

3AQ Quadratic Functions in Vertex Form

Review - Aka: WILL ONLY BE HELPFUL IF YOU ALREADY DID ALL THE OTHER HOMEWORK!

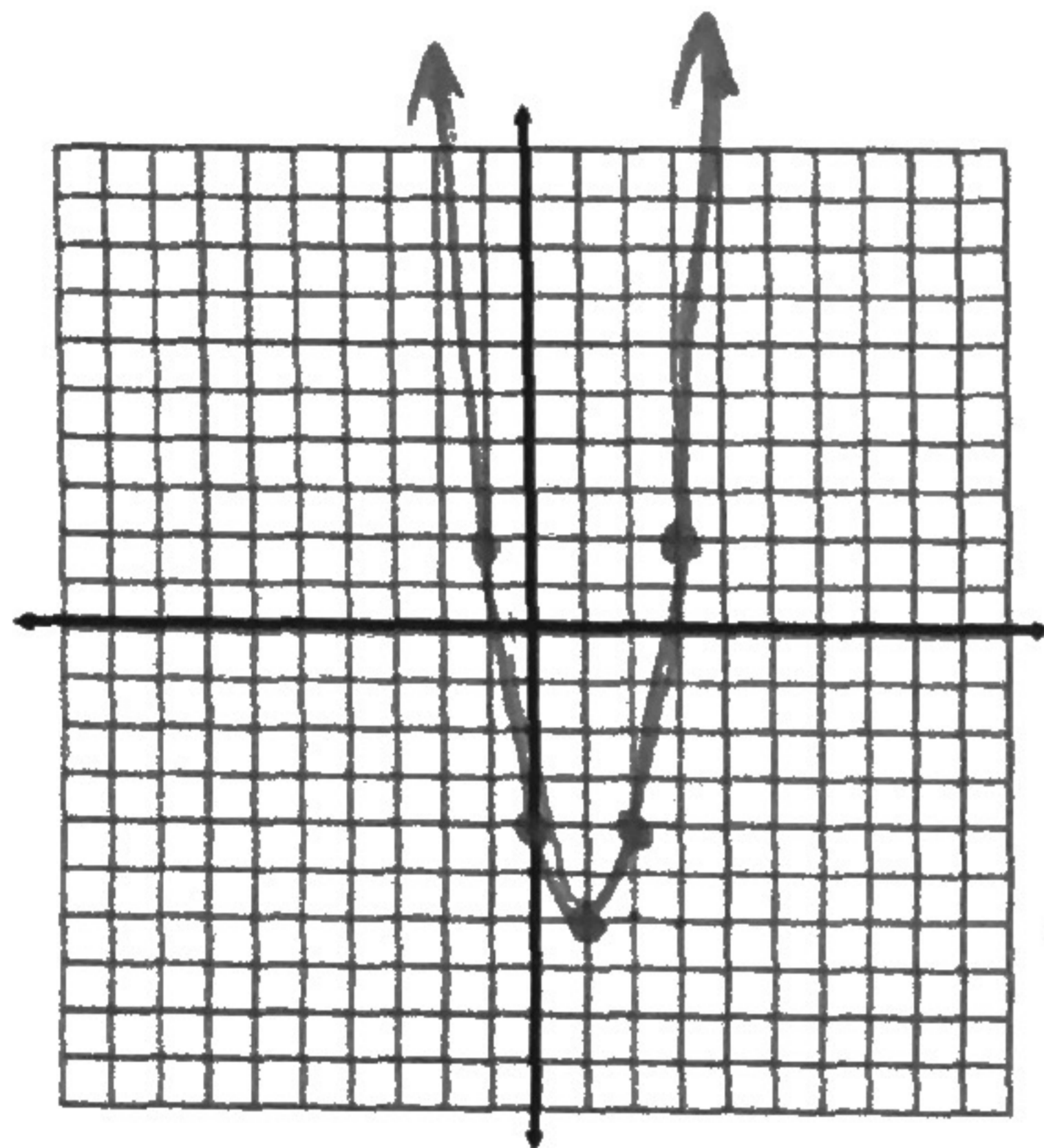
Provide the following information about the given functions, then graph:

