

# Radical functions

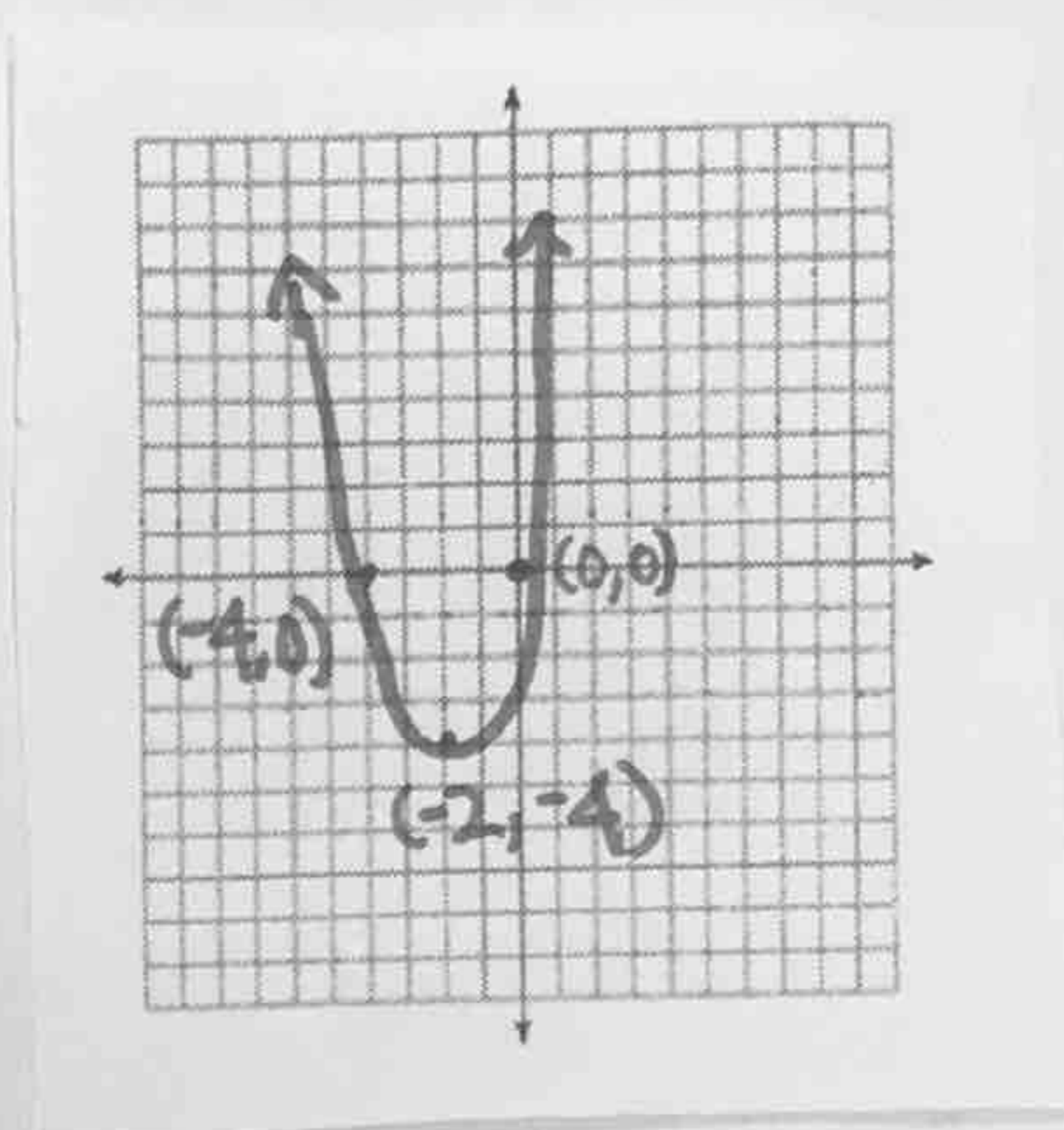
## Test Review Answers

1) a)  $f(x) = (x+2)^2 - 4$

over one, up 1      left 2      down 4

x	-4	-3	-2	-1	0
