Linear Equations

$ax + by = c$	**Standard form** (neither a nor b is 0) Slope is $-a/b$ x-intercept is c/a y-intercept is c/b
$x = k$	**Vertical line** Undefined slope x-intercept is k
$y = k$	**Horizontal line** Slope is 0 y-intercept is k
$y = mx + b$	**Slope-intercept form** Slope is m y-intercept is b
$y - y_1 = m(x - x_1)$	**Point-slope form** Slope is m Line passes through (x_1, y_1)

7.3 Exercises

Write the following equations in slope-intercept form, and then find the slope of the line and the y-intercept. See Example 1.

1. $x + y = 8$ **2.** $x - y = 2$ **3.** $5x + 2y = 10$ **4.** $6x - 5y = 18$

5. $2x - 3y = 5$ **6.** $4x + 3y = 10$ **7.** $-5x - 3y = 4$ **8.** $-2x - 7y = 15$

9. $8x + 11y = 9$ **10.** $4x + 13y = 19$

Find equations of the lines satisfying the following conditions. Write the equations in slope-intercept form. See Example 2.

11. $m = 5, \quad b = 4$

12. $m = -2, \quad b = 1$

13. $m = -\frac{2}{3}, \quad b = \frac{1}{2}$

14. $m = -\frac{5}{8}, \quad b = \frac{1}{4}$

15. Slope $\frac{2}{5}$, y-intercept -1

16. Slope $-\frac{3}{4}$, y-intercept 2

17. Slope 0, y-intercept 4

18. Slope 0, y-intercept -3

19. Slope -1.573, y-intercept 4.209

20. Slope -2.334, y-intercept 0.532

Find equations of the lines satisfying the following conditions. Write the equations in standard form. See Example 3.

21. $m = -\frac{3}{4}$, through $(-2, 5)$

22. $m = -\frac{5}{6}$, through $(4, -3)$

23. $m = -2$, through $(1, 5)$

24. $m = 1$, through $(-2, 3)$

25. $m = \frac{1}{2}$, through (7, 4)

26. $m = \frac{1}{4}$, through (1, −2)

27. Horizontal, through (−3, 2)

28. Vertical, through (1, 5)

29. $m = 4$, x-intercept 3

30. $m = -5$, x-intercept −2

31. $m = 1.2538$, through (4.1642, 2.9371)

32. $m = -0.4093$, through (1.6847, 3.2501)

Find equations for the following lines. (Hint: What kind of line has undefined slope?)

33. Undefined slope, through (2, 8)

34. Undefined slope, through (−4, 1)

35. Vertical, through (−7, 1)

36. Vertical, through (3, −9)

Find equations of the lines passing through the following pairs of points. Write the equations in standard form. See Example 4.

37. (3, 4) and (2, 6)

38. (5, −2) and (−3, 1)

39. (6, 1) and (−2, 5)

40. (4, −2) and (1, 3)

41. (1, 1) and (0, −4)

42. (3, −4) and (−2, 2)

43. $\left(-\frac{2}{5}, \frac{2}{5}\right)$ and $\left(\frac{4}{3}, \frac{2}{3}\right)$

44. $\left(\frac{3}{4}, \frac{8}{3}\right)$ and $\left(\frac{2}{5}, \frac{2}{3}\right)$

45. (2, 5) and (1, 5)

46. (−2, 2) and (4, 2)

47. $(1, \sqrt{5})$ and $(3, 2\sqrt{5})$

48. $(-4, \sqrt{2})$ and $(5, -\sqrt{2})$

Find equations of the lines satisfying the following conditions. Write the equations in standard form. See Examples 5 and 6.

49. Parallel to $3x - y = 8$ and through (−7, 3)

50. Parallel to $2x + 5y = 10$ and through (4, 7)

51. Parallel to $-x + 2y = 3$ and through (−2, −2)

52. Through (−1, 3) and perpendicular to $3x + 2y = 6$

53. Through (8, 5) and perpendicular to $2x - y = 4$

54. Through (2, −7) and perpendicular to $5x + 2y = 7$

55. Parallel to $y = 4$ and through (−2, 7)

56. Parallel to $x - 2 = 0$ and through (8, 4)

Many real-world situations can be described approximately by a straight-line graph. One way to find the equation of such a line is to use two typical data points from the graph and the point-slope form of the equation of a line. Assume that these problems have straight-line graphs.

57. A company finds that it can make a total of 20 generators for $13,900. and that 10 generators cost $7500.
(a) Write an equation that gives the total cost y to produce x generators.
(b) Predict the cost to produce 12 generators.

