Graphing Linear Equations and Inequalities: Exercise Supplement*

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Abstract

This module is from Elementary Algebra by Denny Burzynski and Wade Ellis, Jr. In this chapter the student is shown how graphs provide information that is not always evident from the equation alone. The chapter begins by establishing the relationship between the variables in an equation, the number of coordinate axes necessary to construct its graph, and the spatial dimension of both the coordinate system and the graph. Interpretation of graphs is also emphasized throughout the chapter, beginning with the plotting of points. The slope formula is fully developed, progressing from verbal phrases to mathematical expressions. The expressions are then formed into an equation by explicitly stating that a ratio is a comparison of two quantities of the same type (e.g., distance, weight, or money). This approach benefits students who take future courses that use graphs to display information. The student is shown how to graph lines using the intercept method, the table method, and the slope-intercept method, as well as how to distinguish, by inspection, oblique and horizontal/vertical lines. This module contains the exercise supplement for the chapter "Graphing Linear Equations and Inequalities in One and Two Variables".

1 Exercise Supplement

1.1 Graphing Linear Equations and Inequalities in One Variable (here[1])

For the following problems, graph the equations and inequalities.

Exercise 1 *(Solution on p. 12.)*

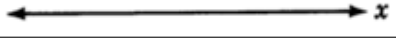
$6x - 18 = 6$

Exercise 2

$4x - 3 = -7$

Exercise 3 *(Solution on p. 12.)*

$5x - 1 = 2$



*Version 1.5: Jun 1, 2009 11:01 am +0000

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[1]"Graphing Linear Equations and Inequalities: Graphing Linear Equations and Inequalities in One Variable" <http://cnx.org/content/m18877/latest/>

Exercise 4
$10x - 16 < 4$

Exercise 5 *(Solution on p. 12.)*
$-2y + 1 \leq 5$

Exercise 6
$\frac{-7a}{12} \geq 2$

Exercise 7 *(Solution on p. 12.)*
$3x + 4 \leq 12$

Exercise 8
$-16 \leq 5x - 1 \leq -11$

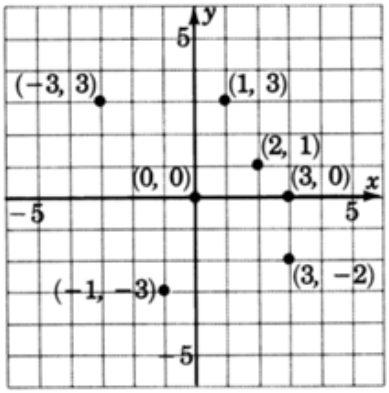
Exercise 9 *(Solution on p. 12.)*
$0 < -3y + 9 \leq 9$

Exercise 10
$\frac{-5c}{2} + 1 = 7$

1.2 Plotting Points in the Plane (here[2])

Exercise 11 *(Solution on p. 12.)*
Draw a coordinate system and plot the following ordered pairs.
$(3, 1), (4, -2), (-1, -3), (0, 3), (3, 0), \left(5, -\frac{2}{3}\right)$

Exercise 12
As accurately as possible, state the coordinates of the points that have been plotted on the graph.



[2]"Graphing Linear Equations and Inequalities: Plotting Points in the Plane" <http://cnx.org/content/m21993/latest/>

1.3 Graphing Linear Equations in Two Variables (here[3])

Exercise 13 *(Solution on p. 12.)*
What is the geometric structure of the graph of all the solutions to the linear equation $y = 4x - 9$?

1.4 Graphing Linear Equations in Two Variables (here[4]) - Graphing Equations in Slope-Intercept Form (here[5])

For the following problems, graph the equations.