f(x)	0	-3	-4	-3	0

vertex

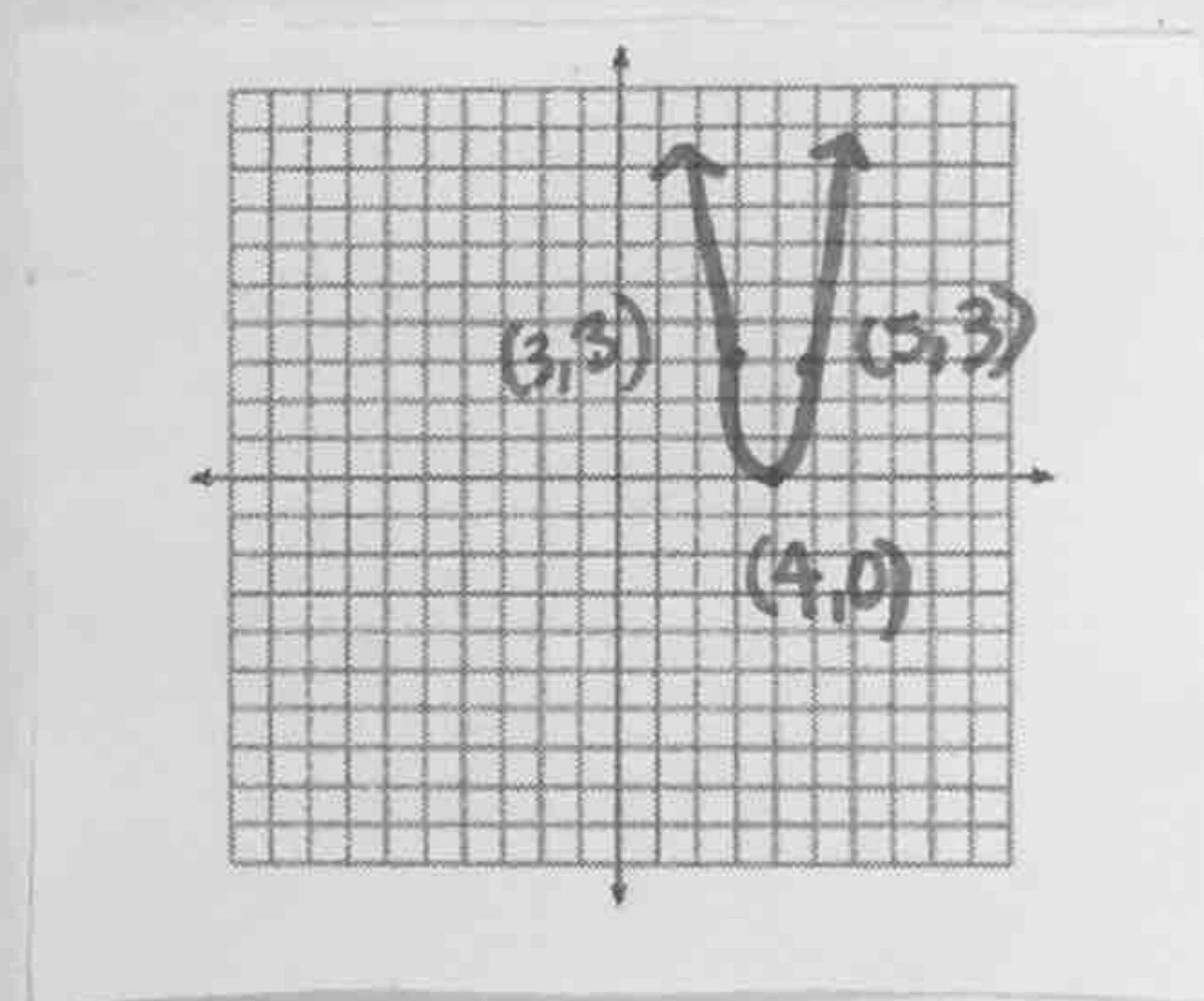


b)  $f(x) = 3(x-4)^2$

over one, up 3 → vertical stretch by 3      right 2

x	2	3	4	5	6
f(x)	12	3	0	3	12

vertex