$$\Rightarrow f(x) = -4(x + 5/2)^2 + 4$$

1. $f(x) = 2(x-1)^2 - 6$ Range: $y \geq -6$

y-int: $(0, -4)$ # of x-int: 2

$f(-5) = 66$ $f(5) = 26$

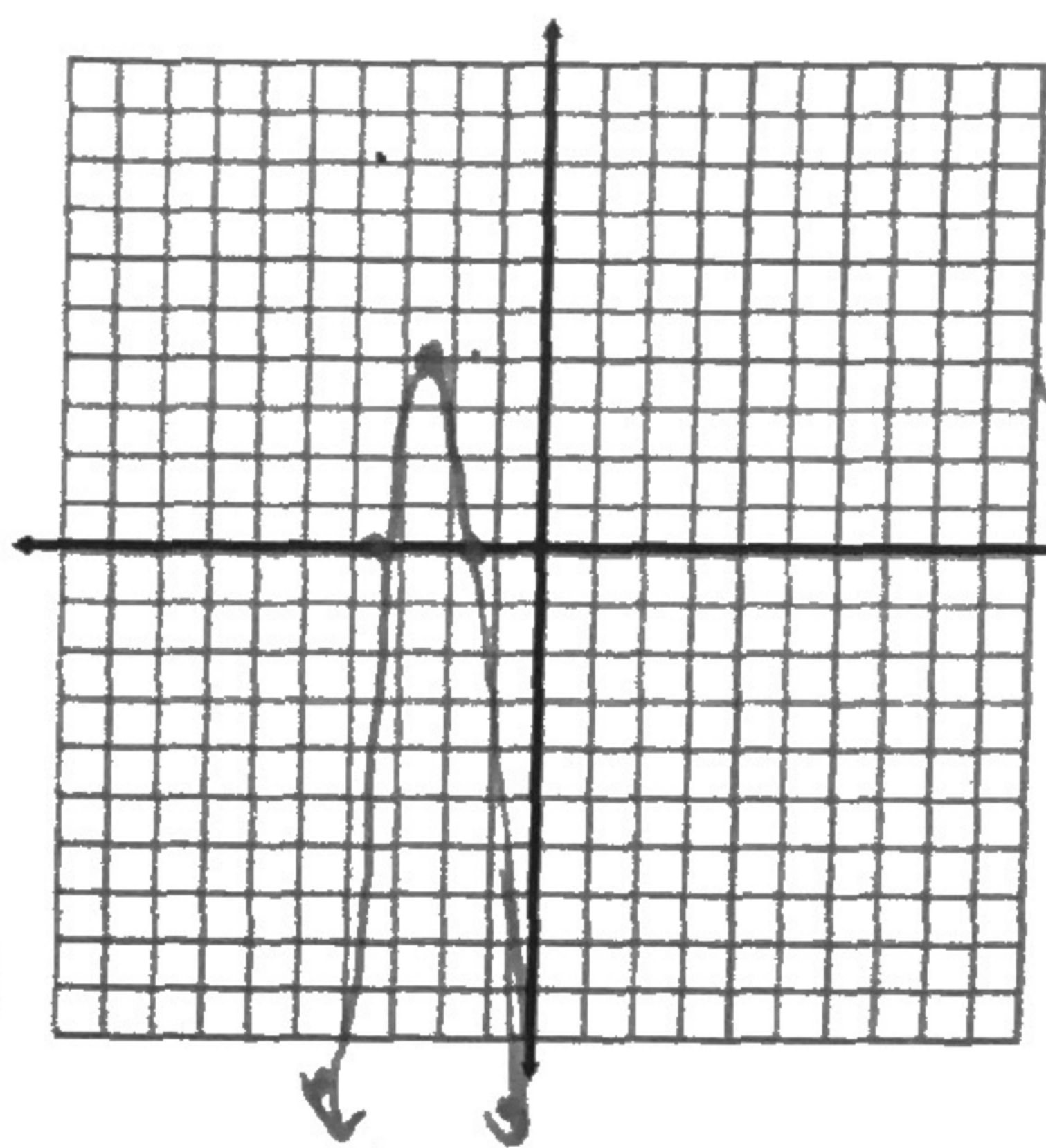


x-int:
 $0 = 2(x-1)^2 - 6$
 $6 = 2(x-1)^2$
 $\sqrt{3} = \sqrt{(x-1)^2}$
 $\pm\sqrt{3} = x-1$
 $x = 1 \pm \sqrt{3}$
 $(1+\sqrt{3}, 0) (1-\sqrt{3}, 0)$
 $\approx (2.73, 0) (-0.73, 0)$