Exercise 14
$y - x = 2$

Exercise 15 *(Solution on p. 12.)*
$y + x - 3 = 0$

Exercise 16
$-2x + 3y = -6$

Exercise 17 *(Solution on p. 13.)*
$2y + x - 8 = 0$

Exercise 18
$4(x - y) = 12$

Exercise 19 *(Solution on p. 13.)*
$3y - 4x + 12 = 0$

Exercise 20
$y = -3$

Exercise 21 *(Solution on p. 13.)*
$y - 2 = 0$

Exercise 22
$x = 4$

Exercise 23 *(Solution on p. 14.)*
$x + 1 = 0$

Exercise 24
$x = 0$

Exercise 25 *(Solution on p. 14.)*
$y = 0$

[3] "Graphing Linear Equations and Inequalities: Graphing Linear Equations in Two Variables" <http://cnx.org/content/m21995/latest/>
[4] "Graphing Linear Equations and Inequalities: Graphing Linear Equations in Two Variables" <http://cnx.org/content/m21995/latest/>
[5] "Graphing Linear Equations and Inequalities: Graphing Equations in Slope-Intercept Form" <http://cnx.org/content/m22000/latest/>

1.5 The Slope-Intercept Form of a Line (here[6])

Exercise 26
Write the slope-intercept form of a straight line.

Exercise 27 *(Solution on p. 14.)*
The slope of a straight line is a _____ of the steepness of the line.

Exercise 28
Write the formula for the slope of a line that passes through the points (x_1, y_1) and (x_2, y_2).

For the following problems, determine the slope and y-intercept of the lines.

Exercise 29 *(Solution on p. 14.)*
$y = 4x + 10$

Exercise 30
$y = 3x - 11$

Exercise 31 *(Solution on p. 14.)*
$y = 9x - 1$

Exercise 32
$y = -x + 2$

Exercise 33 *(Solution on p. 14.)*
$y = -5x - 4$

Exercise 34
$y = x$

Exercise 35 *(Solution on p. 15.)*
$y = -6x$

Exercise 36
$3y = 4x + 9$

Exercise 37 *(Solution on p. 15.)*
$4y = 5x + 1$

Exercise 38
$2y = 9x$

Exercise 39 *(Solution on p. 15.)*
$5y + 4x = 6$

Exercise 40
$7y + 3x = 10$

Exercise 41 *(Solution on p. 15.)*
$6y - 12x = 24$

Exercise 42
$5y - 10x - 15 = 0$

Exercise 43 *(Solution on p. 15.)*
$3y + 3x = 1$

Exercise 44
$7y + 2x = 0$

Exercise 45 *(Solution on p. 15.)*
$y = 4$

For the following problems, find the slope, if it exists, of the line through the given pairs of points.

[6] "Graphing Linear Equations and Inequalities: The Slope-Intercept Form of a Line" <http://cnx.org/content/m22014/latest/>

Exercise 46
$(5,2)\,,\quad (6,3)$

Exercise 47 *(Solution on p. 15.)*
$(8,-2)\,,\quad (10,-6)$

Exercise 48
$(0,5)\,,\quad (3,4)$

Exercise 49 *(Solution on p. 15.)*
$(1,-4)\,,\quad (3,3)$

Exercise 50
$(0,0)\,,\quad (-8,-5)$

Exercise 51 *(Solution on p. 15.)*
$(-6,1)\,,\quad (-2,7)$

Exercise 52
$(-3,-2)\,,\quad (-4,-5)$

Exercise 53 *(Solution on p. 15.)*
$(4,7)\,,\quad (4,-2)$

Exercise 54
$(-3,1)\,,\quad (4,1)$

Exercise 55 *(Solution on p. 15.)*
$\left(\frac{1}{3},\frac{3}{4}\right),\left(\frac{2}{9},-\frac{5}{6}\right)$

Exercise 56
Moving left to right, lines with _____ slope rise while lines with _____ slope decline.

Exercise 57 *(Solution on p. 15.)*
Compare the slopes of parallel lines.

1.6 Finding the Equation of a Line (here[7])

For the following problems, write the equation of the line using the given information. Write the equation in slope-intercept form.

