

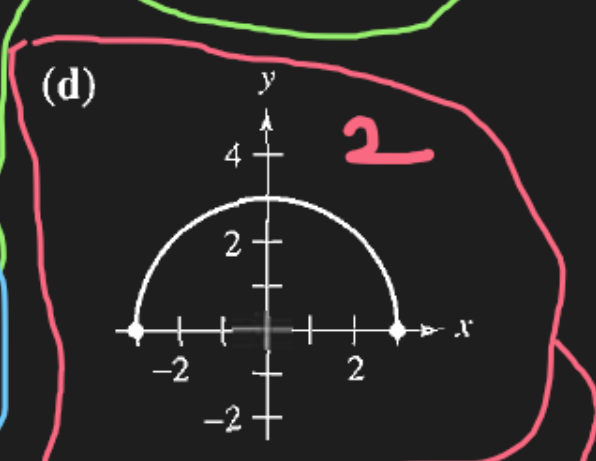
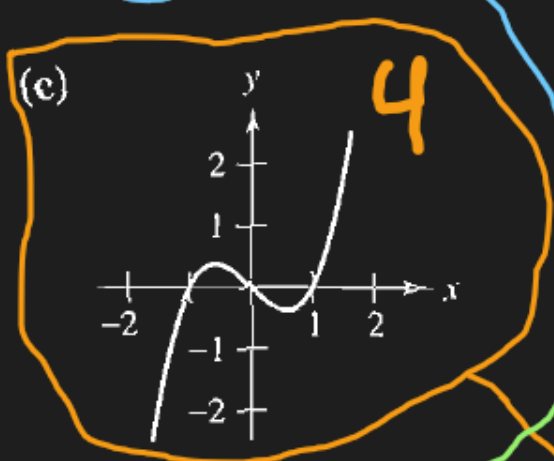
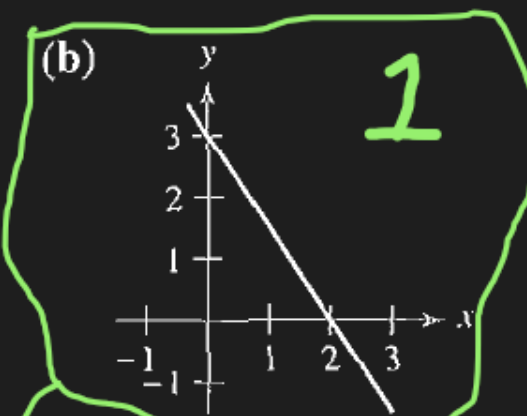
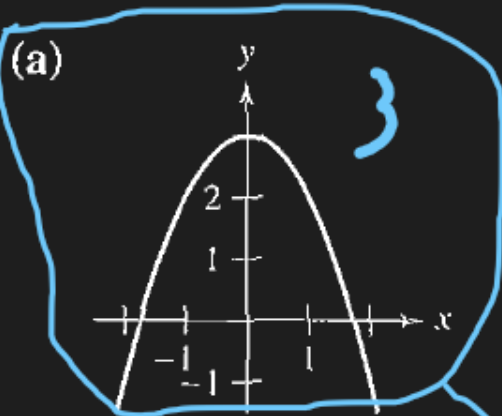
Chapter P.1 Homework

Homework for Chapter P.1:

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Q2:

In Exercises 1–4, match the equation with its graph. [The graphs are labeled (a), (b), (c), and (d).]