58. The sales of a small company were $27,000 in its second year of business and $63,000 in its fifth year.
(a) Write an equation giving the sales y in year x.
(b) Estimate the sales in the fourth year.

Section 7.3 (page 311)

1. $y = -x + 8$; −1; 8 **3.** $y = (-5/2)x + 5$; −5/2; 5 **5.** $y = (2/3)x - 5/3$; 2/3; −5/3
7. $y = (-5/3)x - 4/3$; −5/3; −4/3 **9.** $y = (-8/11)x + 9/11$; −8/11; 9/11 **11.** $y = 5x + 4$
13. $y = (-2/3)x + 1/2$ **15.** $y = (2/5)x - 1$ **17.** $y = 4$ **19.** $y = -1.573x + 4.209$
21. $3x + 4y = 14$ **23.** $2x + y = 7$ **25.** $x - 2y = -1$ **27.** $y = 2$ **29.** $4x - y = 12$
31. $1.2538x - y = 2.2840$ (rounded) **33.** $x = 2$ **35.** $x = -7$ **37.** $2x + y = 10$
39. $x + 2y = 8$ **41.** $5x - y = 4$ **43.** $2x - 13y = -6$ **45.** $y = 5$ **47.** $\sqrt{5}x - 2y = -\sqrt{5}$ **49.** $3x - y = -24$ **51.** $x - 2y = 2$ **53.** $x + 2y = 18$ **55.** $y = 7$

57. (a) $y = 640x + 1100$ (b) $8780 **59.** (a) $y = \frac{4400}{3}x - \frac{94,100}{3}$ (b) $12,633.33

61. $(-\infty, 1/2)$ **63.** $[-2, +\infty)$ **65.** $(-\infty, -8/5)$

Section 7.3 (page 311)

1. $y = -x + 8$; -1; 8 **3.** $y = (-5/2)x + 5$; $-5/2$; 5 **5.** $y = (2/3)x - 5/3$; $2/3$; $-5/3$
7. $y = (-5/3)x - 4/3$; $-5/3$; $-4/3$ **9.** $y = (-8/11)x + 9/11$; $-8/11$; $9/11$ **11.** $y = 5x + 4$
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Section 7.4 (page 316)

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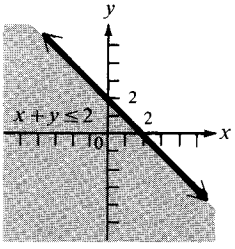

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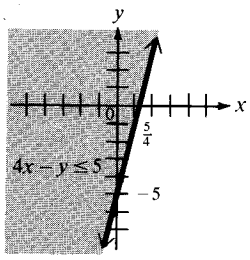

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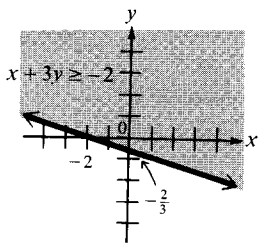

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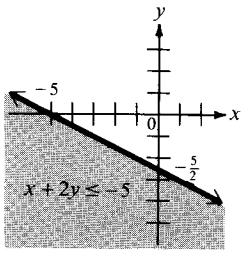

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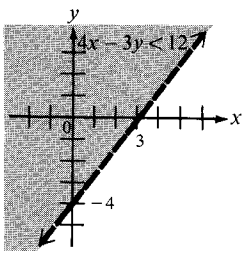

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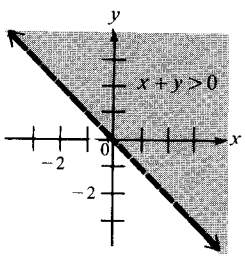

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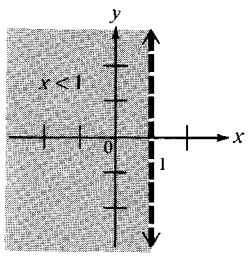

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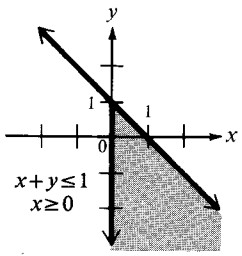

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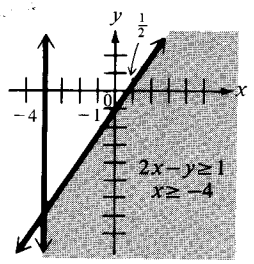

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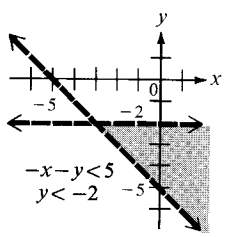

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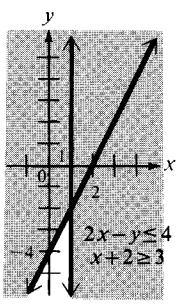

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