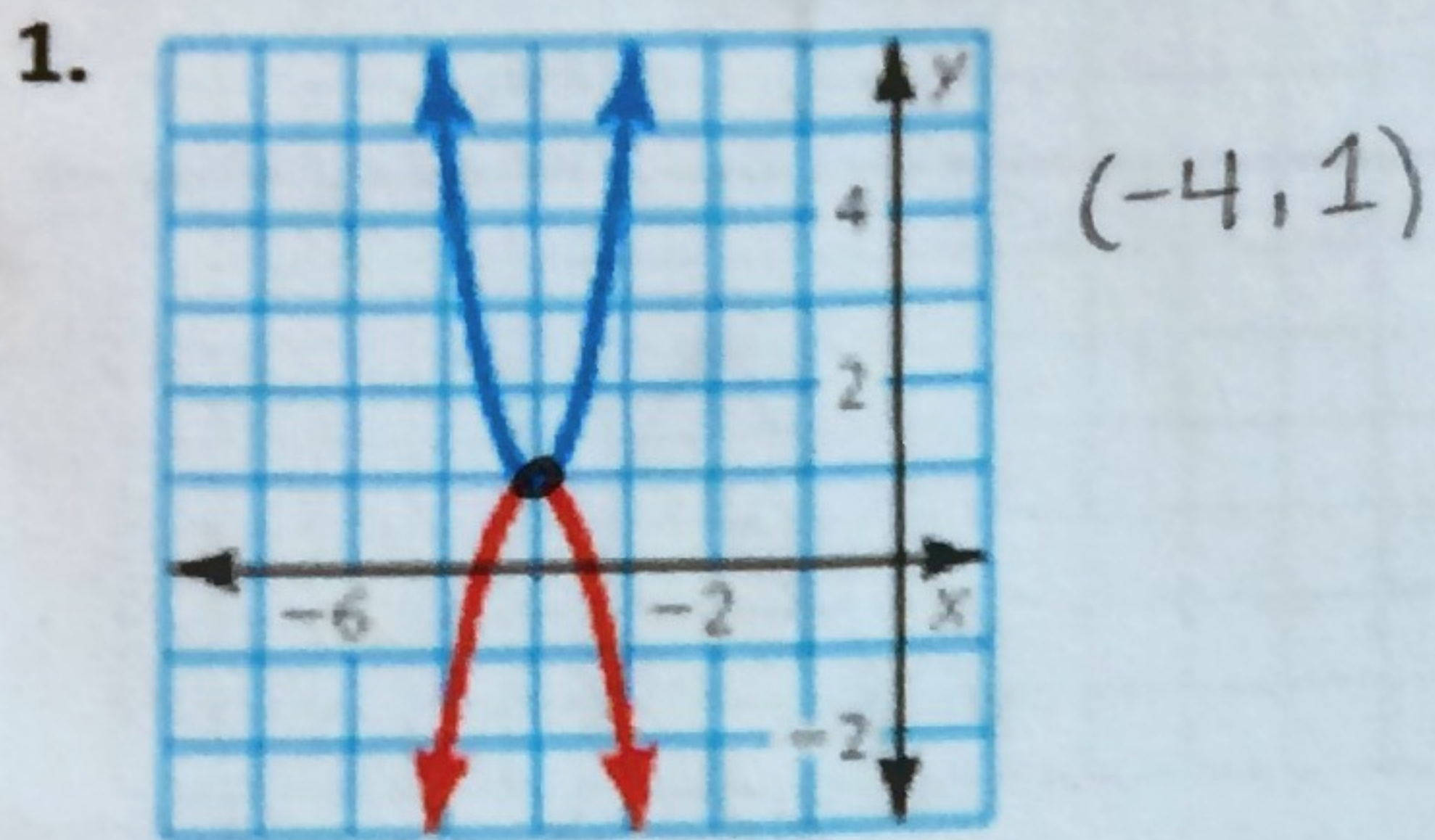


4.1 Solving Nonlinear Systems Homework

Solving by Graphing:

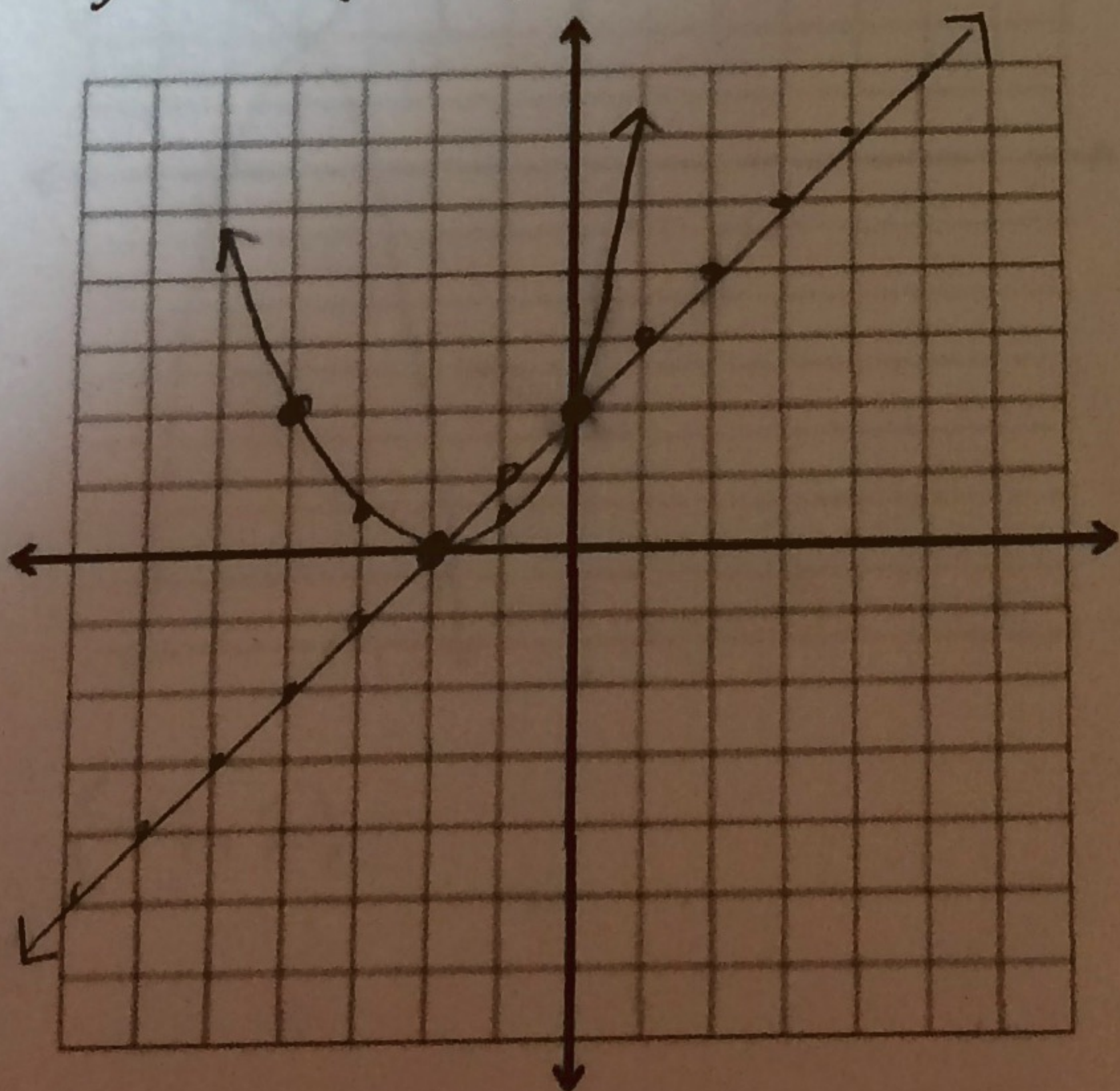
Solve the system of nonlinear equations using the graph.



Solve the system by graphing.