1. $y = -\frac{3}{2}x + 3$

3. $y = 3 - x^2$

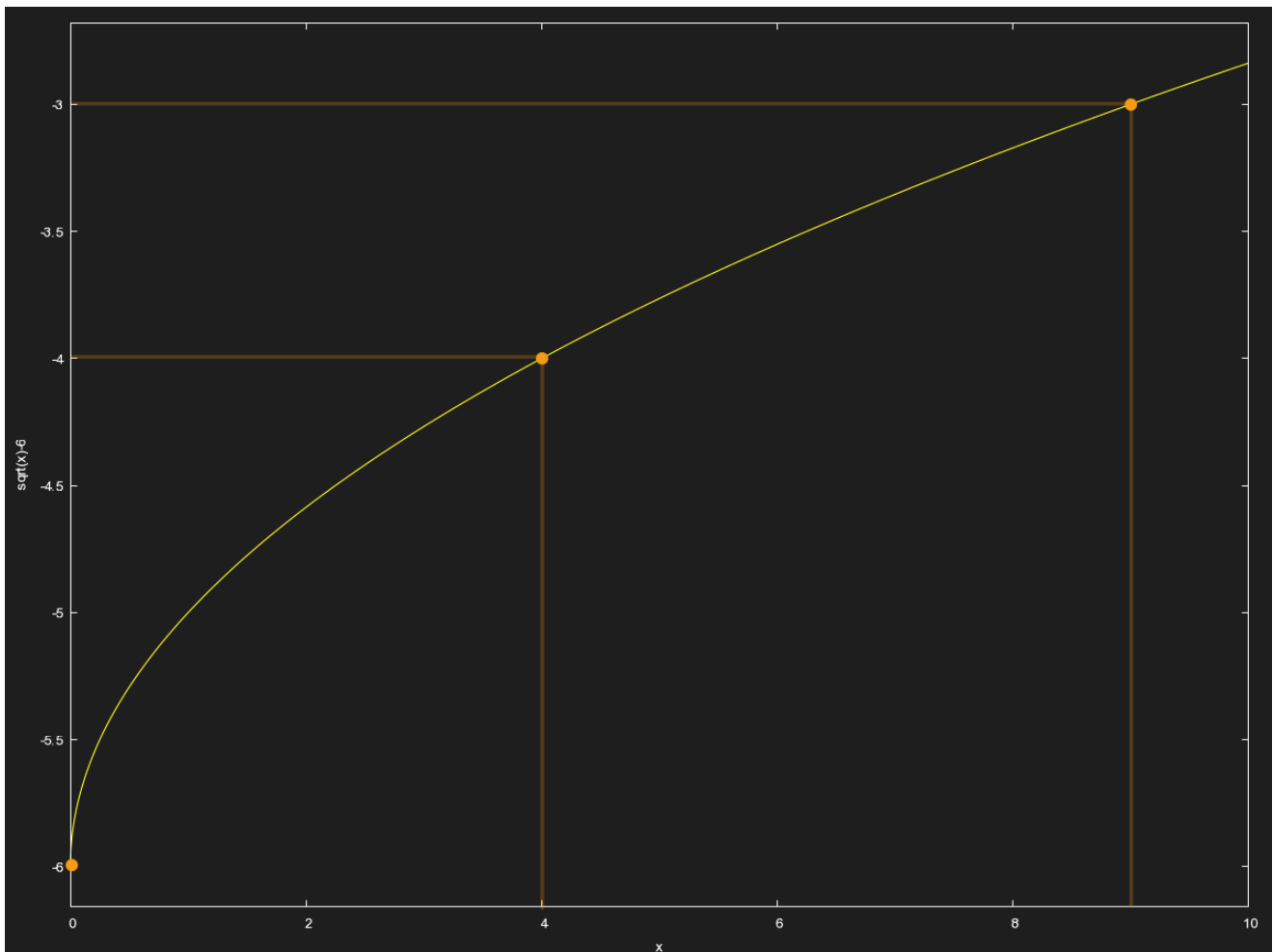
2. $y = \sqrt{9 - x^2}$

4. $y = x^3 - x$

Q11:

Sketch the graph of the equation $y = \sqrt{x} - 6$ by point plotting.

x	y
0	-6
4	-4
9	-3



Q24:

Find any intercepts of the equation $y = (x - 1)\sqrt{x^2 + 1}$

1. Evaluate at $x = 0$:

$$y = (0 - 1)\sqrt{0^2 + 1}$$

$$y = -\sqrt{1} = -1$$

Therefore, the y intercept of the equation is $(0, -1)$.

