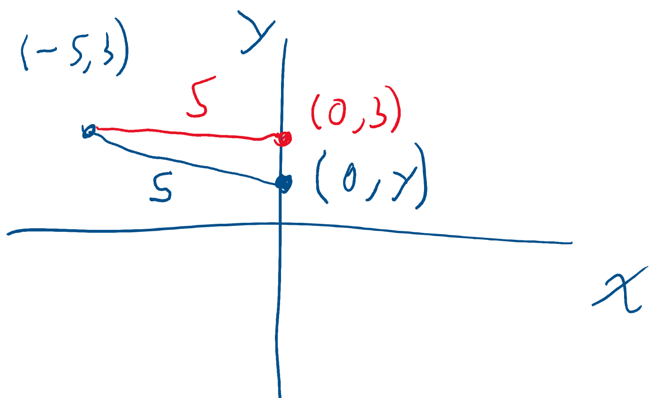
01-27-25 MTH 161-C06N

1 Relations and Functions
 1.1 Sets of Real Numbers and the Cartesian Coordinate Plane
  1.1.4 Exercises
  page 14: 1, 3, 5, 11, 17, 23, 31

1.2 Relations
  1.2.2 Exercises
  page 29: 1, 3, 7, 18, 21, 22, 27, 37, 41, 50

Your Name MTH 161-C06N Quiz 1 open homework, closed book, closed notes, calculator ok.
1.1: 31

31. Find all of the points on the y-axis which are 5 units from the point $(-5, 3)$.



$$5 = \sqrt{(0-(-5))^2 + (y-3)^2}$$

$$25 = 25 + (y-3)^2$$

$$(y-3)^2 = 0$$

$$y - 3 = 0$$

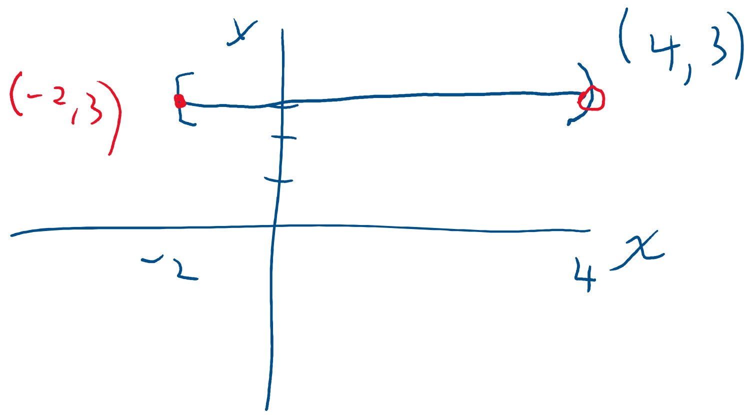
$$\boxed{y = 3}$$

$$\boxed{\text{The point is } (0,3)}$$

1.2

Example 1.2.1. Graph the following relations.

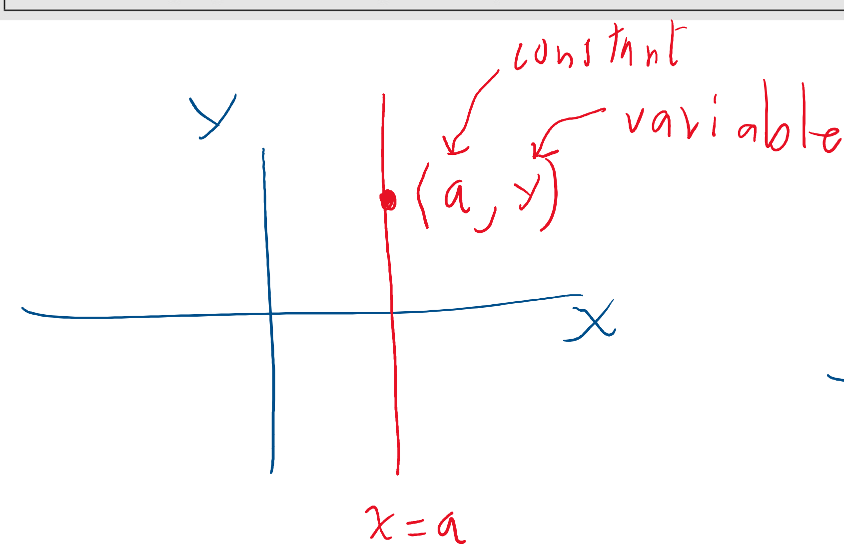
3. $HLS_2 = \{(x, 3) \mid -2 \leq x < 4\}$

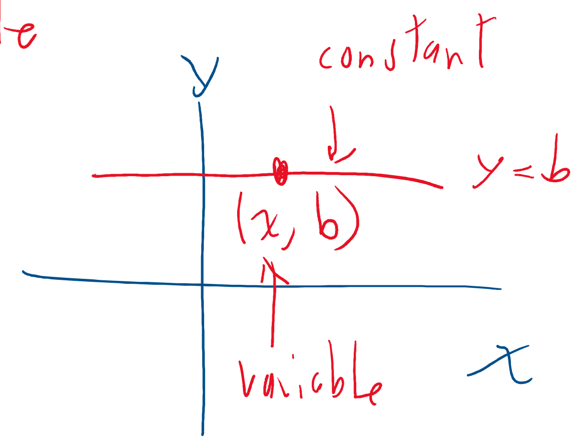


Memorize

Equations of Vertical and Horizontal Lines

- The graph of the equation $x = a$ is a **vertical line** through $(a, 0)$.
- The graph of the equation $y = b$ is a **horizontal line** through $(0, b)$.