Exercise 58
Slope=4, y-intercept=5

Exercise 59 *(Solution on p. 15.)*
Slope=3, y-intercept$=-6$

Exercise 60
Slope=1, y-intercept=8

Exercise 61 *(Solution on p. 15.)*
Slope=1, y-intercept$=-2$

Exercise 62
Slope$=-5$, y-intercept=1

Exercise 63 *(Solution on p. 15.)*
Slope$=-11$, y-intercept$=-4$

[7] "Graphing Linear Equations and Inequalities: Finding the Equation of a Line" <http://cnx.org/content/m21998/latest/>

Exercise 64
Slope=2, y-intercept=0

Exercise 65 *(Solution on p. 15.)*
Slope= -1, y-intercept=0

Exercise 66
$m = 3, \quad (4, 1)$

Exercise 67 *(Solution on p. 15.)*
$m = 2, \quad (1, 5)$

Exercise 68
$m = 6, \quad (5, -2)$

Exercise 69 *(Solution on p. 15.)*
$m = -5, \quad (2, -3)$

Exercise 70
$m = -9, \quad (-4, -7)$

Exercise 71 *(Solution on p. 15.)*
$m = -2, \quad (0, 2)$

Exercise 72
$m = -1, \quad (2, 0)$

Exercise 73 *(Solution on p. 16.)*
$(2, 3), \quad (3, 5)$

Exercise 74
$(4, 4), \quad (5, 1)$

Exercise 75 *(Solution on p. 16.)*
$(6, 1), \quad (5, 3)$

Exercise 76
$(8, 6), \quad (7, 2)$

Exercise 77 *(Solution on p. 16.)*
$(-3, 1), \quad (2, 3)$

Exercise 78
$(-1, 4), \quad (-2, -4)$

Exercise 79 *(Solution on p. 16.)*
$(0, -5), \quad (6, -1)$

Exercise 80
$(2, 1), \quad (6, 1)$

Exercise 81 *(Solution on p. 16.)*
$(-5, 7), \quad (-2, 7)$

Exercise 82
$(4, 1), \quad (4, 3)$

Exercise 83 *(Solution on p. 16.)*
$(-1, -1), \quad (-1, 5)$

Exercise 84

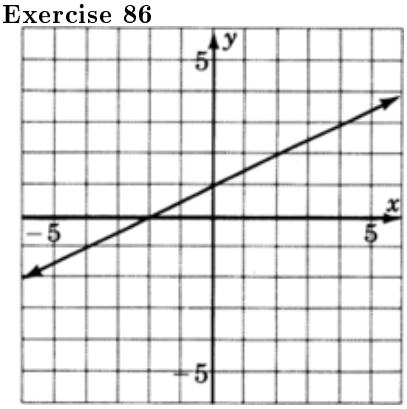
$(0,4)\,,\quad (0,-3)$

Exercise 85 *(Solution on p. 16.)*

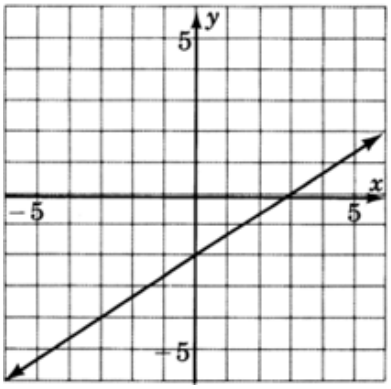
$(0,2)\,,\quad (1,0)$

For the following problems, reading only from the graph, determine the equation of the line.