2. Evaluate at $y = 0$:

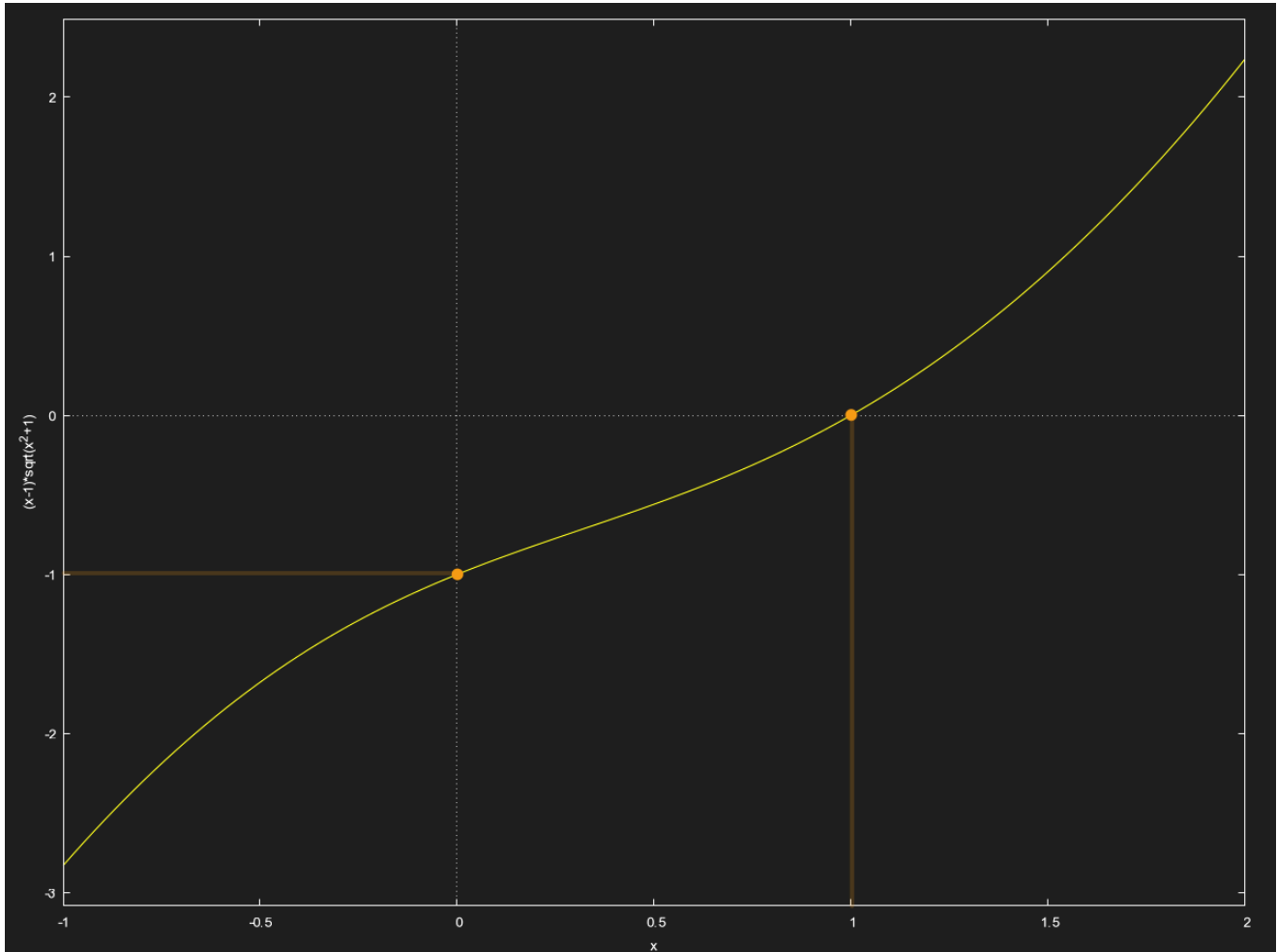
$$(x - 1)\sqrt{x^2 + 1} = 0$$

$(x - 1) = 0$	$\sqrt{x^2 + 1} = 0$
$x = 1$	$x^2 + 1 = 0$

$(x - 1) = 0$	$\sqrt{x^2 + 1} = 0$
	$x^2 = -1$
	$x = \sqrt{-1}(\text{undefined})$

Therefore, the x intercept of the equation is $(1, 0)$.