4. $f(x) = -(2x+5)^2 + 4$ Range: $y \leq 4$

y-int: $(0, -21)$ # of x-int: 2

$f(-6) = -285$ $f(6) = -45$

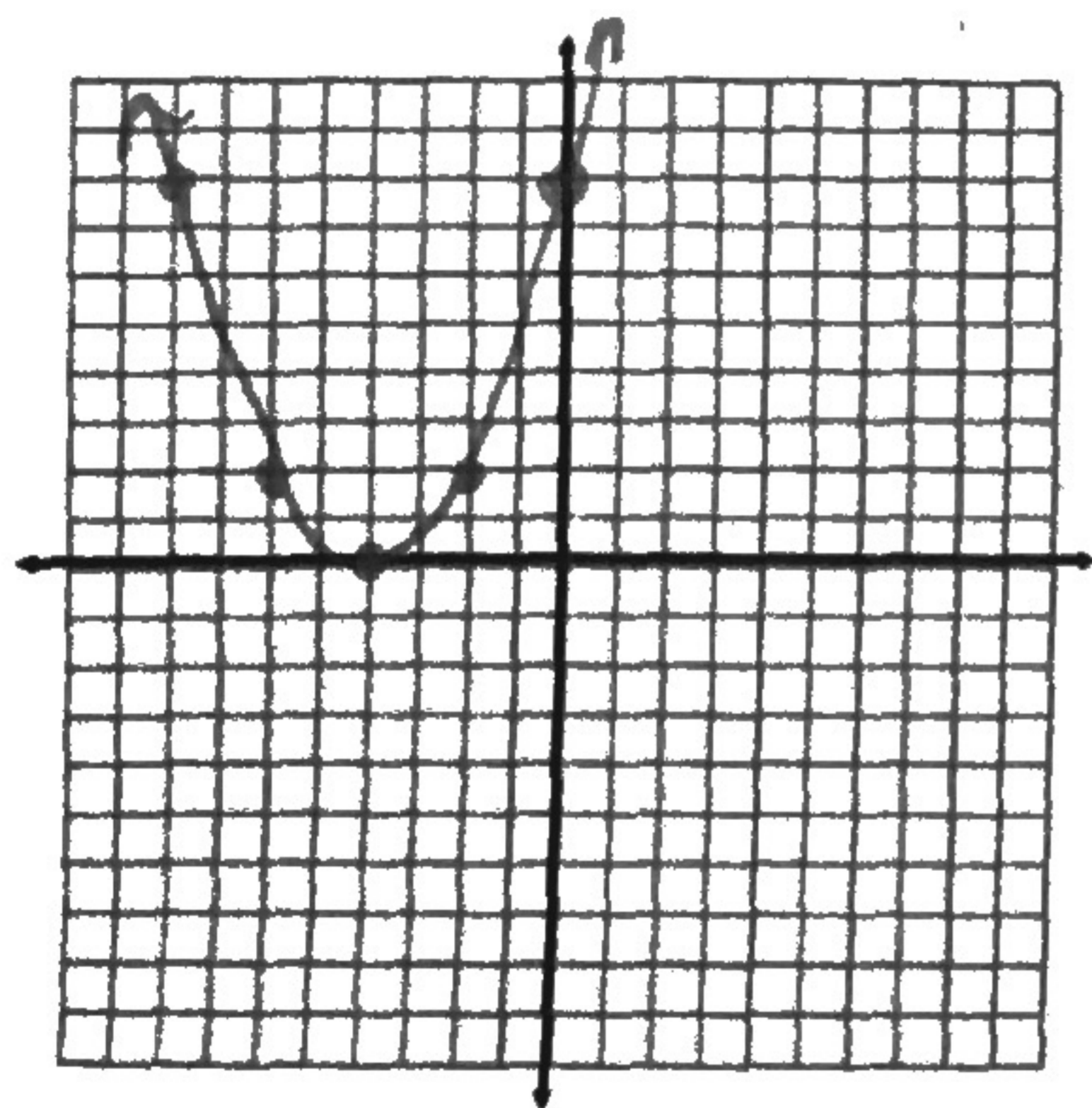


x-int:
 $0 = -(2x+5)^2 + 4$
 $4 = (2x+5)^2$
 $\pm 2 = 2x+5$
 $\frac{2x}{2} = \frac{-5 \pm 2}{2}$
 $(-\frac{7}{2}, 0) (-\frac{3}{2}, 0)$
 $\approx (-3.5, 0) (-1.5, 0)$