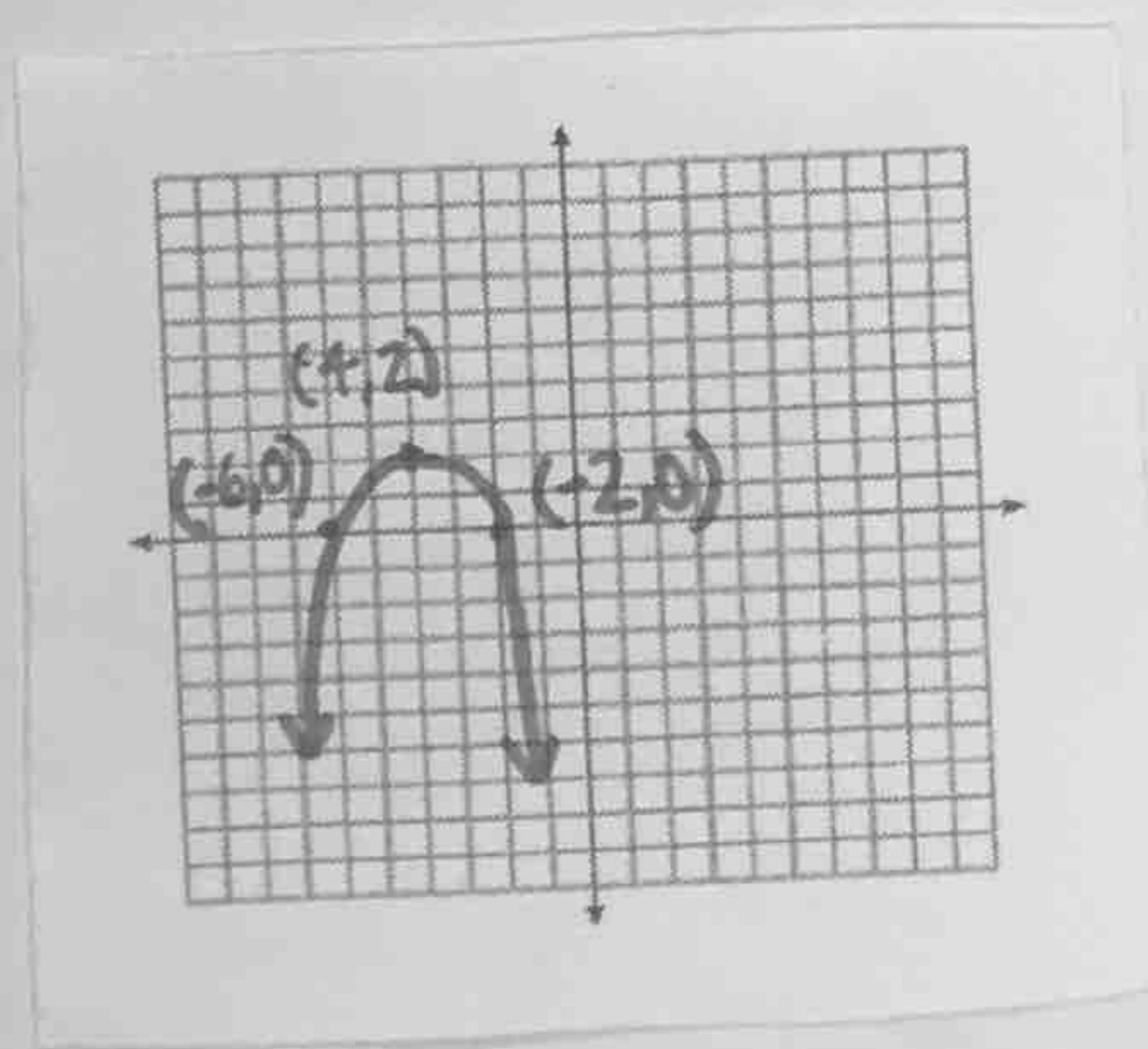


c)  $f(x) = -\frac{1}{2}(x+4)^2 + 2$

over 1, down 1/2 { flipped over x-axis }      vertical compression by 1/2      left 4      up 2