Here is a graph for reference:



Q28:

Find any intercepts of the equation $y = 2x - \sqrt{x^2 + 1}$

1. Evaluate at $x = 0$:

$$y = 2(0) - \sqrt{0^2 + 1}$$

$$y = -\sqrt{1} = -1$$

Therefore, the y intercept of the equation is $0, -1$

2. Evaluate at $y = 0$:

$$2x - \sqrt{x^2 + 1} = 0$$

$$2x = \sqrt{x^2 + 1}$$

$$(2x)^2 = \pm(x^2 + 1)$$

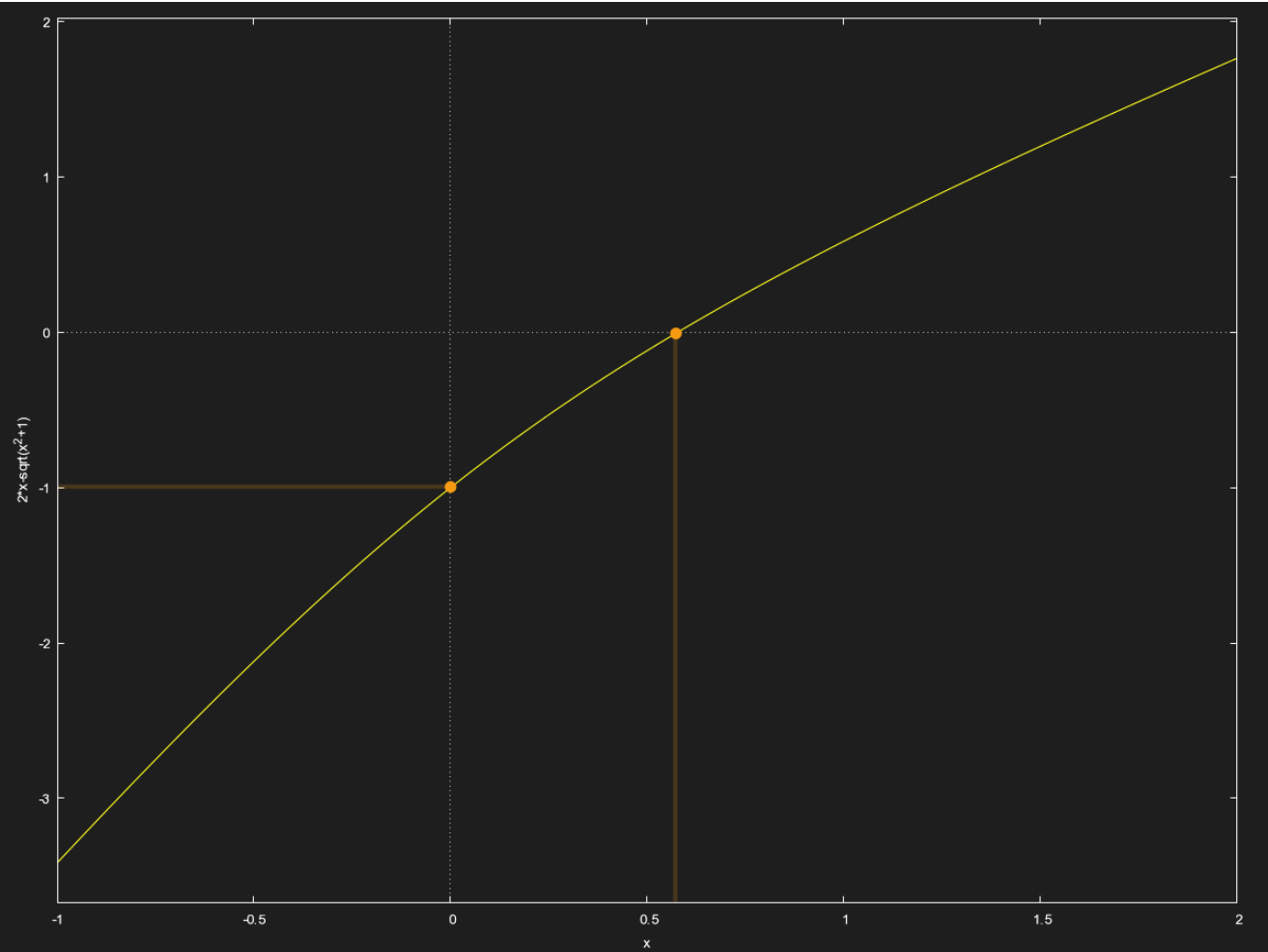
$$4x^2 = \pm(x^2 + 1)$$

$$4x^2 \pm (x^2 + 1) = 0$$

$4x^2 + (x^2 + 1) = 0$	$4x^2 - (x^2 + 1) = 0$
$4x^2 + x^2 + 1 = 0$	$4x^2 - x^2 - 1 = 0$
$5x^2 + 1 = 0$	$3x^2 - 1 = 0$
$5x^2 = -1$	$3x^2 = 1$
$x = \sqrt{\frac{-1}{5}}(\text{undefined})$	$x = \sqrt{\frac{1}{3}} \approx 0.5773502691896257\dots$

Therefore, the x intercept is $(\sqrt{\frac{1}{3}}, 0)$.