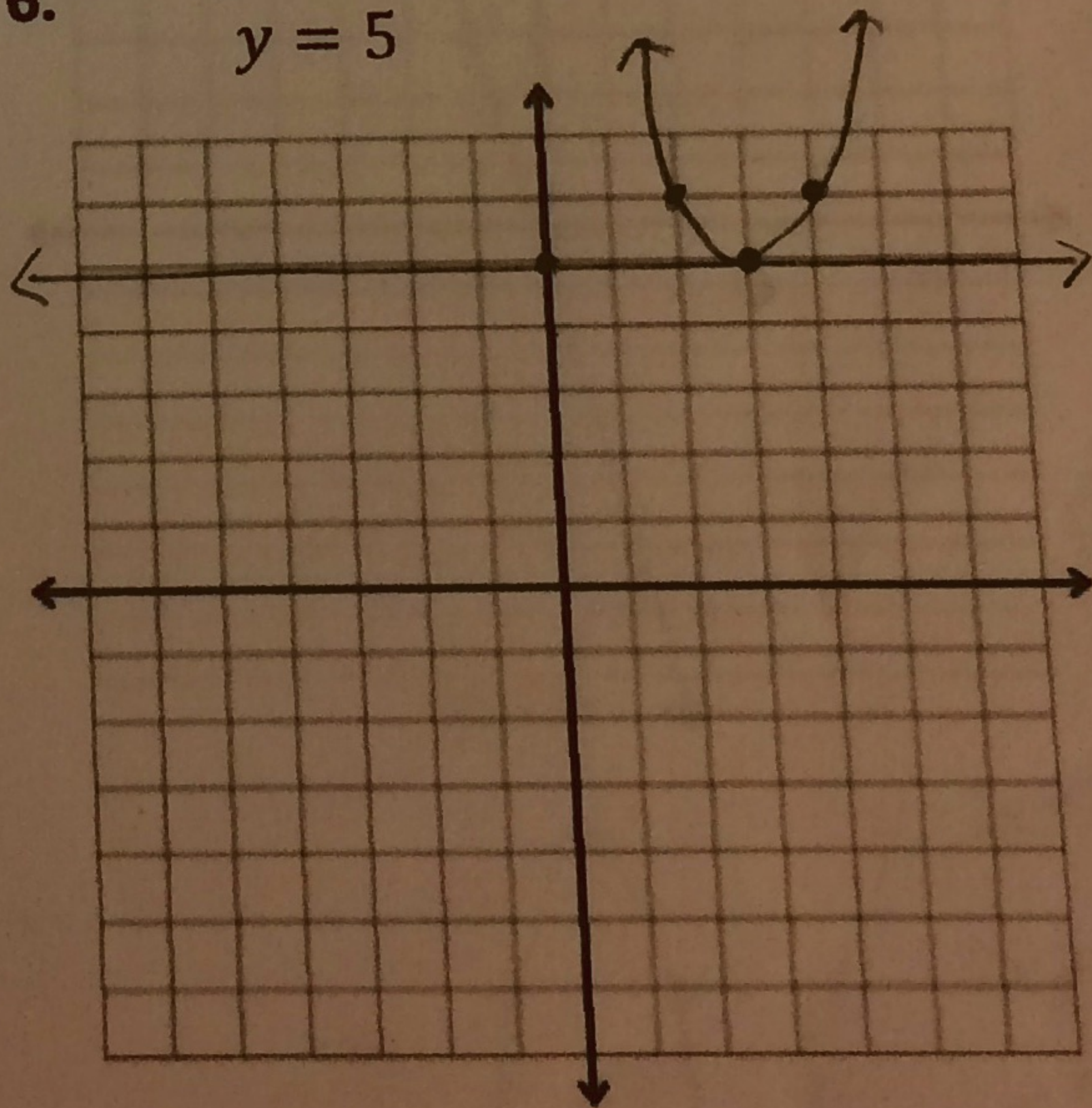
$y = x + 2$

5. $y = 0.5(x + 2)^2$



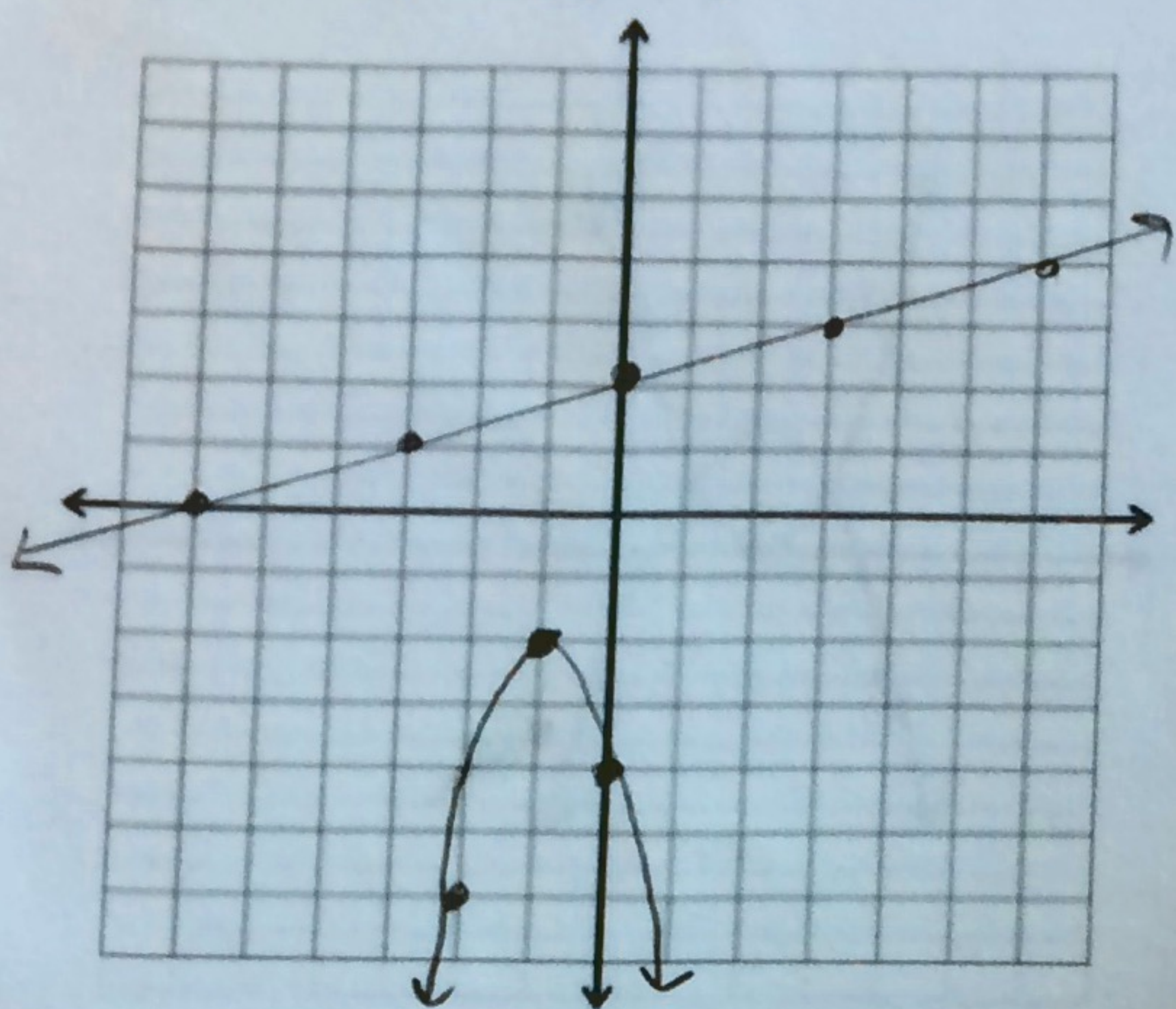
$(-2, 0)$ and $(0, 2)$

6. $y = (x - 3)^2 + 5$