2. $f(x) = \frac{1}{2}(x+4)^2$ Range: $y \geq 0$

y-int: $(0, 8)$ # of x-int: 1

$f(-5) = \frac{1}{2}$ $f(5) = \frac{81}{2}$

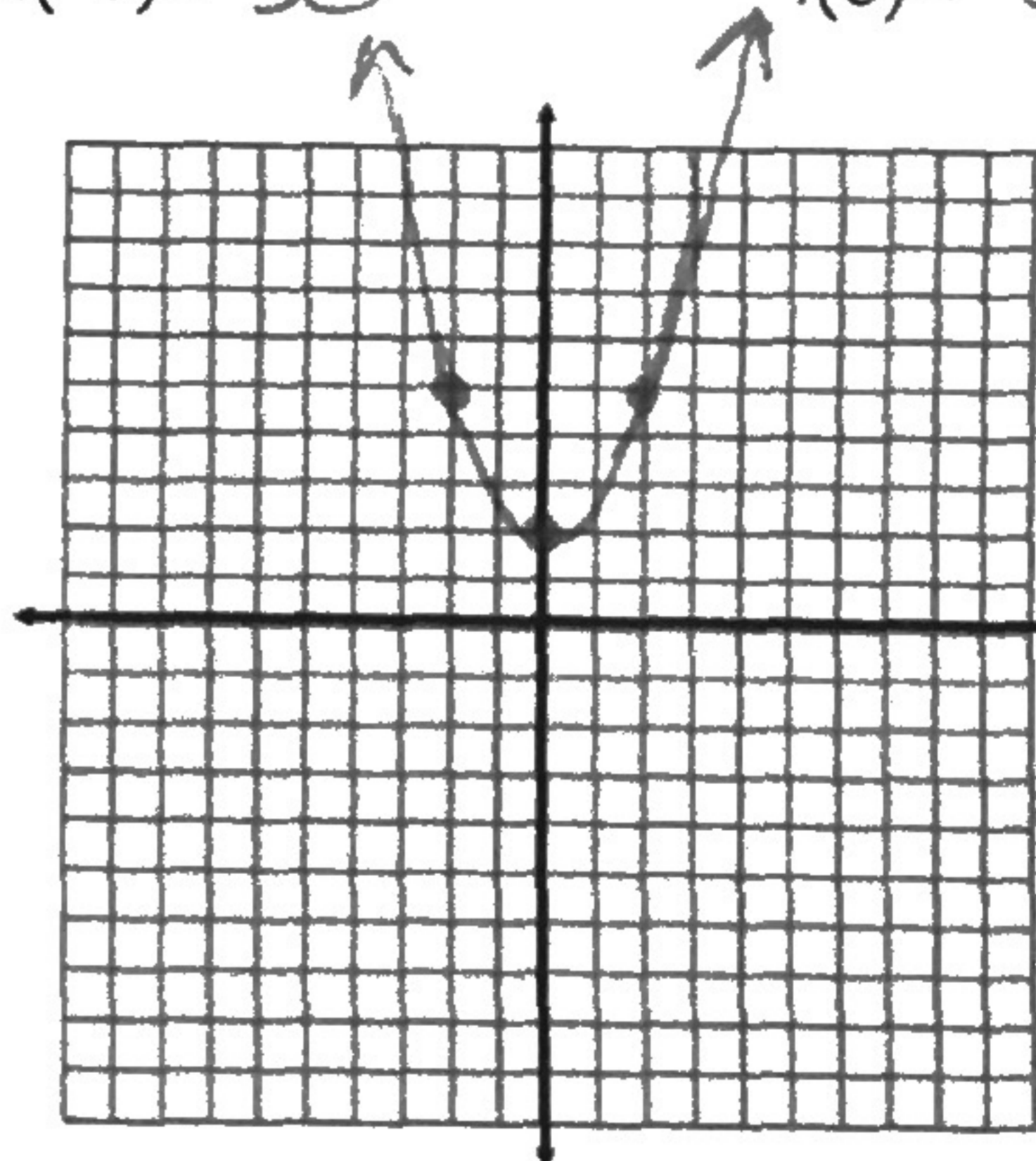


x-int:
 $0 = \frac{1}{2}(x+4)^2$
 $x+4 = 0$
 $x = -4$
 $(-4, 0)$

5. $f(x) = \frac{3}{4}x^2 + 2$ Range: $y \geq 2$