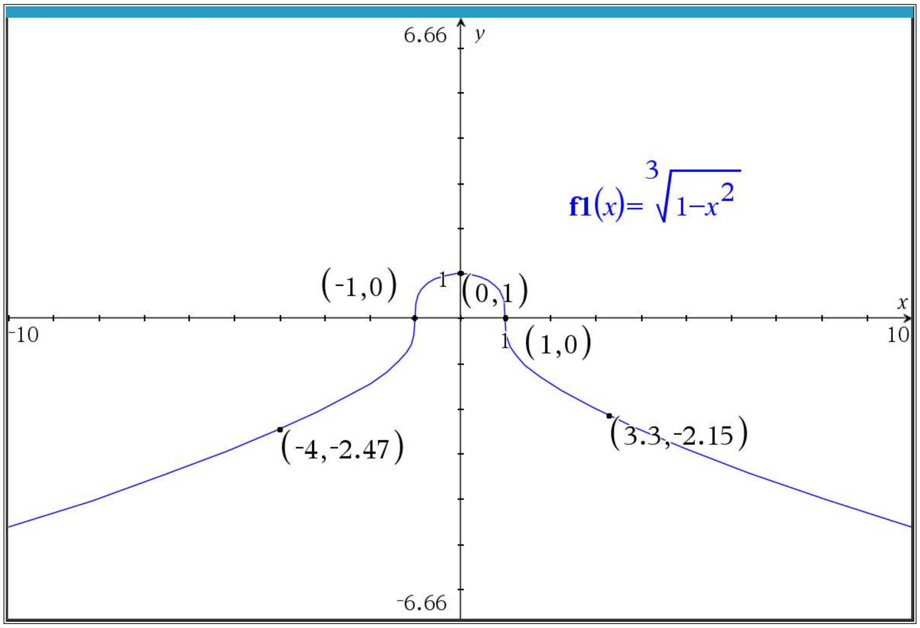




memorize

The Fundamental Graphing Principle

The graph of an equation is the set of points which satisfy the equation. That is, a point (x, y) is on the graph of an equation if and only if x and y satisfy the equation.



Memorize

Definition 1.5. Suppose the graph of an equation is given.

- A point on a graph which is also on the x-axis is called an ***x*-intercept** of the graph.
- A point on a graph which is also on the y-axis is called an ***y*-intercept** of the graph.

Memorize

Finding the Intercepts of the Graph of an Equation

Given an equation involving x and y, we find the intercepts of the graph as follows:

- x-intercepts have the form $(x, 0)$; set $y = 0$ in the equation and solve for x.
- y-intercepts have the form $(0, y)$; set $x = 0$ in the equation and solve for y.

Why is knowing the x and y-intercepts of a graph useful?

If we have two intercepts for a line, then we can graph the line by drawing the line through those two points.

Graph the line $2x+3y=6$

x-intercept: set $y=0$, solve for x

$2x+3(0)=6$

$2x=6$

$2x + 3(0) = 6$

$2x = 6$

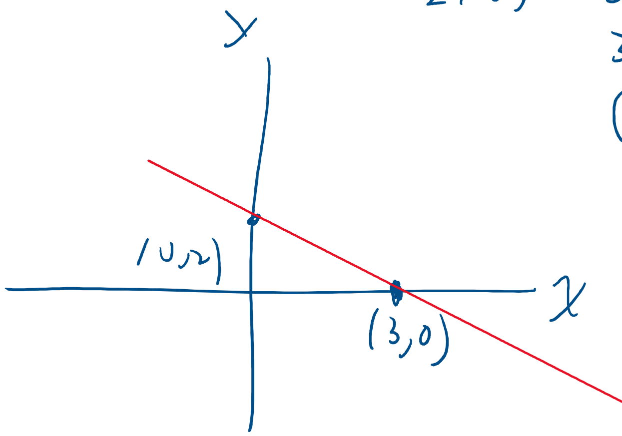
$\boxed{x = 3}$ or the point $(3,0)$

y-intercept set $x = 0$, solve for y

$2(0) + 3y = 6$

$3y = 6$

$\boxed{y = 2}$ or the point $(0,2)$



Testing the Graph of an Equation for Symmetry

To test the graph of an equation for symmetry

- about the y-axis – substitute $(-x, y)$ into the equation and simplify. If the result is equivalent to the original equation, the graph is symmetric about the y-axis.
- about the x-axis – substitute $(x, -y)$ into the equation and simplify. If the result is equivalent to the original equation, the graph is symmetric about the x-axis.
- about the origin - substitute $(-x, -y)$ into the equation and simplify. If the result is equivalent to the original equation, the graph is symmetric about the origin.

1.2.2 Exercises

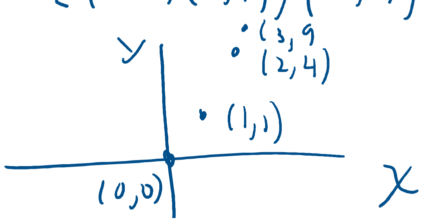
In Exercises 1 - 20, graph the given relation.

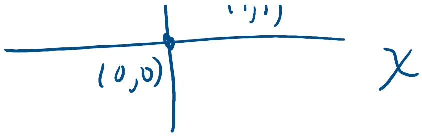
6. $\{(\sqrt{j}, j) \mid j = 0, 1, 4, 9\}$ set-builder notation

list (roster) notation

$= \{(\sqrt{0}, 0), (\sqrt{1}, 1), (\sqrt{4}, 4), (\sqrt{9}, 9)\}$

$= \{(0,0), (1,1), (2,4), (3,9)\}$





solve $x^2 = 4$

$x = \pm\sqrt{4}$

$\boxed{x = \pm 2}$