 $y = 5$



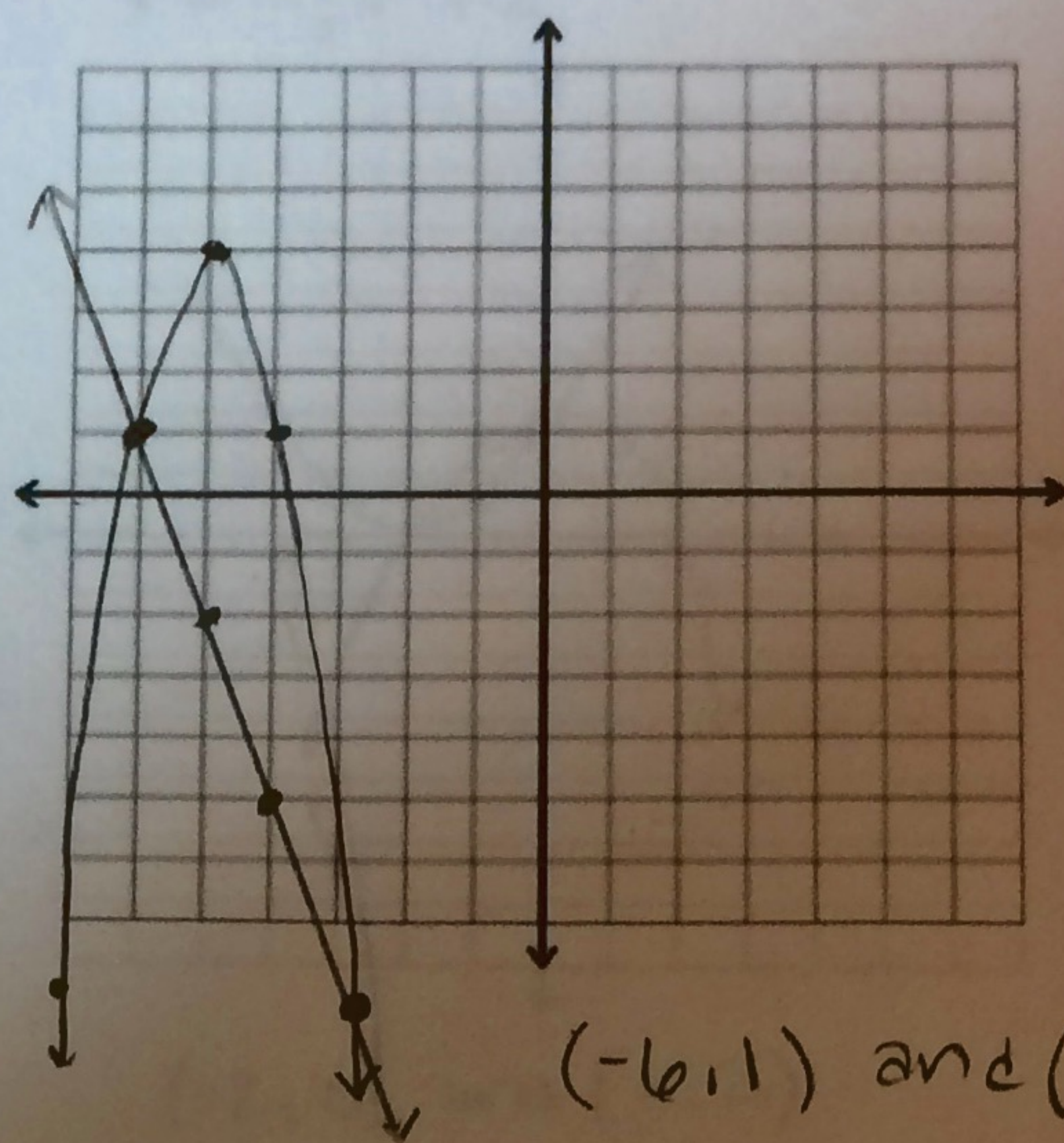
$(3, 5)$

7. $y = \frac{1}{3}x + 2$
 $y = -3x^2 - 5x - 4$



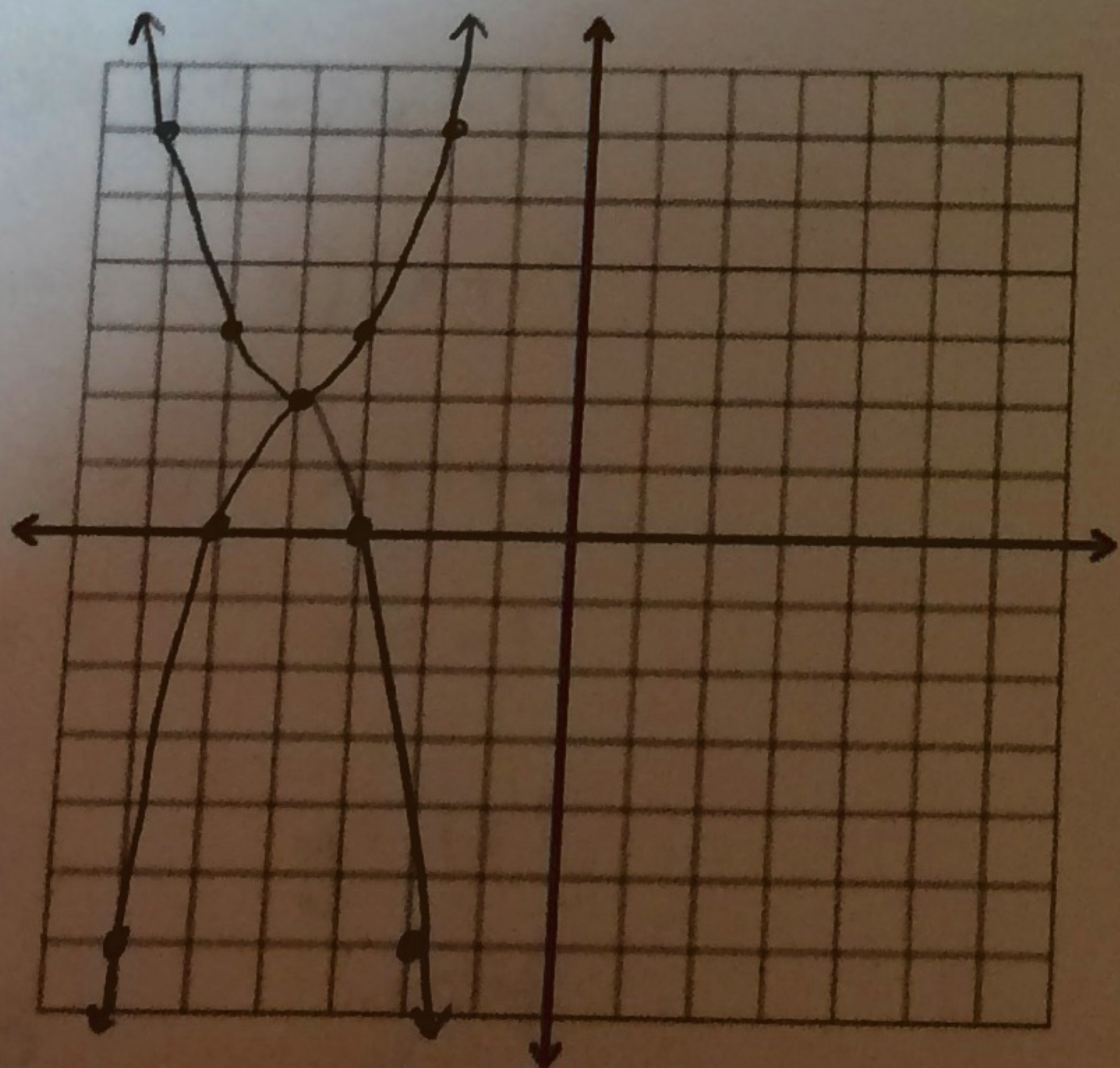