y-int: $(0, 2)$ # of x-int: 0

$f(-8) = 50$ $f(8) = 50$

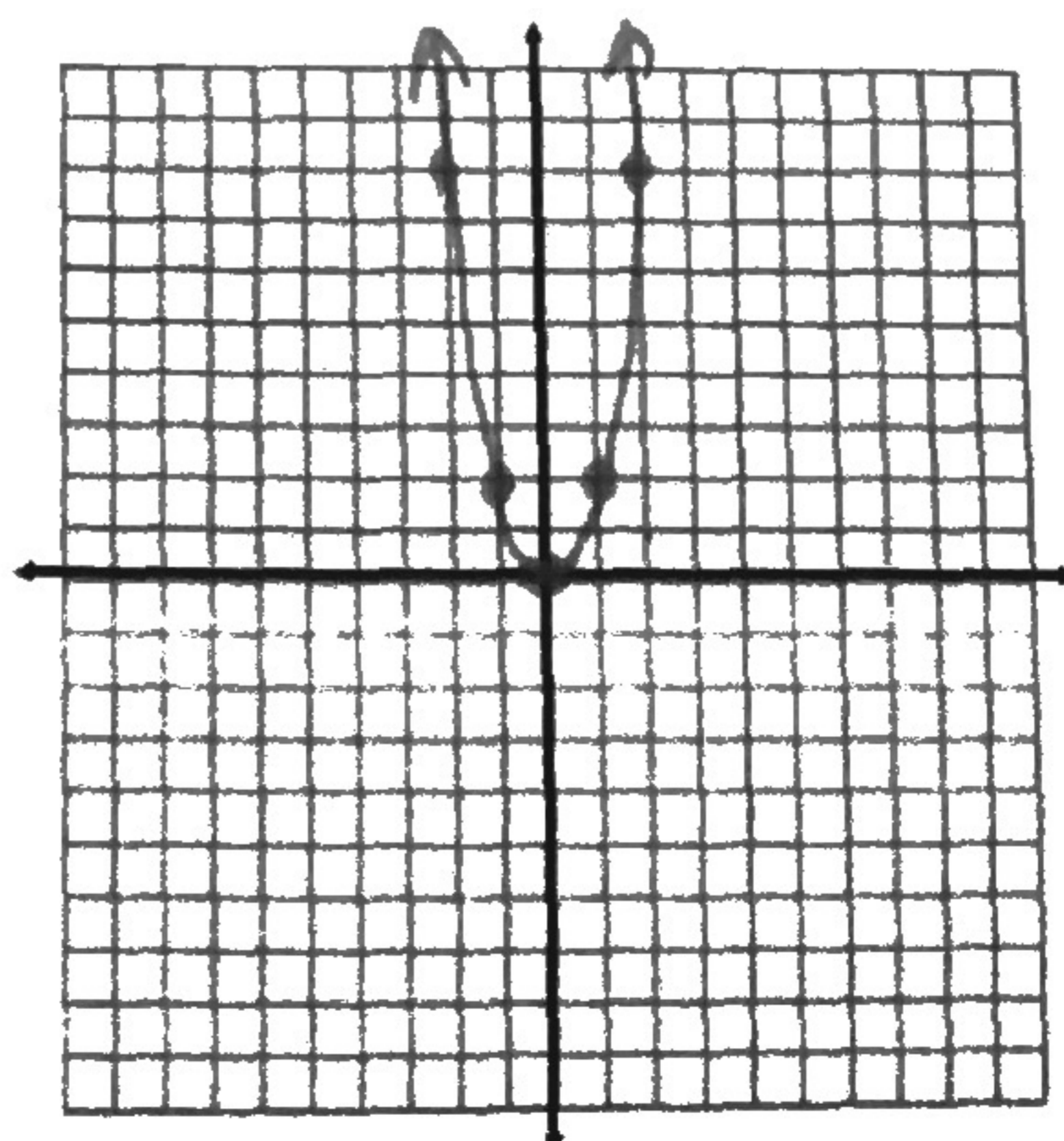


x-int:
 $0 = \frac{3}{4}x^2 + 2$
 $-2 = \frac{3}{4}x^2$
 $\sqrt{\frac{-8}{3}} = \sqrt{x^2}$
 $x = \pm \frac{\sqrt{8}\sqrt{3}}{\sqrt{3}\sqrt{3}} = \pm \frac{\sqrt{24}}{3}$
 $x = \pm \frac{2\sqrt{6}}{3}$