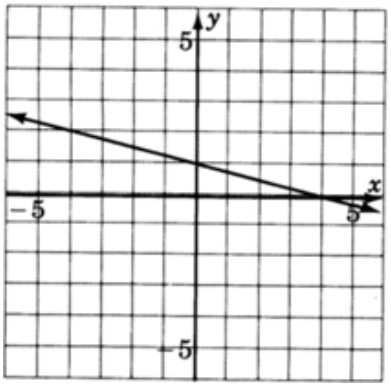
Exercise 86



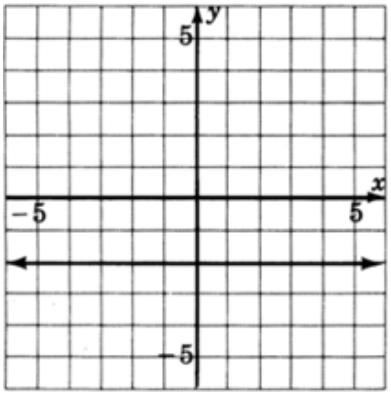
Exercise 87 *(Solution on p. 16.)*



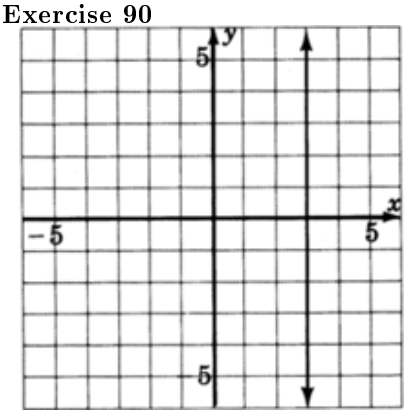
Exercise 88



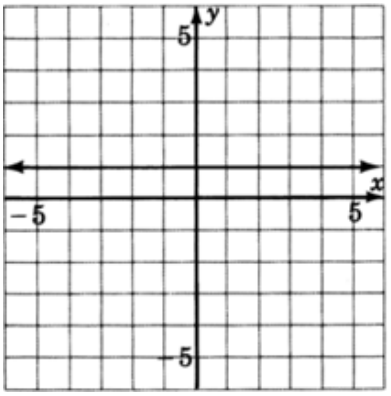
Exercise 89 *(Solution on p. 16.)*



Exercise 90



Exercise 91 *(Solution on p. 16.)*



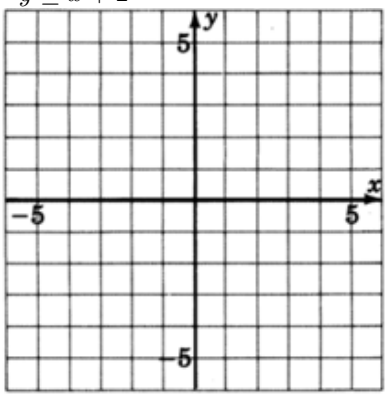
1.7 Graphing Linear Inequalities in Two Variables (here[8])

For the following problems, graph the inequalities.

[8] "Graphing Linear Equations and Inequalities: Graphing Linear Inequalities in Two Variables" <http://cnx.org/content/m22011/latest/>