no solution

8. $y = -3x^2 - 30x - 71$
 $y = -3x - 17$



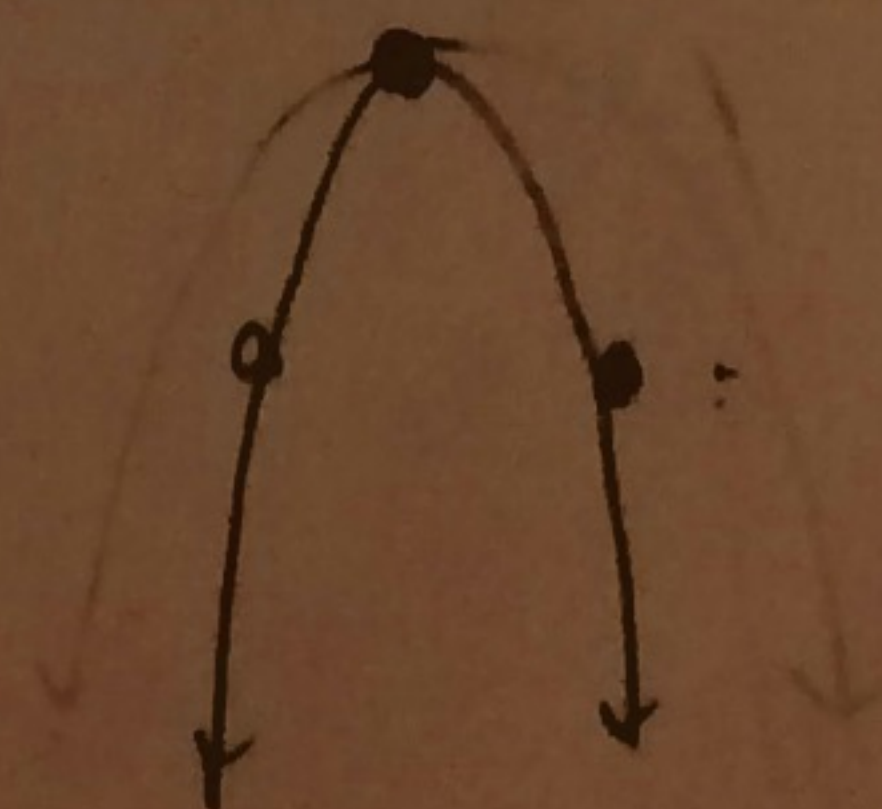
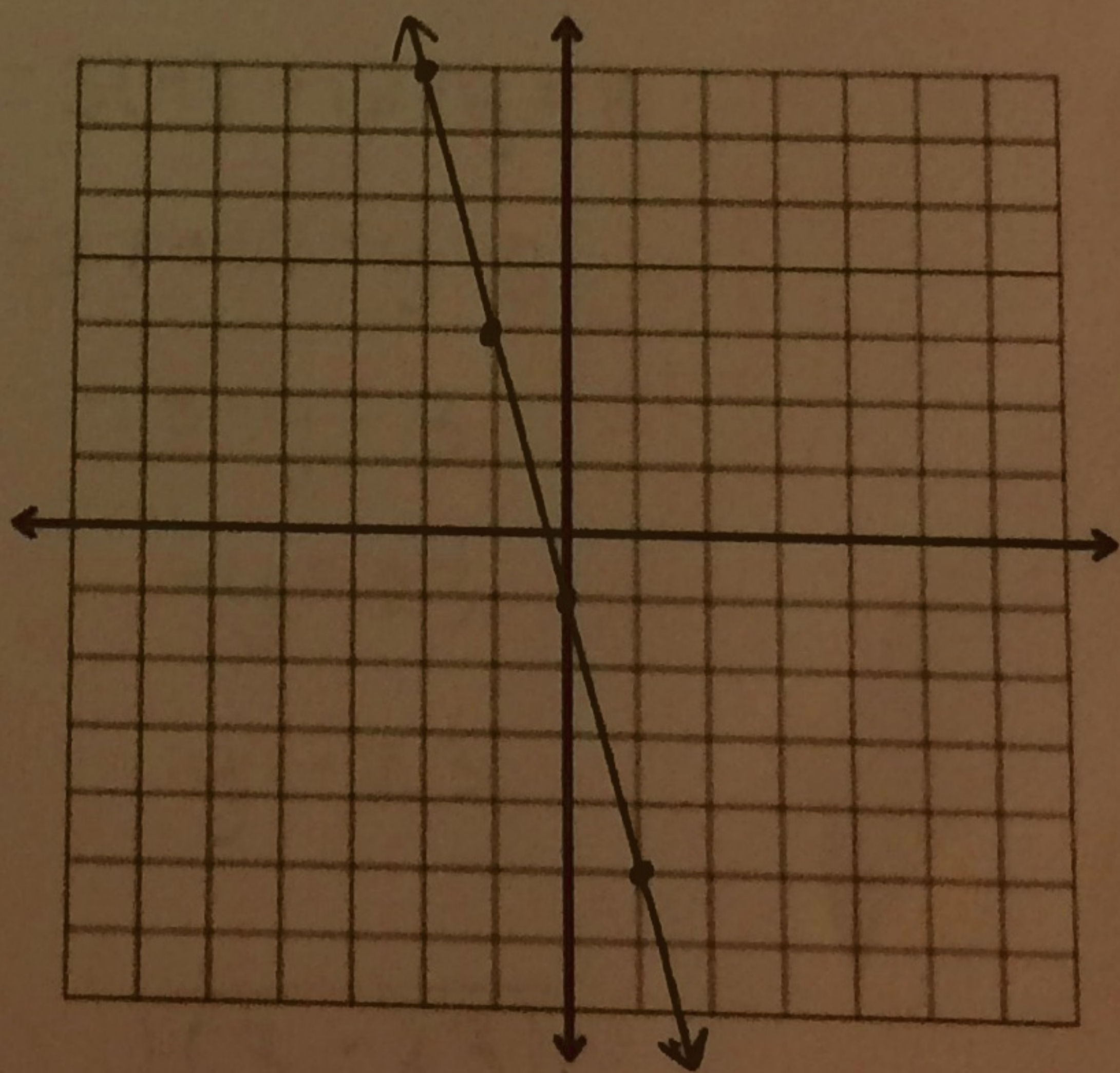
$(-6, 1)$ and $(-3, -8)$