3. $f(x) = 2x^2$ Range: $y \geq 0$

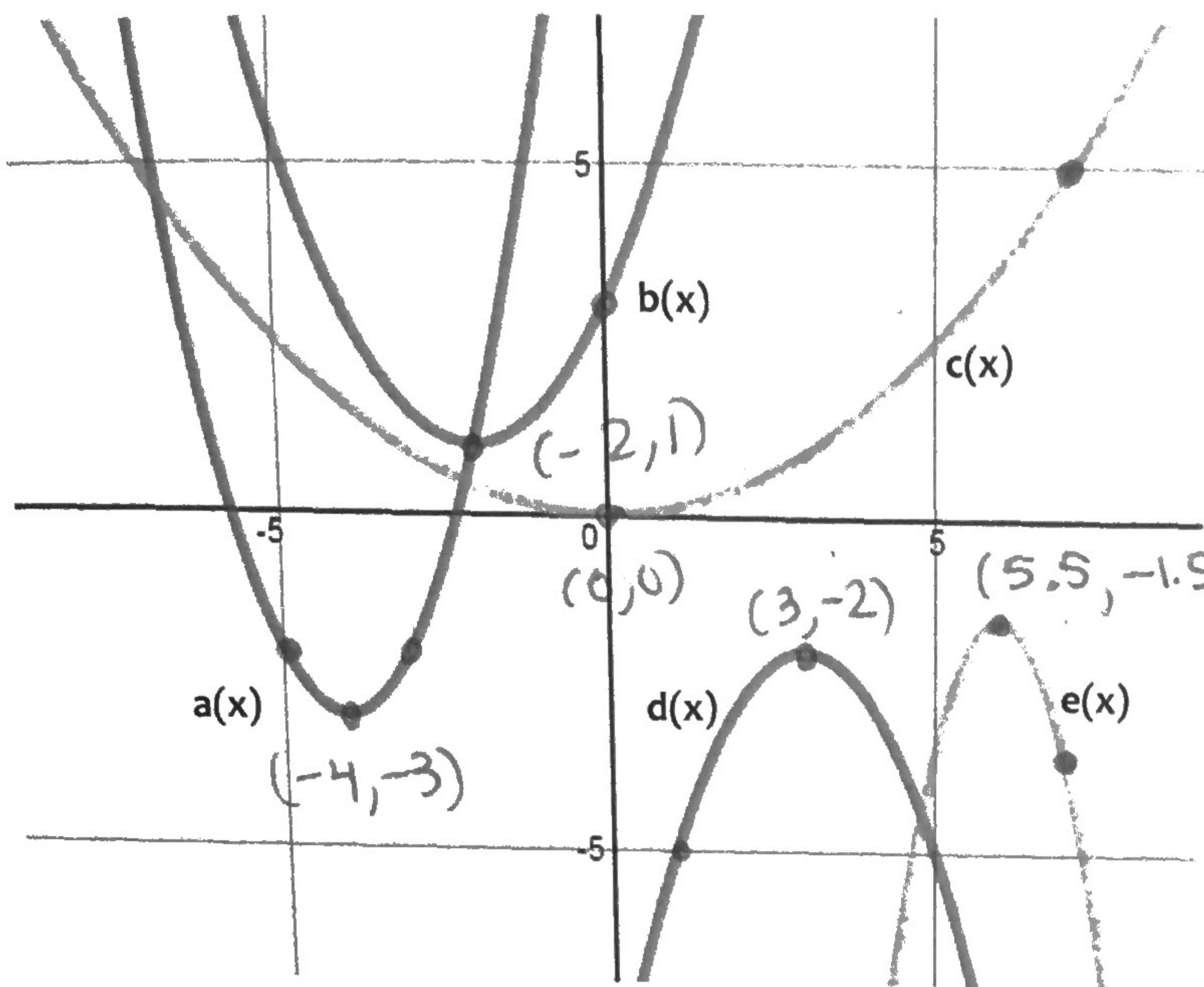
y-int: $(0, 0)$ # of x-int: 1

$f(-3/4) = \frac{9}{8}$ $f(3/4) = \frac{9}{8}$



x-int:
 $2x^2 = 0$
 $x^2 = 0$
 $(0, 0)$

6. Write the equation of the function from the graph:



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

$$b(x) = \frac{1}{2}(x+2)^2 + 1$$

* $\hookrightarrow c(x) = \frac{5}{49}x^2$ if you counted (7, 5) as a point

$$d(x) = -\frac{3}{4}(x-3)^2 - 2$$

$$e(x) = -2(x-5.5)^2 - 1.5$$

7. Transformations: Complete the table

Original function	Transformations in Function Notation	List of transformations	Transformed function
$f(x) = 3x^2 + 5$ $-6(x^2) - 10$	$g(x) = -2f(x+2) + 7$	<ul style="list-style-type: none"> reflect over x-axis v. stretch by f. of 2 shift left 2, up 7 	$g(x) = -6(x+2)^2 - 3$
$c(x) = -6(x-3)^2 - 1$	$d(x) = \frac{4}{3}c(x) + 10$	<ul style="list-style-type: none"> stretch v. by 4/3 shift up 10 	$d(x) = -8(x-3)^2 + \frac{26}{3}$