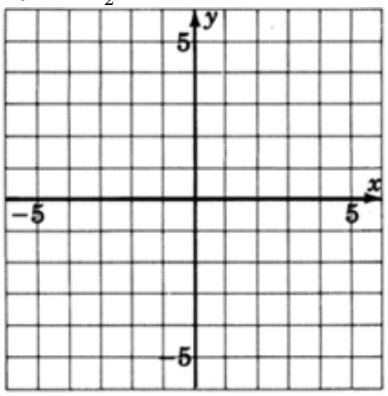
Exercise 92

$y \leq x + 2$



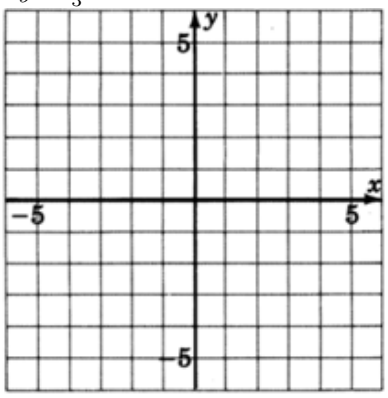
Exercise 93 *(Solution on p. 16.)*

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



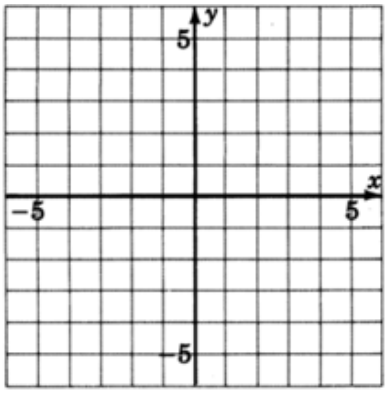
Exercise 94

$y > \frac{1}{3}x - 3$



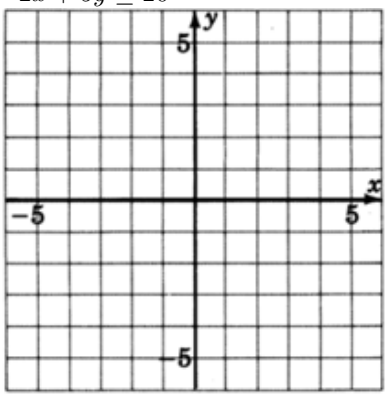
Exercise 95 *(Solution on p. 16.)*

$-2x + 3y \leq -6$



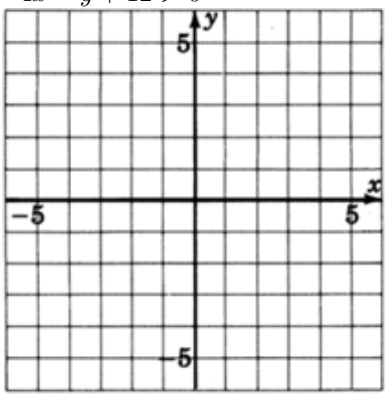
Exercise 96

$2x + 5y \geq 20$



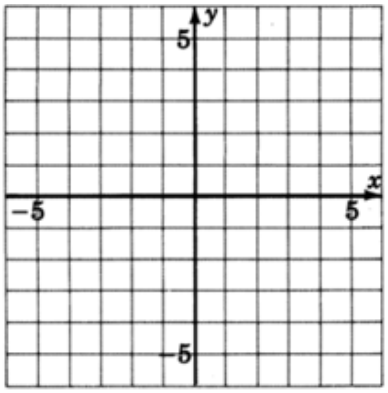
Exercise 97 *(Solution on p. 16.)*

$4x - y + 12 > 0$



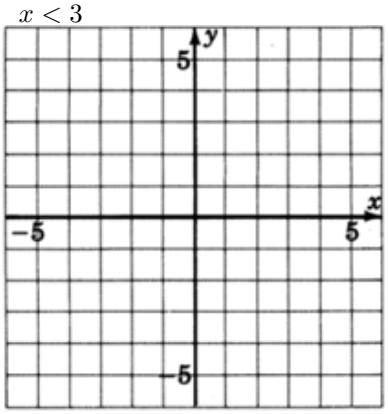
Exercise 98

$y \geq -2$



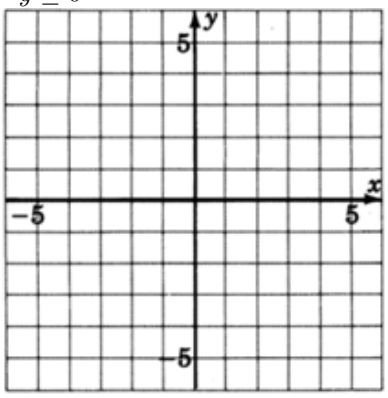
Exercise 99 *(Solution on p. 17.)*

$x < 3$



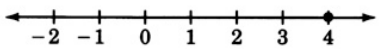
Exercise 100

$y \leq 0$

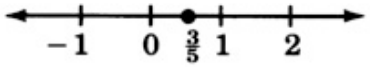


Solutions to Exercises in this Module

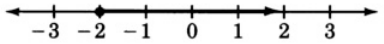
Solution to Exercise (p. 1)
$x = 4$



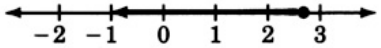
Solution to Exercise (p. 1)
$x = \frac{3}{5}$