9. $y = x^2 + 8x + 18$
 $y = -2x^2 - 16x - 30$



$(-4, 2)$

10. $y = -2x^2 - 9$
 $y = -4x - 1$



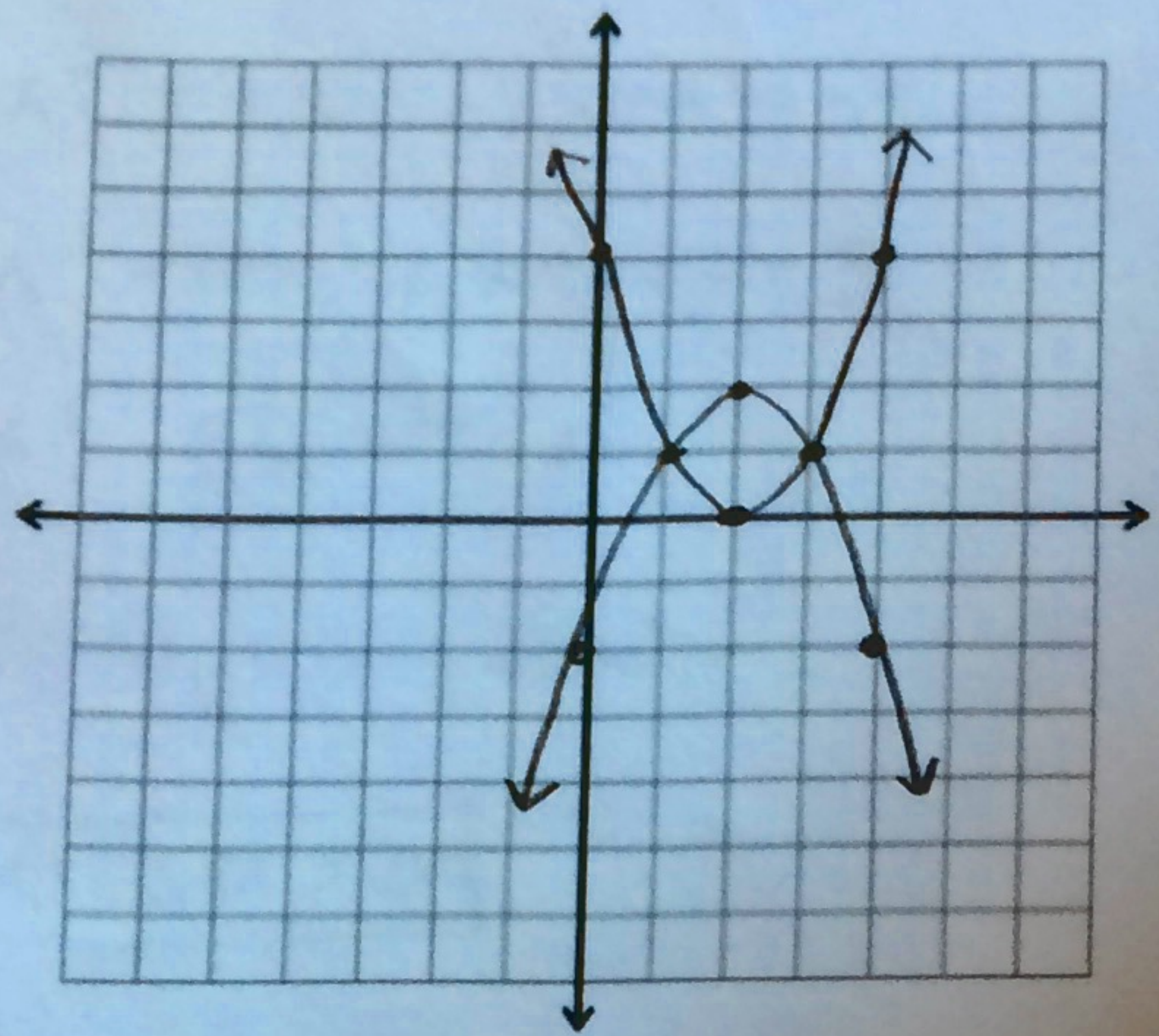
$-2x^2 - 9 = -4x - 1$

$2x^2 - 4x + 8 = 0$

$x^2 - 2x + 4 = 0$

no solution

11. $y = (x - 2)^2$
 $y = -x^2 + 4x - 2$



$(1, 1)$ and $(3, 1)$

Solving Using Substitution:

Solve the system by substitution.