$t(x) = \frac{1}{2}(x+5)^2 - 10$	$w(x) = \frac{2}{5}t(x+7) - 2$	<ul style="list-style-type: none"> Vertically stretch by a factor of 2/5 Shift left 7, down 2 	$w(x) = \frac{1}{5}(x+12)^2 - 6$
$k(x) = \frac{4}{3}(x-8)^2 - 2$	$m(x) = k(-x-1) - 3$	<ul style="list-style-type: none"> Reflect over y-axis Shift left 1, down 3 units 	$m(x) = \frac{4}{3}(x+9)^2 - 5$ or $\frac{4}{3}(-x-9)^2 - 5$ but ew.

8. For each of the following quadratics: Solve and classify the x-intercepts using square roots. If the root(s) is/are irrational, simplify and rationalize, then approximate the decimal to two places.

1. $f(x) = x^2 - 9$
 $\sqrt{x^2} = \sqrt{9}$ $x = \pm 3$
rational

2. $f(x) = 4x^2 + 108$
 $-108 = 4x^2$
 $\sqrt{x^2} = \sqrt{-27}$ $x = \pm 3i\sqrt{3}$
complex

3. $f(x) = 3(x-3)^2 - 42$
 $x = 3 \pm \sqrt{14}$
irrational
 $\approx -0.7416, 6.7416$

4. $f(x) = -\frac{1}{2}(x-1)^2 + 2$
 $-2 = -\frac{1}{2}(x-1)^2$ ± 2 $x = -1, 3$
rational

5. $f(x) = 3(x+2)^2$ $x = -2$
rational

6. $f(x) = \frac{1}{2}(3x+5)^2 + 24$
 $-48 = \sqrt{(3x+5)^2}$
 $5 \pm 4i\sqrt{3} = 3x \pm 5$
 $x = \frac{-5 + 4i\sqrt{3}}{3}, \frac{-5 - 4i\sqrt{3}}{3}$
complex