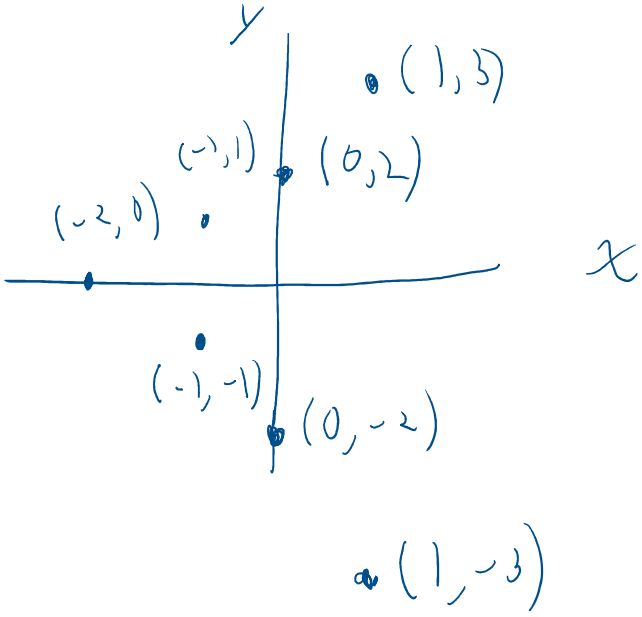
1.2 Relations
1.2.2 Exercises
page 29: 1, 3, 7, 18, 21, 22, 27, 37, 41, 50

1.2

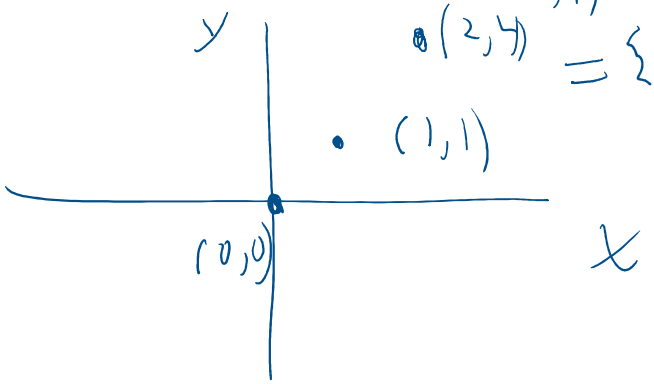
1.2.2 Exercises

In Exercises 1 - 20, graph the given relation.

2. $\{(-2,0),\ (-1,1),\ (-1,-1),\ (0,2),\ (0,-2),\ (1,3),\ (1,-3)\}$ $=R$



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

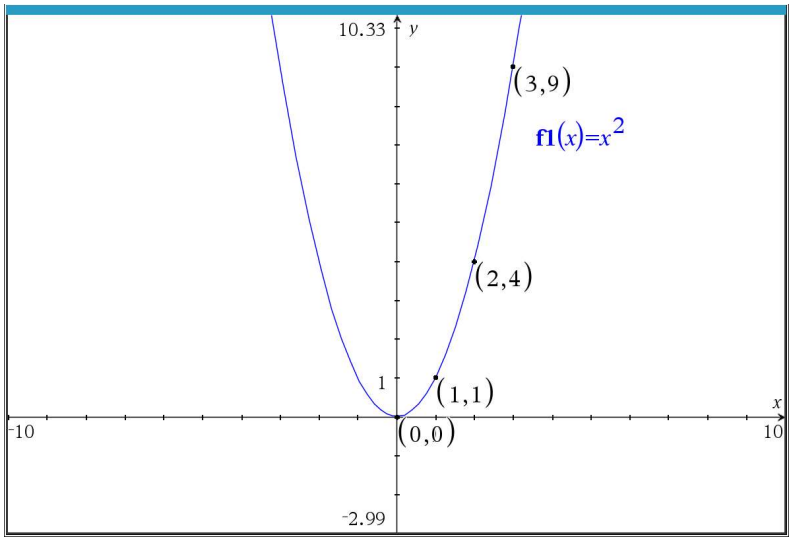


$= \{(0,0), (1,1), (2,4), (3,9)\}$

$x = \sqrt{y}$

$\Rightarrow$ implies $y = x^2$

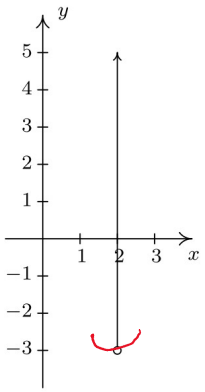
I graphed the function $y = x^2$ and then went to Trace, and entered x = 0, 1, 2 and 3. The y-values agree with the given points of the relation.