13. $y = x + 5$
 $y = x^2 - x + 2$

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

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

$$0 = (x - 3)(x + 1)$$

$$x - 3 = 0 \quad x + 1 = 0$$

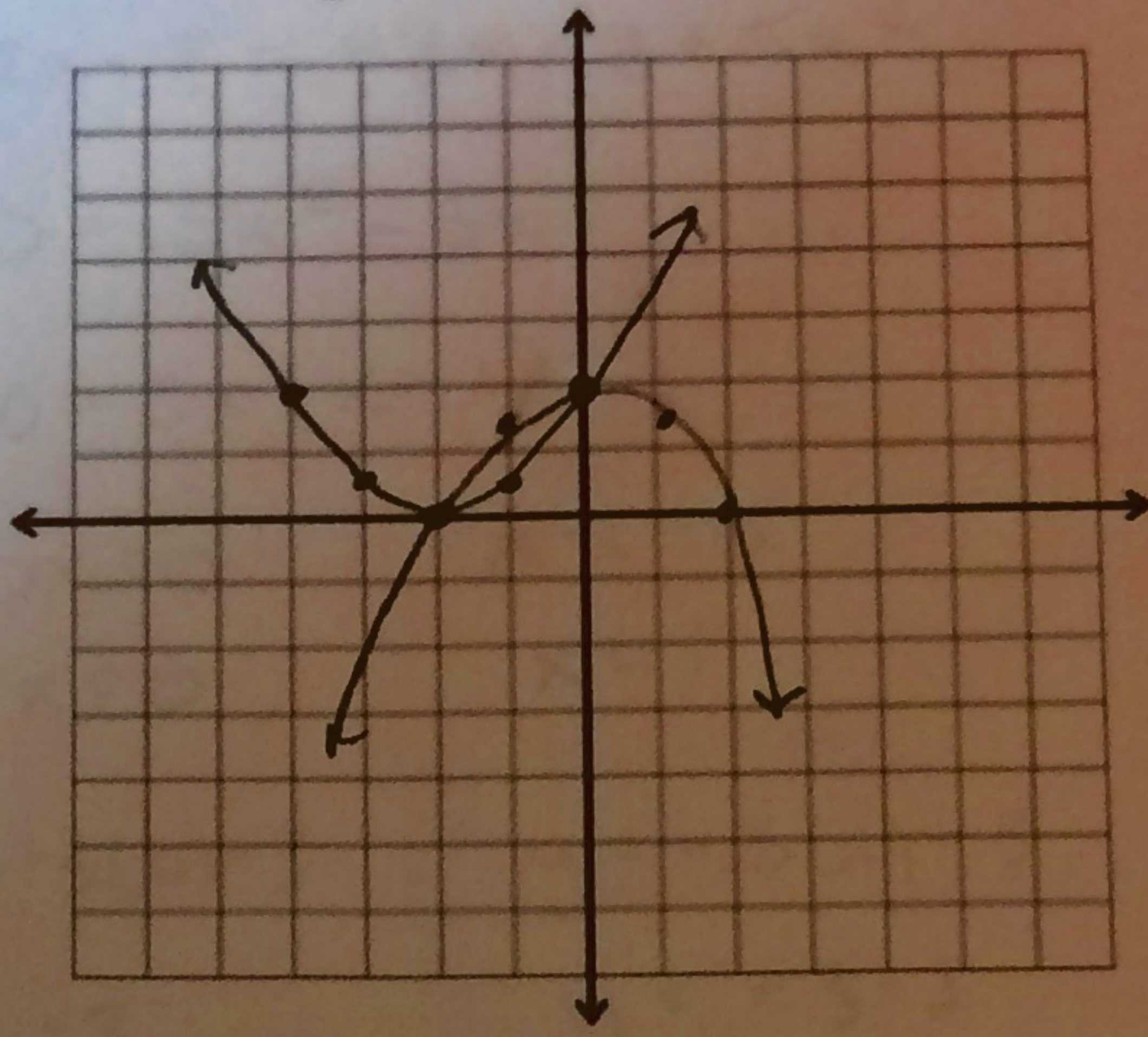
$$x = 3 \quad x = -1$$

$$y = 3 + 5 \quad y = -1 + 5$$

$$y = 8 \quad y = 4$$

$(3, 8)$ and $(-1, 4)$

12. $y = \frac{1}{2}(x + 2)^2$
 $y = -\frac{1}{2}x^2 + 2$



$(-2, 0)$ and $(0, 2)$

14. $x = 3$
 $-3x^2 + 4x - y = 8$

$$-3(3)^2 + 4(3) - y = 8$$

$$-3(9) + 12 - y = 8$$

$$-27 + 12 - y = 8$$

$$-15 - y = 8$$

$$-y = 23$$

$$y = -23$$

$(3, -23)$

$$15. \begin{aligned} 2x^2 + 4x - y &= -3 \\ -2x + y &= -4 \quad y = 2x - 4 \end{aligned}$$

$$2x^2 + 4x - (2x - 4) = -3$$

$$2x^2 + 4x - 2x + 4 = -3$$

$$2x^2 + 2x + 7 = 0$$

imaginary solutions

no solution

$$16. \begin{aligned} 2x - 3 &= y + 5x^2 \\ y &= -3x - 3 \end{aligned}$$

$$2x - 3 = -3x - 3 + 5x^2$$

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

$$0 = 5x(x - 1)$$

$$5x = 0 \quad x - 1 = 0$$

$$x = 0 \quad x = 1$$

$$y = -3(0) - 3$$

$$y = -3(1) - 3$$

$$y = -3$$

$$y = -3 - 3$$

$$y = -6$$

(0, -3) and (1, -6)

$$17. \begin{aligned} y &= x^2 - 1 \\ -7 &= -x^2 - y \end{aligned}$$

$$-7 = -x^2 - (x^2 - 1)$$

$$-7 = -x^2 - x^2 + 1$$

$$0 = -2x^2 + 8$$

$$0 = x^2 - 4$$

$$0 = (x - 2)(x + 2)$$

$$x - 2 = 0 \quad x + 2 = 0$$

$$x = 2 \quad x = -2$$

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

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

$$y = 4 - 1$$

$$y = 4 - 1$$

$$y = 3$$

$$y = 3$$

(2, 3) and (-2, 3)

$$18. \begin{aligned} y + 16x - 22 &= 4x^2 & y &= 4x^2 - 16x + 22 \\ 4x^2 - 24x + 26 + y &= 0 \end{aligned}$$

$$4x^2 - 24x + 26 + 4x^2 - 16x + 22 = 0$$

$$8x^2 - 40x + 48 = 0$$

$$x^2 - 5x + 6 = 0$$

$$(x - 3)(x - 2) = 0$$

$$x - 3 = 0$$

$$x - 2 = 0$$

$$x = 3$$

$$x = 2$$

$$y = 4(3)^2 - 16(3) + 22$$

$$y = 4(2)^2 - 16(2) + 22$$

$$y = 4(9) - 48 + 22$$

$$y = 4(4) - 32 + 22$$

$$y = 36 - 26$$

$$y = 16 - 10$$

$$y = 10$$

$$y = 6$$

(3, 10) and (2, 6)

Solve Using Elimination:

Solve the system by elimination.