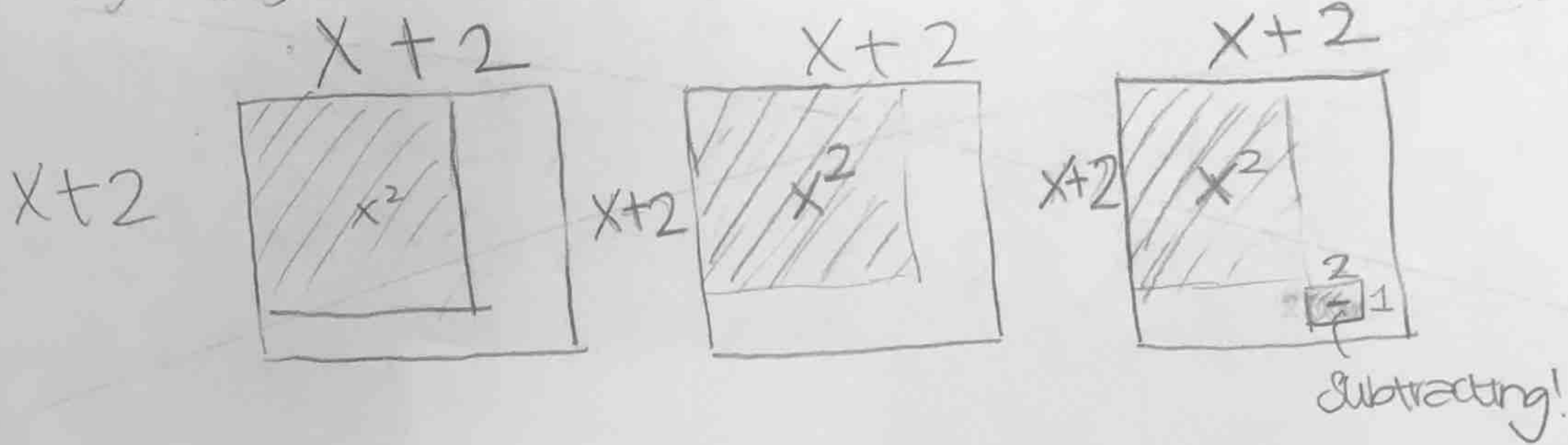
x	-6	-5	-4	-3	-2
f(x)	0	1.5	2	1.5	0

vertex



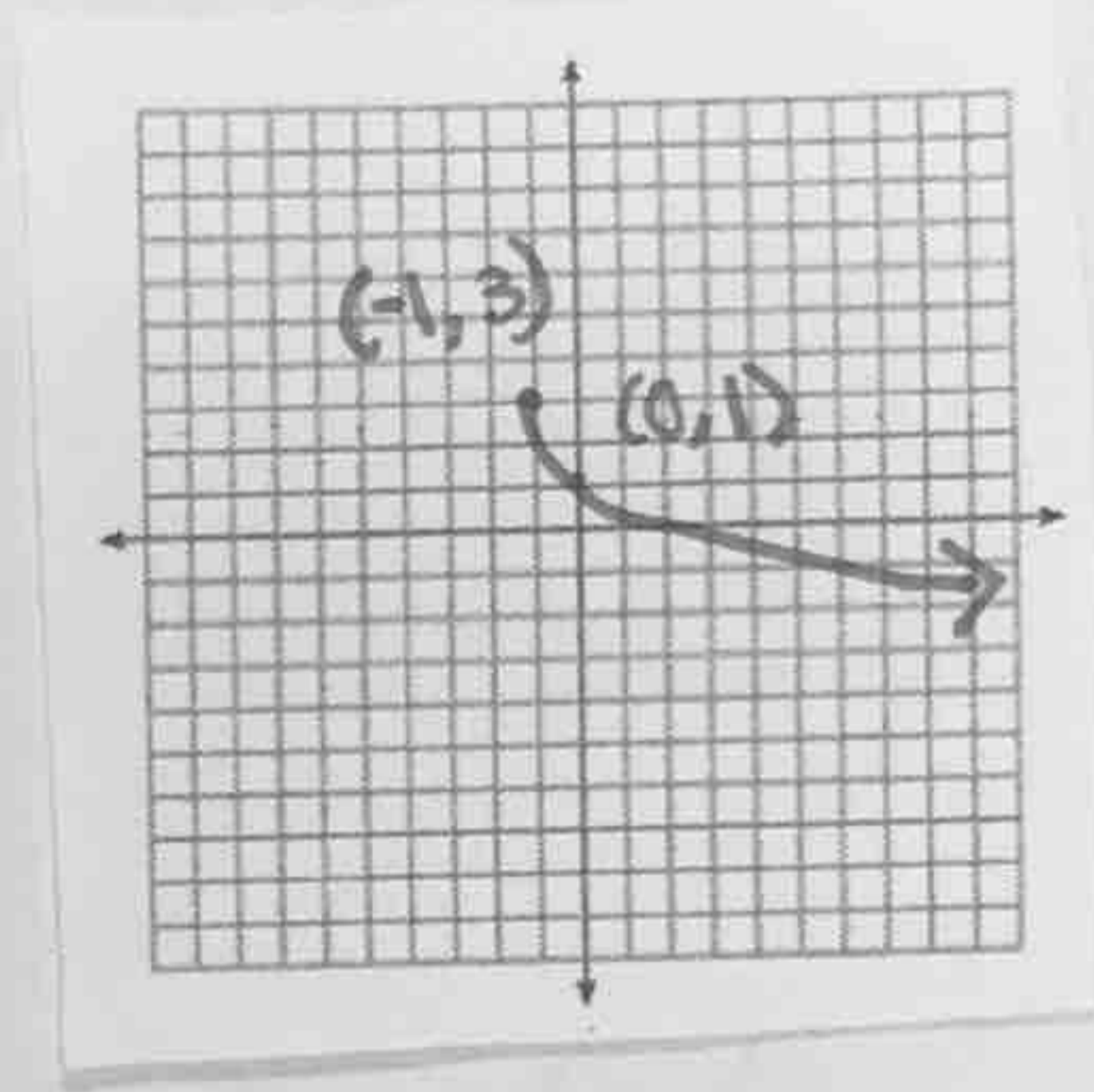


$$2) f(x) = 3(x+2)^2 - 2$$



$$3) f(x) = -2\sqrt{x+1} + 3$$

flipped  $\nearrow$  vertical stretch by 2  $\uparrow$  left 1  $\downarrow$  up 3  $\nwarrow$   
 over one, down 2



4) domain (x-values) -  $[-1, \infty)$   
 range (y-values) -  $(-\infty, 3]$

$$5) a) \begin{array}{r} 2 + \sqrt{x+5} = 3 \\ -2 \qquad -2 \\ \hline \sqrt{x+5} = 1 \\ \hline x+5 = 1 \\ -5 \quad -5 \\ \hline x = -4 \end{array}$$

$$b) \begin{array}{r} (\sqrt{5x+14})^2 = (x)^2 \\ 5x+14 = x^2 \\ -x^2 \quad -x^2 \\ \hline -x^2 + 5x + 14 = 0 \end{array}$$

Solve by:

- factoring
- completing the square
- quadratic formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \quad a = -1$$