1.2:23

In Exercises 21 - 30, describe the given relation using either the roster or set-builder method.

23.



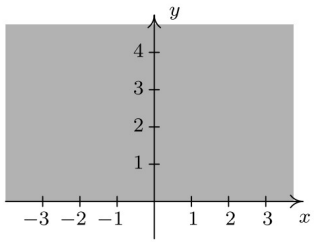
Relation C

use set-builder notation

$\{(x,y) \mid x = 2, -3 < y\}$

$= \{(2,y) \mid -3 < y\}$

26.



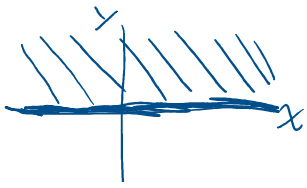
Relation F

$F = \{(x,y) \mid -4 < x, x \geq 0\}$

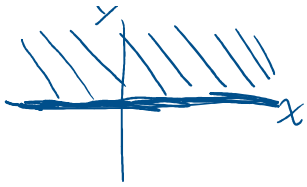
Textbook answer

26. $F = \{(x,y) \mid y \geq 0\}$

Note: Dr. Goral finds this graph a bit unclear.



$\{(x,y) \mid y \geq 0\}$

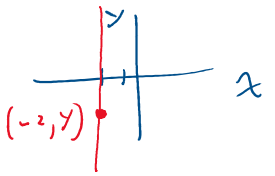


$\{(x,y) \mid y \geq 0\}$

1.2:

In Exercises 31 - 36, graph the given line.

31. $x = -2$



$x = -2$
vertical line

1.2

For each equation given in Exercises 41 - 52:

- Find the x- and y-intercept(s) of the graph, if any exist.
- Follow the procedure in Example 1.2.3 to create a table of sample points on the graph of the equation.
- Plot the sample points and create a rough sketch of the graph of the equation.
- Test for symmetry. If the equation appears to fail any of the symmetry tests, find a point on the graph of the equation whose reflection fails to be on the graph as was done at the end of Example 1.2.4

48. $3x - 2y = 10$

$3x = 2y + 10$

$3x - 10 = 2y$

$2y = 3x - 10$

$y = \frac{3x}{2} - 5$

Good notation: $\frac{3x}{2} = \left(\frac{3}{2}\right)x$ | bad notation: $3/2\,x$

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

$3x - 2(0) = 10$

$3x = 10$

$x = \frac{10}{3}$

or the point $\left(\frac{10}{3}, 0\right)$

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

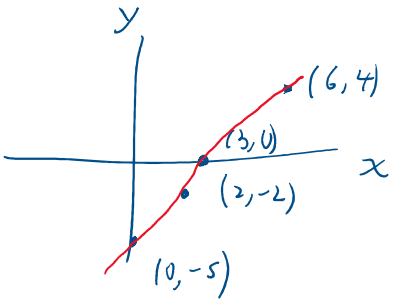
$3(0) - 2y = 10$

$-2y = 10$

$y = -5$

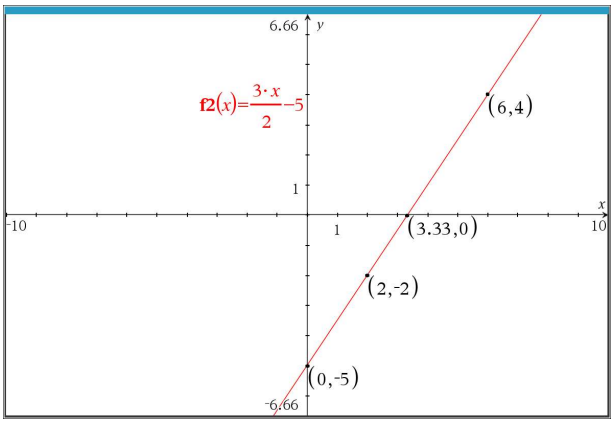
or the point $(0, -5)$

x	y
0	-5
2	-2
$\frac{10}{3}$	0
6	4



I graphed the function $y = \frac{3x}{2} - 5$. Then, I used Trace with x = 0,2, 10/3, 6 to confirm that the

plotted points satisfy the given equation.



By inspection of the graph, there is no symmetry.

48. $3x - 2y = 10$

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.

y-axis symmetry - No

$3(-x) - 2y = 10$

$-3x - 2y = 10$ Not equivalent

x-axis symmetry - No

$3x - 2(-y) = 10$

$3x + 2y = 10$ not equivalent

origin symmetry - No

$3(-x) - 2(-y) = 10$

$-3x + 2y = 10$ not equivalent