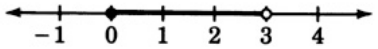
Solution to Exercise (p. 2)
$y \geq -2$



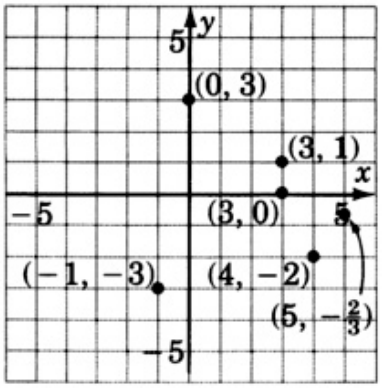
Solution to Exercise (p. 2)
$x \leq \frac{8}{3}$



Solution to Exercise (p. 2)
$0 \leq y < 3$

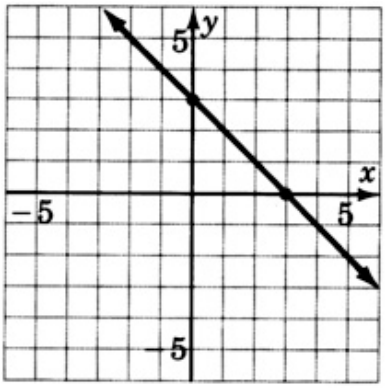


Solution to Exercise (p. 2)

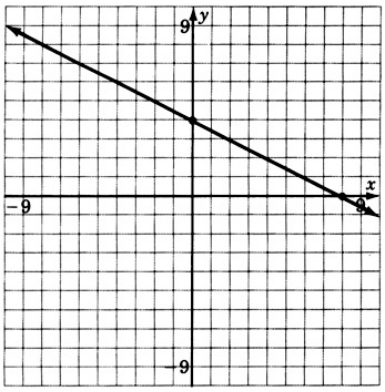


Solution to Exercise (p. 3)
a straight line

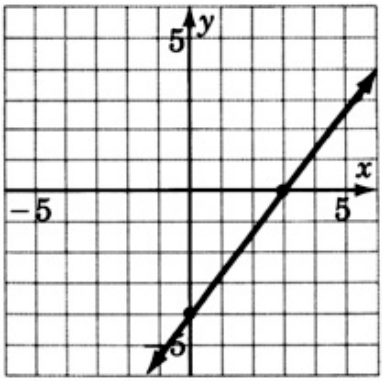
Solution to Exercise (p. 3)



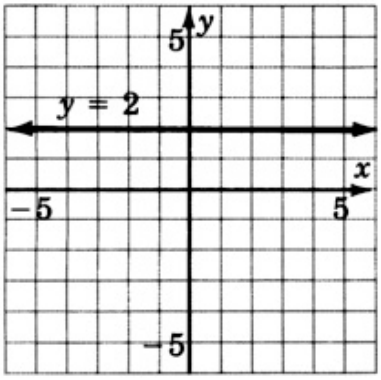
Solution to Exercise (p. 3)



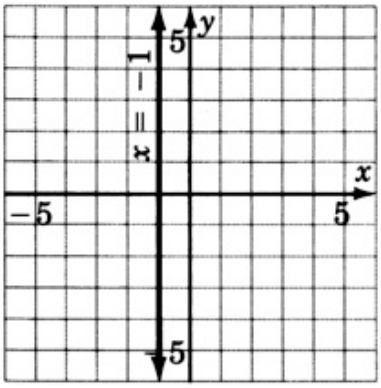
Solution to Exercise (p. 3)



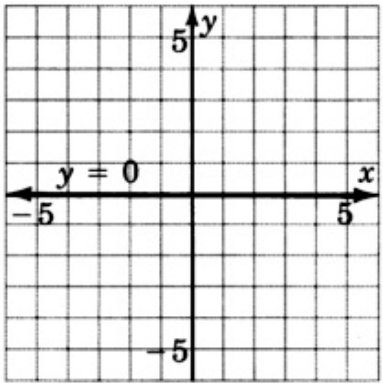
Solution to Exercise (p. 3)



Solution to Exercise (p. 3)



Solution to Exercise (p. 3)