$$= \frac{-5 \pm \sqrt{5^2 - 4(-1)(14)}}{2(-1)} \quad b = 5$$

$$= \frac{-5 \pm \sqrt{25 + 56}}{-2} \quad c = 14$$

$$= \frac{-5 \pm \sqrt{81}}{-2}$$

$$= \frac{-5 \pm 9}{-2}$$

$$\boxed{x = 7}$$

$$\frac{-5+9}{-2} = \frac{4}{-2} = -2$$

$$\frac{-5-9}{-2} = \frac{-14}{-2} = 7$$

nonnegative  $\sqrt{\quad}$

Check answers

~~$$x = -2$$

$$\sqrt{5(-2)+14} = -2$$

$$\sqrt{-10+14} = -2$$

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

$$2 \neq -2$$~~

$$x = 7$$

$$\sqrt{5(7)+14} = 7$$

$$\sqrt{35+14} = 7$$

$$\sqrt{49} = 7$$

$$7 = 7$$

✓



$$c) (\sqrt{3x+5})^2 = (\sqrt{x+1})^2$$

$$\begin{array}{r} 3x+5 = x+1 \\ -x \quad -x \end{array}$$

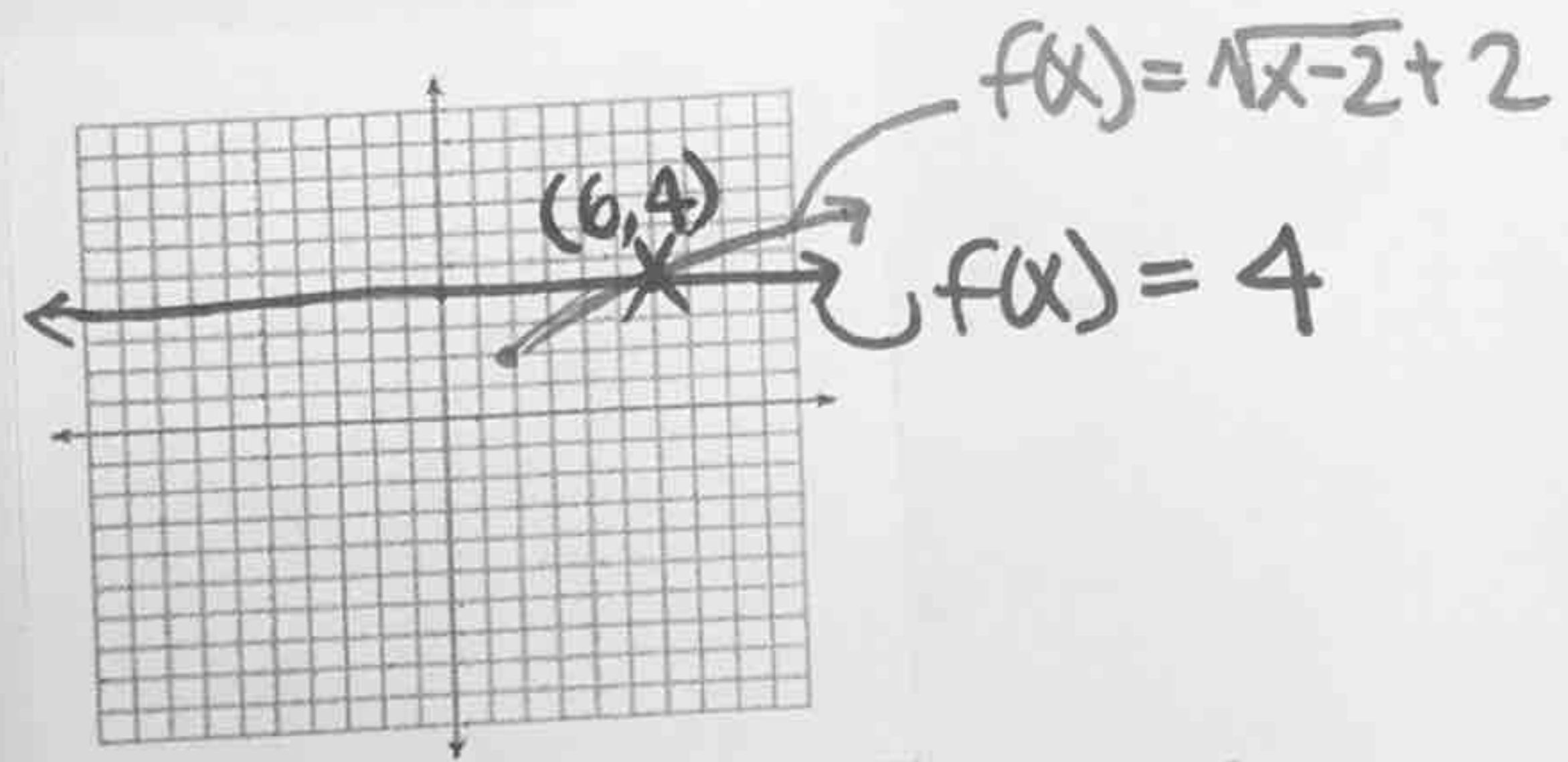
$$\begin{array}{r} 2x+5 = 1 \\ -5 \quad -5 \end{array}$$

$$\begin{array}{r} 2x = -4 \\ 2 \quad 2 \end{array}$$

$$\boxed{x = -2}$$

$$6) \sqrt{x-2} + 2 = 4$$

↑            ↑  
right 2    up 2



\* They intersect @ (6,4), so the solution is  $x=6$ .

7) extraneous solution - incorrect values of the variable, such as those introduced as a result of the squaring process.

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

$$\begin{array}{r} (\sqrt{x+2})^2 = (x-4)^2 \\ x+2 = x^2 - 8x + 16 \\ -x \quad -2 \quad \quad -x \quad -2 \end{array}$$

$$0 = x^2 - 9x + 14$$

$$0 = (x-7)(x-2)$$

$$\begin{array}{r} x-7=0 \\ +7 \quad +7 \\ \hline x=7 \end{array}$$

$$\begin{array}{r} x-2=0 \\ +2 \quad +2 \\ \hline x=2 \end{array}$$

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

$$\begin{array}{r|l} x & x^2 & -4 \\ -4 & -4x & 16 \end{array}$$

- Solve by:
- factoring
  - completing square
  - Quadratic formula

check -

$$\begin{array}{l} 4 + \sqrt{7+2} = 7 \\ 4 + \sqrt{9} = 7 \\ 4 + 3 = 7 \checkmark \\ 7 = 7 \end{array}$$

$$\begin{array}{l} 4 + \sqrt{2+2} = 2 \text{ extraneous solution!} \\ 4 + \sqrt{4} = 2 \\ 4 + 2 = 2 \\ 6 \neq 2 \end{array}$$