19. $2x^2 - 3x - y = -5$
 $-x + y = 5$

$$\begin{array}{r} 2x^2 - 3x - y = -5 \\ + \quad -x + y = 5 \\ \hline \end{array}$$

$$2x^2 - 4x = 0$$

$$2x(x-2) = 0$$

$$2x = 0 \quad x - 2 = 0$$

$$x = 0 \quad x = 2$$

$$-(0) + y = 5 \quad -2 + y = 5$$

$$y = 5 \quad y = 7$$

$(0, 5)$ and $(2, 7)$

21. $-3x^2 + y = -18x + 29$
 $-3x^2 - y = 18x - 25$

$$\begin{array}{r} -3x^2 + y = -18x + 29 \\ + \quad -3x^2 - y = 18x - 25 \\ \hline \end{array}$$

$$-9x^2 = 4$$

$$x^2 = \frac{-4}{9}$$

no solution

20. $-3x^2 + 2x - 5 = y$
 $-x + 2 = -y$

$$\begin{array}{r} -3x^2 + 2x - 5 = y \\ + \quad -x + 2 = -y \\ \hline \end{array}$$

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

imaginary solutions

no solution

22. $y = -x^2 - 6x - 10$ $-y = x^2 + 6x + 10$
 $y = 3x^2 + 18x + 22$

$$\begin{array}{r} -y = x^2 + 6x + 10 \\ + \quad y = 3x^2 + 18x + 22 \\ \hline \end{array}$$

$$0 = 4x^2 + 24x + 32$$

$$0 = x^2 + 6x + 8$$

$$0 = (x+4)(x+2)$$

$$x+4=0$$

$$x+2=0$$

$$x=-4$$

$$x=-2$$

$$y = 3(-4)^2 + 18(-4) + 22$$

$$y = 3(-2)^2 + 18(-2) + 22$$

$$y = -2$$

$$y = -2$$

$(-4, -2)$ and $(-2, -2)$

$$23. \begin{aligned} y + 2x &= -14 \\ -x^2 - y - 6x &= 11 \end{aligned}$$

$$y + 2x = -14$$

$$+ \frac{-x^2 - y - 6x = 11}{}$$

$$-x^2 - 4x = -3$$

$$x^2 + 4x - 3 = 0$$

$$x = \frac{-4 \pm \sqrt{4^2 - 4(1)(-3)}}{2(1)}$$

$$x = \frac{-4 \pm \sqrt{28}}{2} \quad x = \frac{-4 \pm 2\sqrt{7}}{2}$$

$$x = -2 + \sqrt{7} \quad x = -2 - \sqrt{7}$$

$$\boxed{(-2 + \sqrt{7}, -15.3) \text{ and } (-2 - \sqrt{7}, -4.7)}$$

$$25. \begin{aligned} y &= -3x^2 - 30x - 76 \\ y &= 2x^2 + 20x + 44 \end{aligned}$$

$$y = -3x^2 - 30x - 76$$

$$-(y = 2x^2 + 20x + 44)$$

$$0 = -5x^2 - 50x - 120$$

$$0 = x^2 + 10x + 24$$

$$0 = (x + 6)(x + 4)$$

$$x + 6 = 0$$

$$x = -6$$

$$x + 4 = 0$$

$$x = -4$$

$$y = 2(-6)^2 + 20(-6) + 44$$

$$y = 2(36) - 120 + 44$$

$$y = 72 - 76$$

$$y = -4$$

$$y = 2(-4)^2 + 20(-4) + 44$$

$$y = 2(16) - 80 + 44$$

$$y = 32 - 36$$

$$y = -4$$

$$\boxed{(-6, -4) \text{ and } (-4, -4)}$$

$$24. \begin{aligned} y &= x^2 + 4x + 7 \\ -y &= 4x + 7 \end{aligned}$$

$$y = x^2 + 4x + 7$$

$$+ \frac{-y = 4x + 7}{}$$

$$0 = x^2 + 8x + 14$$

$$x = \frac{-8 \pm \sqrt{8^2 - 4(1)(14)}}{2(1)}$$

$$x = \frac{-8 \pm \sqrt{8}}{2}$$

$$x = \frac{-8 \pm 2\sqrt{2}}{2}$$

$$x = -4 + \sqrt{2}$$

$$x = -4 - \sqrt{2}$$

$$\boxed{(-4 + \sqrt{2}, 3.3) \text{ and } (-4 - \sqrt{2}, 14.7)}$$

$$26. \begin{aligned} -10x^2 + y &= -80x + 155 \\ 5x^2 + y &= 40x - 85 \end{aligned}$$

$$-10x^2 + y = -80x + 155$$

$$-(5x^2 + y = 40x - 85)$$

$$-15x^2 = -120x + 240$$

$$0 = 15x^2 - 120x + 240$$

$$0 = x^2 - 8x + 16$$

$$0 = (x - 4)^2$$

$$x - 4 = 0$$

$$x = 4$$

$$5(4)^2 + y = 40(4) - 85$$

$$5(16) + y = 160 - 85$$

$$80 + y = 75$$

$$y = -5$$

$$\boxed{(4, -5)}$$