Solution to Exercise (p. 4)

measure

Solution to Exercise (p. 4)

slope: 4

y-intercept: $(0, 10)$

Solution to Exercise (p. 4)

slope: 9

y-intercept: $(0, -1)$

Solution to Exercise (p. 4)

slope: -5

y-intercept: $(0,-4)$

Solution to Exercise (p. 4)

slope: -6

y-intercept: $(0,0)$

Solution to Exercise (p. 4)

slope: $\frac{5}{4}$

y-intercept: $\left(0,\frac{1}{4}\right)$

Solution to Exercise (p. 4)

slope: $-\frac{4}{5}$

y-intercept: $\left(0,\frac{6}{5}\right)$

Solution to Exercise (p. 4)

slope: 2

y-intercept: $(0,4)$

Solution to Exercise (p. 4)

slope: -1

y-intercept: $\left(0,\frac{1}{3}\right)$

Solution to Exercise (p. 4)

slope: 0

y-intercept: $(0,4)$

Solution to Exercise (p. 5)

slope: -2

Solution to Exercise (p. 5)

slope: $\frac{7}{2}$

Solution to Exercise (p. 5)

slope: $\frac{3}{2}$

Solution to Exercise (p. 5)

No Slope

Solution to Exercise (p. 5)

slope: $\frac{57}{4}$

Solution to Exercise (p. 5)

The slopes of parallel lines are equal.

Solution to Exercise (p. 5)

$y=3x-6$

Solution to Exercise (p. 5)

$y=x-2$

Solution to Exercise (p. 5)

$y=-11x-4$

Solution to Exercise (p. 6)

$y=-x$

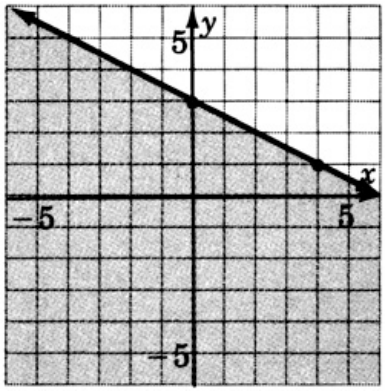
Solution to Exercise (p. 6)

$y=2x+3$

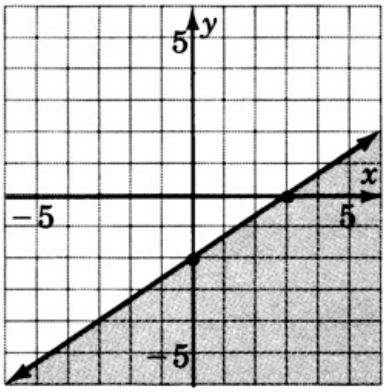
Solution to Exercise (p. 6)

$y=-5x+7$

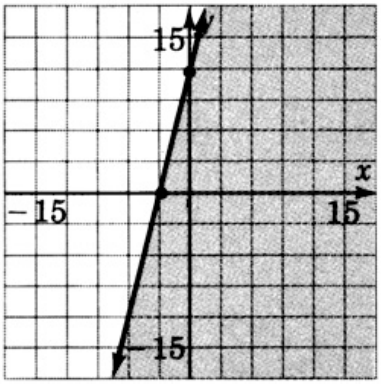
Solution to Exercise (p. 6)
$y = -2x + 2$
Solution to Exercise (p. 6)
$y = 2x - 1$
Solution to Exercise (p. 6)
$y = -2x + 13$
Solution to Exercise (p. 6)
$y = \frac{2}{5}x + \frac{11}{5}$
Solution to Exercise (p. 6)
$y = \frac{2}{3}x - 5$
Solution to Exercise (p. 6)
$y = 7$ (zero slope)
Solution to Exercise (p. 6)
$x = -1$ (no slope)
Solution to Exercise (p. 7)
$y = -2x + 2$
Solution to Exercise (p. 7)
$y = \frac{2}{3}x - 2$
Solution to Exercise (p. 8)
$y = -2$
Solution to Exercise (p. 8)
$y = 1$
Solution to Exercise (p. 9)



Solution to Exercise (p. 9)



Solution to Exercise (p. 10)



Solution to Exercise (p. 11)