Here is a graph for reference:



Q56:

Sketch the graph of the equation $y = \frac{10}{x^2+1}$. Identify any intercepts and test for symmetry.

1. Function Properties:

- Since the function contains no x variable in the numerator, $y \neq 0 \forall x \in \mathbb{R}$.
- The domain of the equation is $\{x \in \mathbb{R}\}$, because $x^2 + 1 \neq 0 \forall x \in \mathbb{R}$.

2. Symmetries:

- x axis symmetry test:

$$y = \frac{10}{x^2+1}, \text{ substitute } (-y) \text{ for } y:$$

$$(-y) = \frac{10}{x^2+1}$$

$$y = -\frac{10}{x^2+1}$$

$$\{y = -\frac{10}{x^2+1}\} \neq \{y = \frac{10}{x^2+1}\}$$

Therefore, this equation is not symmetrical with respect to the x axis.

- y axis symmetry test: $y = \frac{10}{x^2+1}$, substitute $(-x)$ for x : $y = \frac{10}{(-x)^2+1}$

$$y = \frac{10}{x^2+1} \quad \{y = \frac{10}{x^2+1}\} = \{y = \frac{10}{x^2+1}\} \text{ Therefore, this equation is symmetrical with respect to the } y \text{ axis.}$$

- In fact, it is unnecessary to test for symmetry with respect to the origin now. And this is a proof why:

$$\text{Let } f(x) = y$$

$$f(x) = f(-x) \text{ as shown previously.}$$

$$f(x) \neq -f(x) \text{ as shown previously.}$$

$$f(-x) \stackrel{?}{=} -f(x)$$

Substitute $f(x)$ for $f(-x)$ since they are equal:

$$f(x) \stackrel{?}{=} -f(x)$$

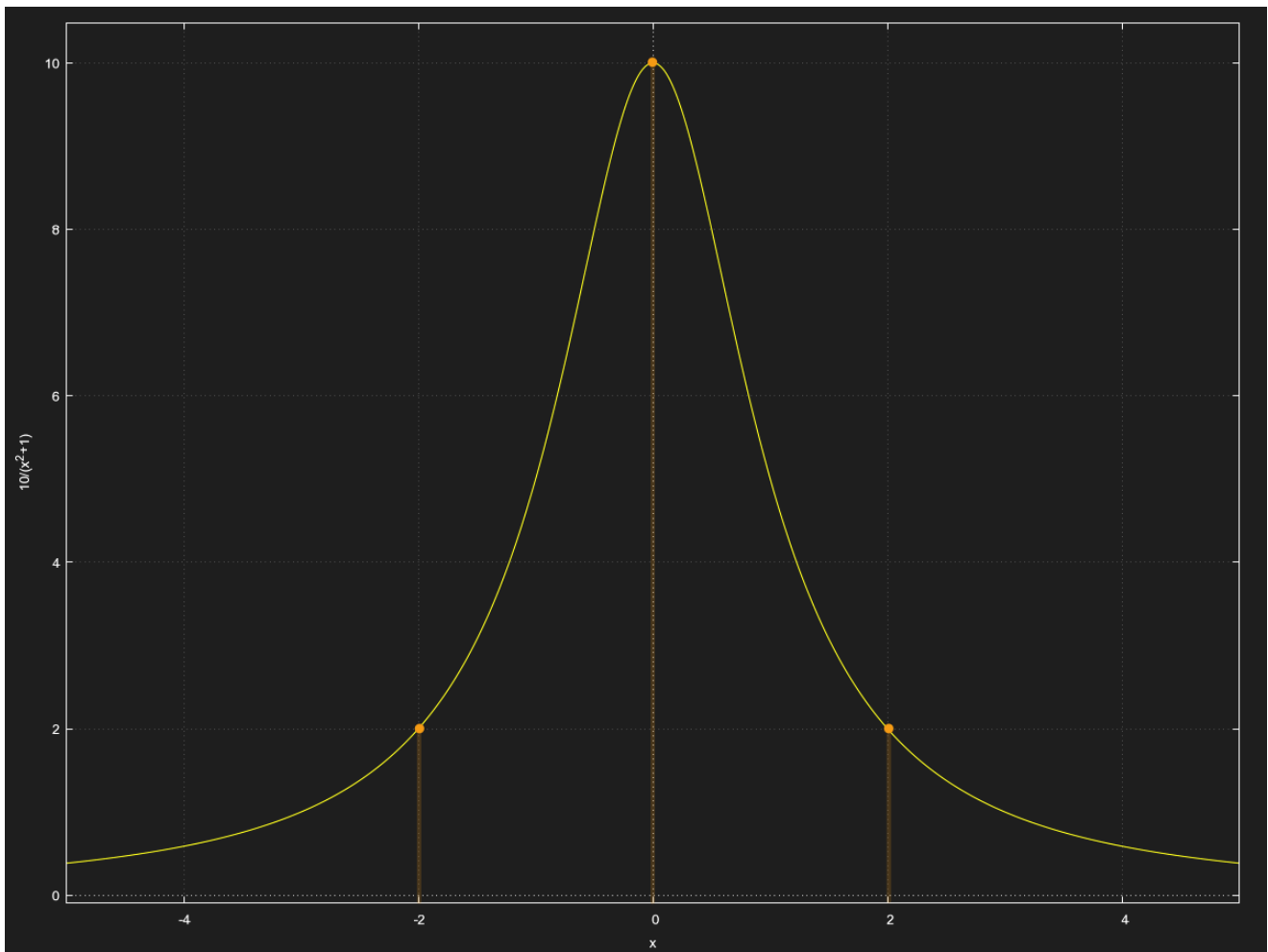
Since it was shown that $f(x) \neq -f(x)$ and since $f(x) = f(-x)$,

$$f(-x) \neq -f(x)$$

Since $f(-x) \neq -f(x)$, the equation is not symmetric with respect to the origin.

3. Graph:

x	y
2	2
-2	2
3	1
-3	1



Q66:

Find the points of intersection of the following equations: $\begin{cases} x = 3 - y^2 \\ y = x - 1 \end{cases}$

1. Solve for y by elimination:

$$\begin{cases} x = 3 - y^2 \\ y = x - 1 \end{cases} \Rightarrow \begin{cases} x - 3 = -y^2 \\ y = x - 1 \end{cases}$$

$$\begin{cases} y^2 = -x + 3 \\ y = x - 1 \end{cases}$$

$$y^2 + y = 2$$

$$y^2 + y - 2 = 0$$

$$(y - 1)(y + 2) = 0$$

$$y = 1 \text{ and } y = -2$$

2. Substitute y in the equations:

$$x = 3 - y^2, \text{ substitute } y = 1$$

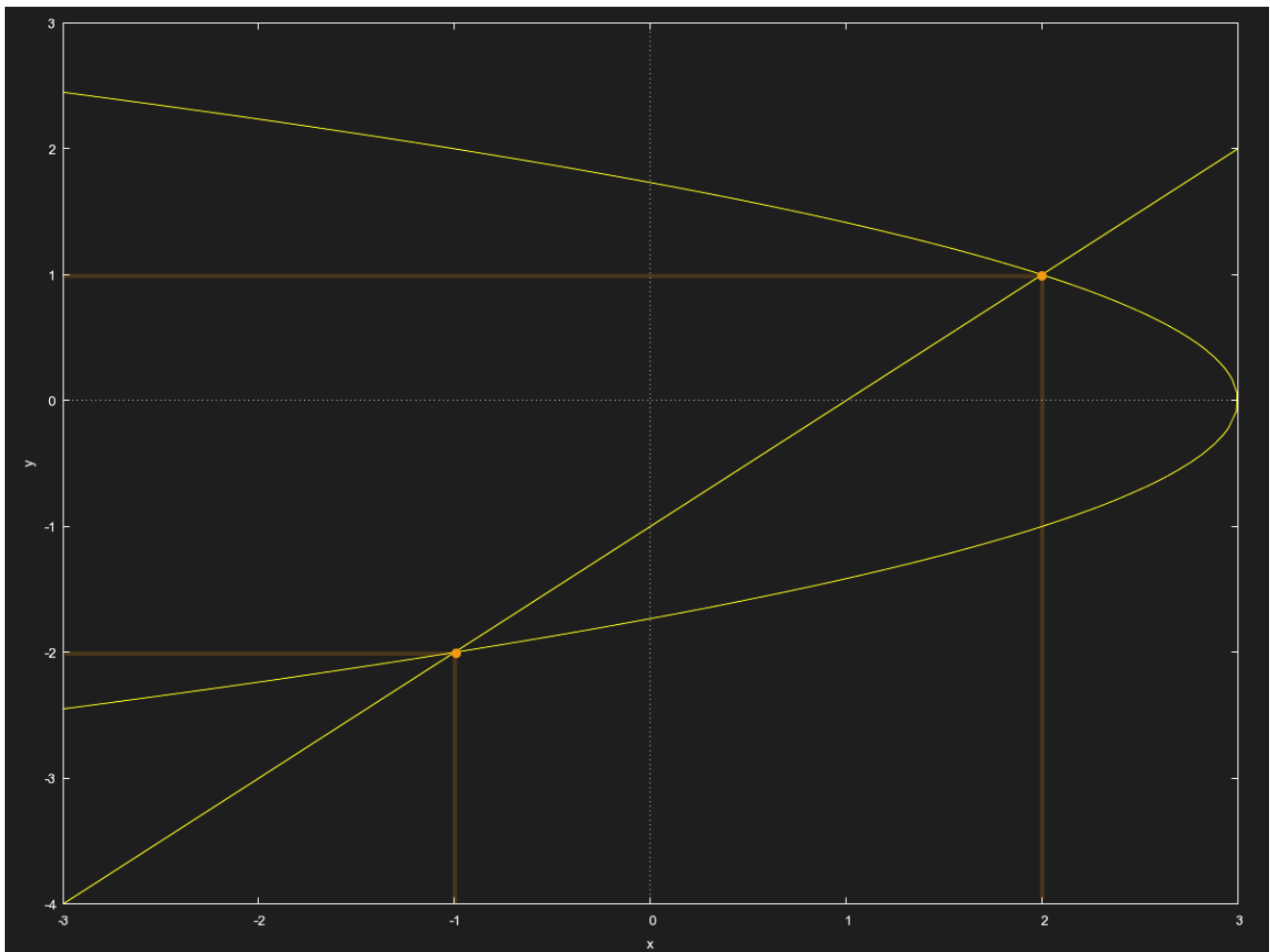
$$x = 3 - (1)^2 = 2$$

$$x = 3 - y^2, \text{ substitute } y = -2$$

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

Therefore, the points of intersection are $(2, 1)$ and $(-2, -1)$.

Here is a graph for reference:



Q68:

Find the points of intersection of the following equations: $\begin{cases} x^2 + y^2 = 25 \\ -3x + y = 15 \end{cases}$

1. Solve for y :

$$-3x + y = 15$$

$$y = 3x + 15$$

2. Solve for x via substitution:

$$x^2 + y^2 = 25, \text{ substitute } y = 3x + 15$$

$$x^2 + (3x + 15)^2 = 25$$

$$x^2 + 9x^2 + (2)(15)(3)x + 15^2 = 25$$

$$10x^2 + 90x + 225 = 25$$

$$10x^2 + 90x + 200 = 0$$

$$x^2 + 9x + 20 = 0$$

$$x^2 + 4x + 5x + 20 = 0$$

$$x(x + 4) + 5(x + 4) = 0$$

$$(x + 4)(x + 5) = 0$$

$$x = -4 \text{ and } x = -5$$

3. Back-substitute to solve for y :

$$y = 3x + 15, \text{ substitute } x = -4$$

$$y = 3(-4) + 15 = -12 + 15 = 3$$

$$y = 3x + 15, \text{ substitute } x = -5$$

$$y = 3(-5) + 15 = -15 + 15 = 0$$

Therefore, the points of intersection are $(-4, 3)$ and $(-5, 0)$.

Here is a graph for reference:

