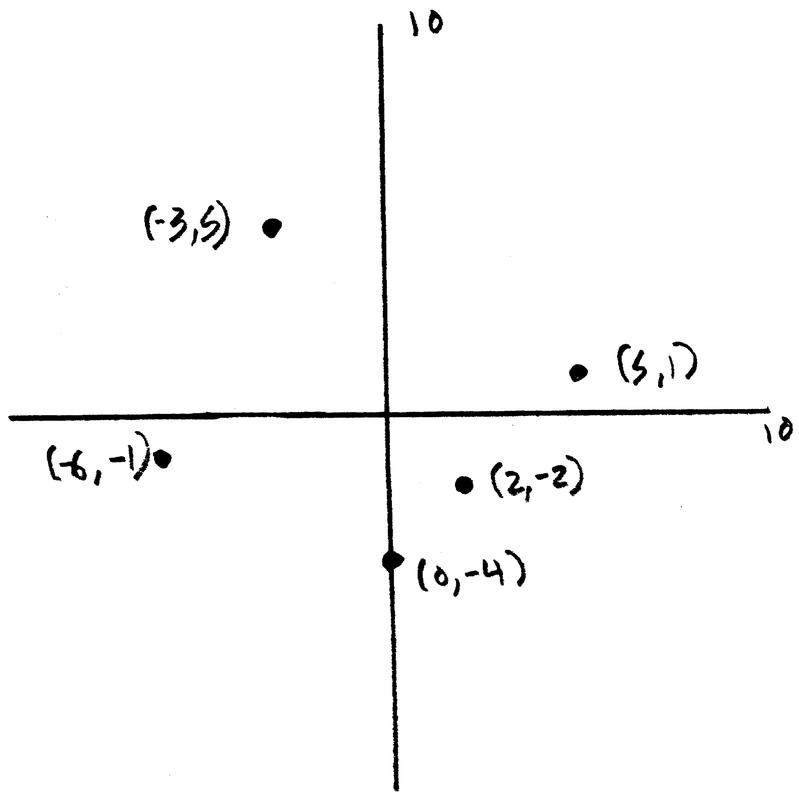
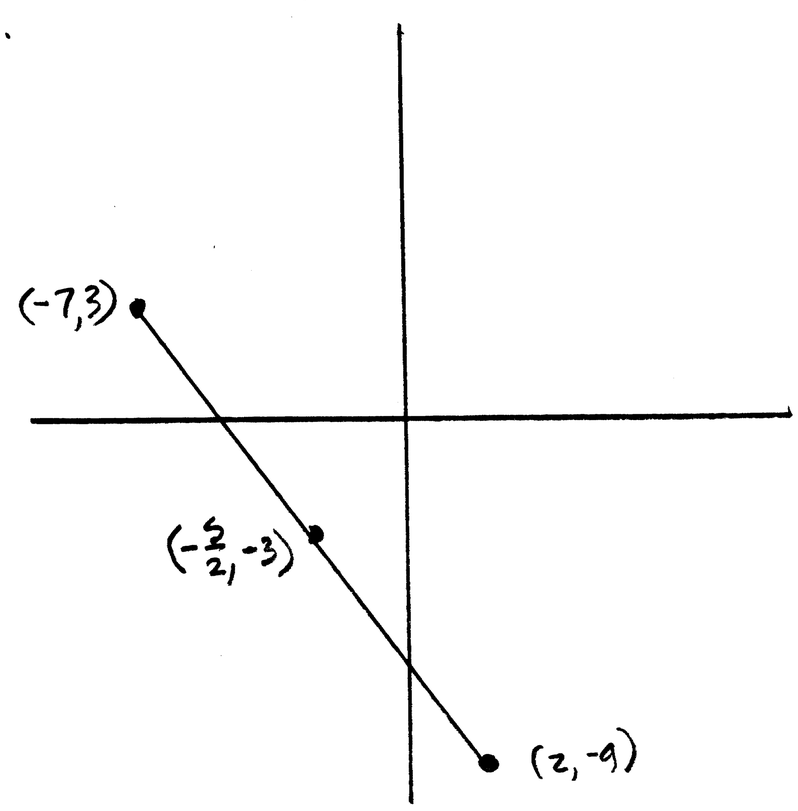
Section 2.1

2.



6. $(-7,3)$ $(2,-9)$

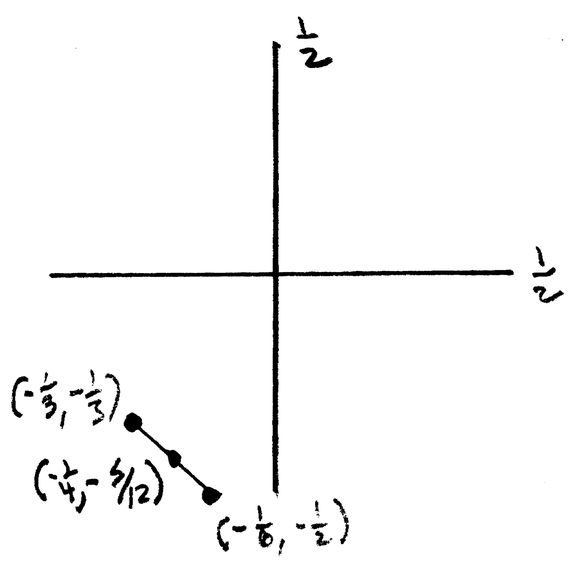
a.



b. $d = [(-7-2)^2 + (3+9)^2]^{1/2}$
$= (81 + 144)^{1/2}$
$= 225^{1/2}$
$d = 15.$

c. $\left(\frac{-7+2}{2}, \frac{3-9}{2}\right) = \left(-\frac{5}{2}, -3\right)$

10. a. $\left(-\frac{1}{3}, -\frac{1}{3}\right)$ $\left(-\frac{1}{6}, -\frac{1}{2}\right)$



b. $d = \left[\left(-\frac{1}{3} + \frac{1}{6}\right)^2 + \left(-\frac{1}{3} + \frac{1}{2}\right)^2\right]^{1/2}$
$= \left[\left(-\frac{1}{6}\right)^2 + \left(\frac{1}{6}\right)^2\right]^{1/2}$
$= \left(\frac{1}{36} + \frac{1}{36}\right)^{1/2}$
$= \left(\frac{2}{36}\right)^{1/2}$
$d = \frac{\sqrt{2}}{6}$

c. $\left(\frac{-1/3 - 1/6}{2}, \frac{-1/3 - 1/2}{2}\right) = \left(-\frac{1}{4}, -\frac{5}{12}\right)$

18. $15 = [(x+9)^2 + (8+4)^2]^{1/2}$

$225 = (x+9)^2 + 144$

$(x+9)^2 = 81$

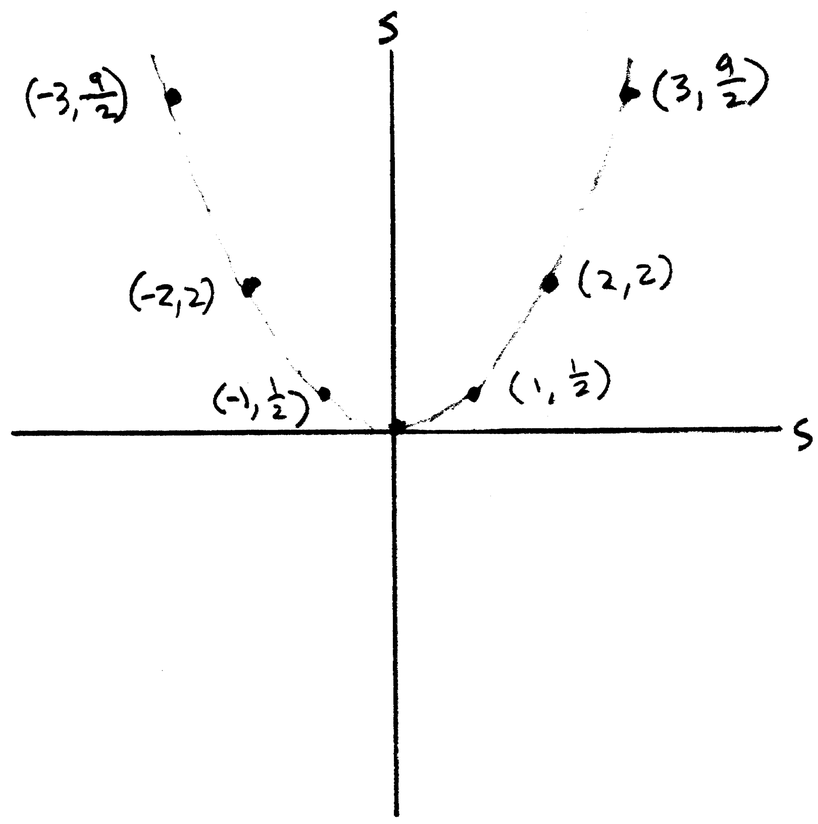
$|x+9| = 9$

$x+9 = \pm 9$

$x = 0, -18$

28. $y = \frac{1}{2}x^2$

x	y
-3	$\frac{9}{2}$
-2	2
-1	$\frac{1}{2}$
0	0
1	$\frac{1}{2}$
2	2
3	$\frac{9}{2}$



30. $2x = -y - 6$

$2x = -(0) - 6$
$2x = -6$
$x = -3$

$2(0) = -y - 6$
$0 = -y - 6$
$y = -6$

x: $(-3, 0)$
y: $(0, -6)$

32. $y = 4 - x^2$

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

$y = 4 - (0)^2$
$y = 4$

x: $(\pm 2, 0)$
y: $(0, 4)$

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

$0 = \sqrt{x^2+9}$

$x^2+9 = 0$

$x^2 = -9$

none.

$y = \sqrt{0^2+9}$

$= \sqrt{9}$

$y = 3$

x: none

y: (0,3)

36. $x^2y - x^2 + 4y = 0$

$x^2(0) - x^2 + 4(0) = 0$

$-x^2 = 0$

$x = 0$

$(0^2)y - 0^2 + 4y = 0$

$4y = 0$

$y = 0$

x, y: (0,0).

40. $y = x^4 - x^2 + 3$

x: $-y = x^4 - x^2 + 3$

$y = -x^4 + x^2 - 3$

NO

y: $y = (-x)^4 - (-x)^2 + 3$

$y = x^4 - x^2 + 3$

YES

O: $-y = (-x)^4 - (-x)^2 + 3$

$y = -x^4 + x^2 - 3$

NO

42. $y^2 = x + 2$

x: $(-y)^2 = x + 2$

$y^2 = x + 2$

Yes.

y: $y^2 = (-x) + 2$

$y^2 = -x + 2$

NO.

O: $(-y)^2 = (-x) + 2$

$y = -x + 2$

NO.

44. $y = \sqrt{4-x^2}$

x: $(-y) = \sqrt{4-x^2}$
$y = -\sqrt{4-x^2}$
NO

y: $y = \sqrt{4-(-x)^2}$
$y = \sqrt{4-x^2}$
YES.

O: $(-y) = \sqrt{4-(-x)^2}$
$y = -\sqrt{4-x^2}$
NO.

46. $x^3y = 1$

x: $x^3(-y) = 1$
$x^3y = -1$
NO

y: $(-x)^3y = 1$
$x^3y = -1$
NO

O: $(-x)^3(-y) = 1$
$x^3y = 1$
YES.

48. $y = \frac{x}{x^2+1}$

x: $(-y) = \frac{x}{x^2+1}$
$y = -\frac{x}{x^2+1}$
NO

y: $y = \frac{-x}{(-x)^2+1}$
$y = -\frac{x}{x^2+1}$
NO.

O: $(-y) = \frac{-x}{(-x)^2+1}$
$y = \frac{x}{x^2+1}$
YES.

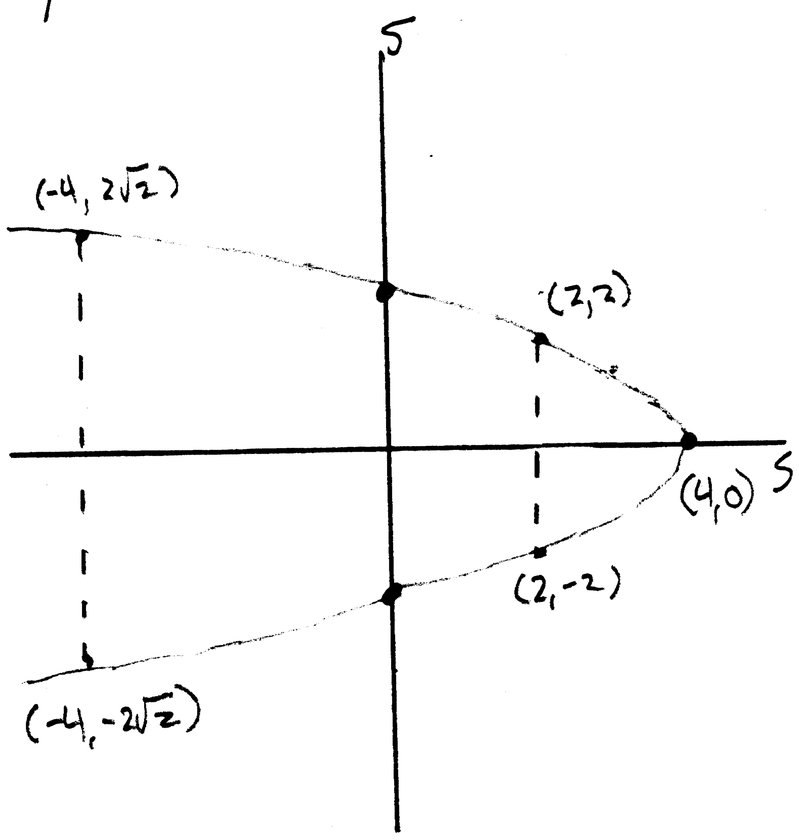
50. $x^2+y^2=9$

x: $x^2+(-y)^2=9$
$x^2+y^2=9$
YES!

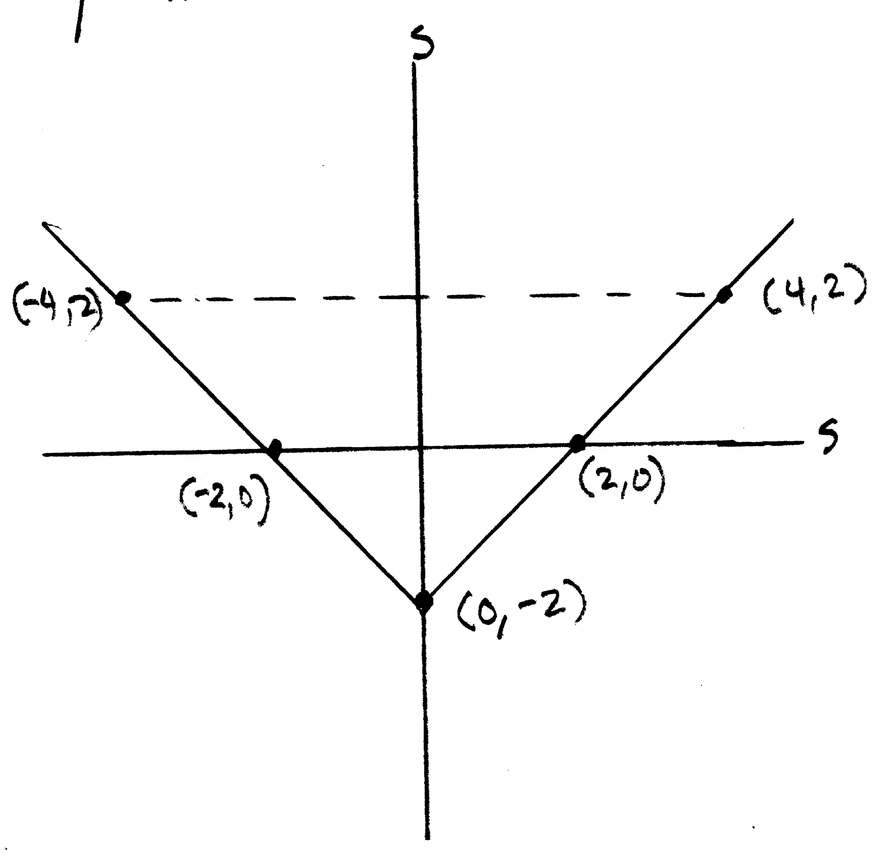
y: $(-x)^2+y^2=9$
$x^2+y^2=9$
YES.

O: $(-x)^2+(-y)^2=9$
$x^2+y^2=9$
YES.

52. $y^2 = -x + 4$



54. $y = |x| - 2$



64. $y = x^2 - 1$

$0 = x^2 - 1$ $\qquad$ $y = 0^2 - 1$

$x^2 = 1$ $\qquad$ $y = -1$

$x = \pm 1$

x: $(\pm 1, 0)$

y: $(0, -1)$

x: $(-y) = x^2 - 1$

$y = -x^2 + 1$

NO

64 (Continued)

y: $y = (-x)^2 - 1$

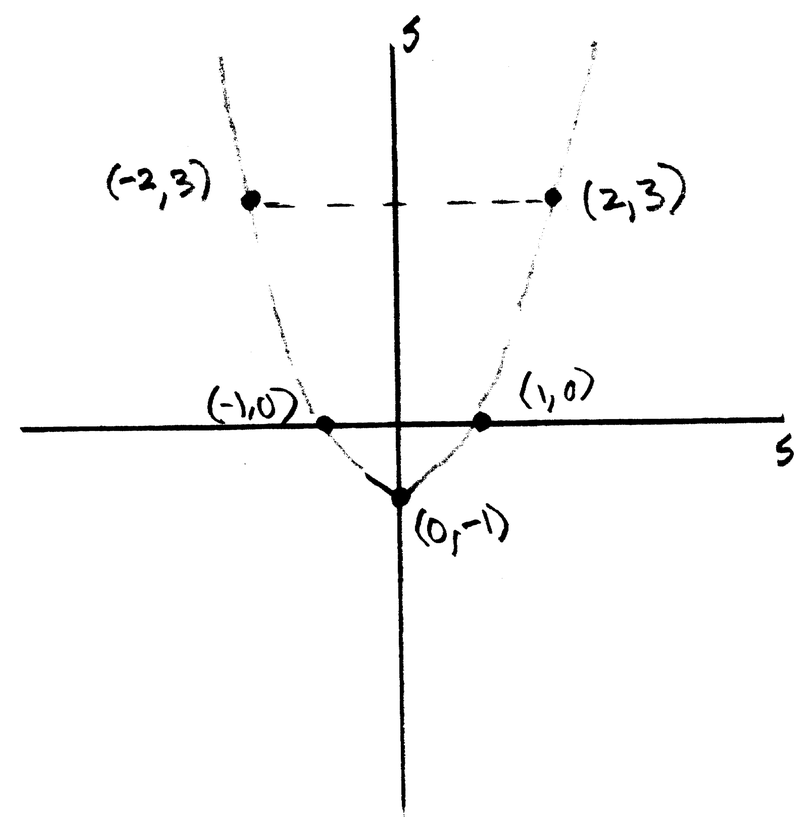
$y = x^2 - 1$

YES

o: $(-y) = (-x)^2 - 1$

$y = -x^2 + 1$

NO



X	Y
-2	3
2	3

70. $y = \frac{4}{x^2+1}$

x: $0 = \frac{4}{x^2+1}$

none.

y: $y = \frac{4}{0^2+1}$

$y = 4$

x: none.

y: $(0,4)$

x: $(-y) = \frac{4}{x^2+1}$

$y = -\frac{4}{x^2+1}$

NO

y: $y = \frac{4}{(-x)^2+1}$

$y = \frac{4}{x^2+1}$

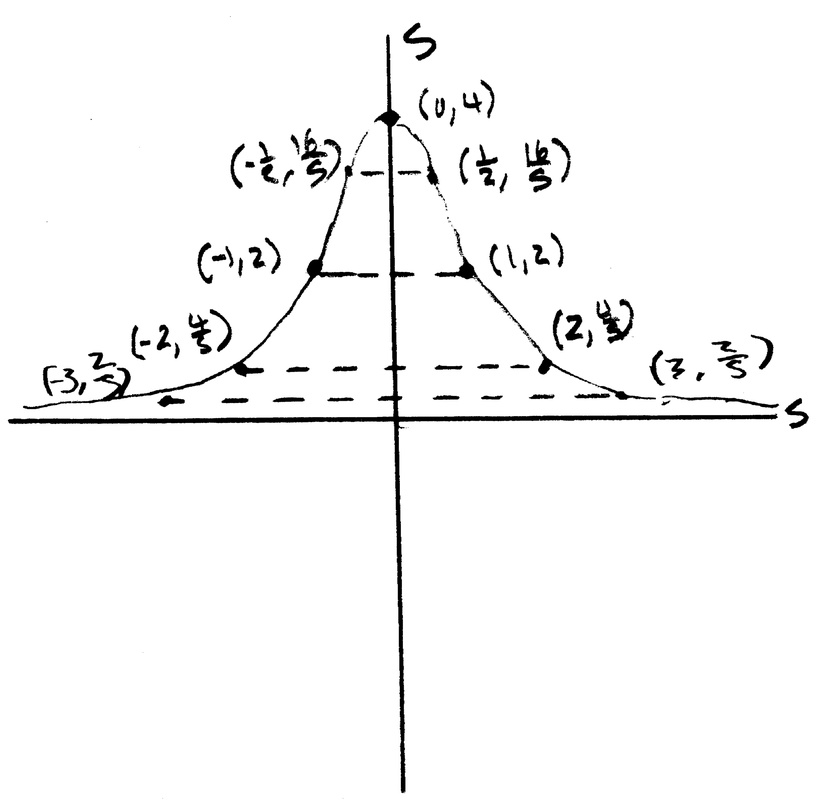
YES.

O: $(-y) = \frac{4}{(-x)^2+1}$

$y = -\frac{4}{x^2+1}$

NO.

A: $x \to \pm\infty$, $y \to 0$



x	y
±1	2
±2	4/5
±½	16/5

x	y
±3	2/5

72. $y = \sqrt{1-x}$

x: $0 = \sqrt{1-x}$

$1 - x = 0$

$x = 1$

y: $y = \sqrt{1-0} = 1$

x: $(1,0)$

y: $(0,1)$

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

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

NO

y: $y = \sqrt{1-(-x)}$

$y = \sqrt{1+x}$

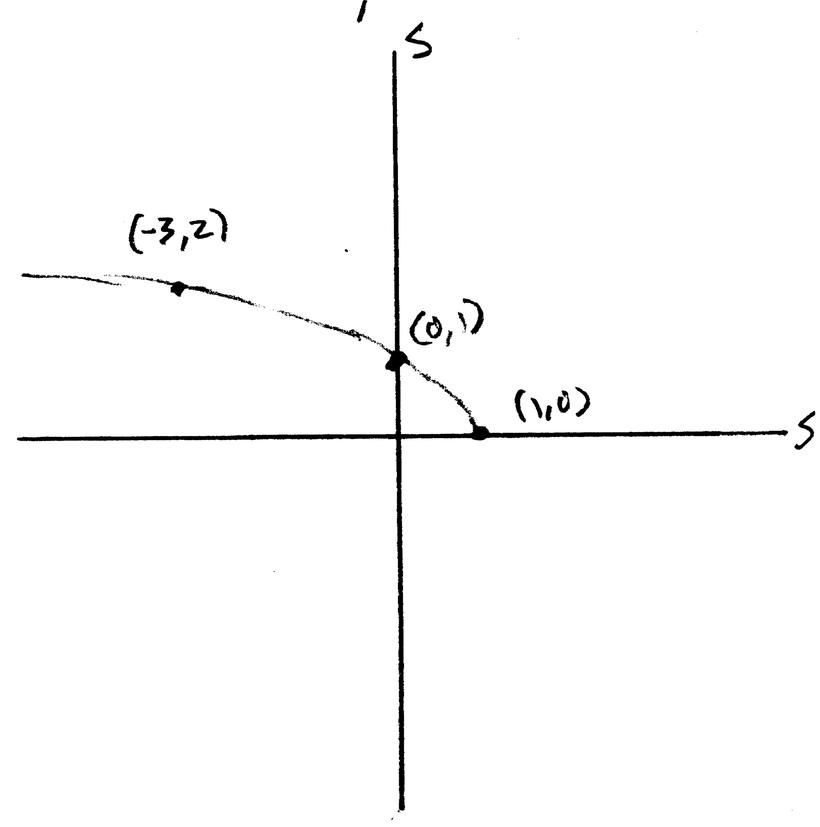
NO

O: $(-y) = \sqrt{1-(-x)}$

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

NO.

As $x \to -\infty$, $y \to \infty$



x	y
-3	2

Section 2.2

34. $(6,-1)$ $(0,0)$

$$m = \frac{-1-0}{6-0} = -\frac{1}{6}$$
$$y - 0 = -\frac{1}{6}(x-0)$$
$$y = -\frac{1}{6}x$$

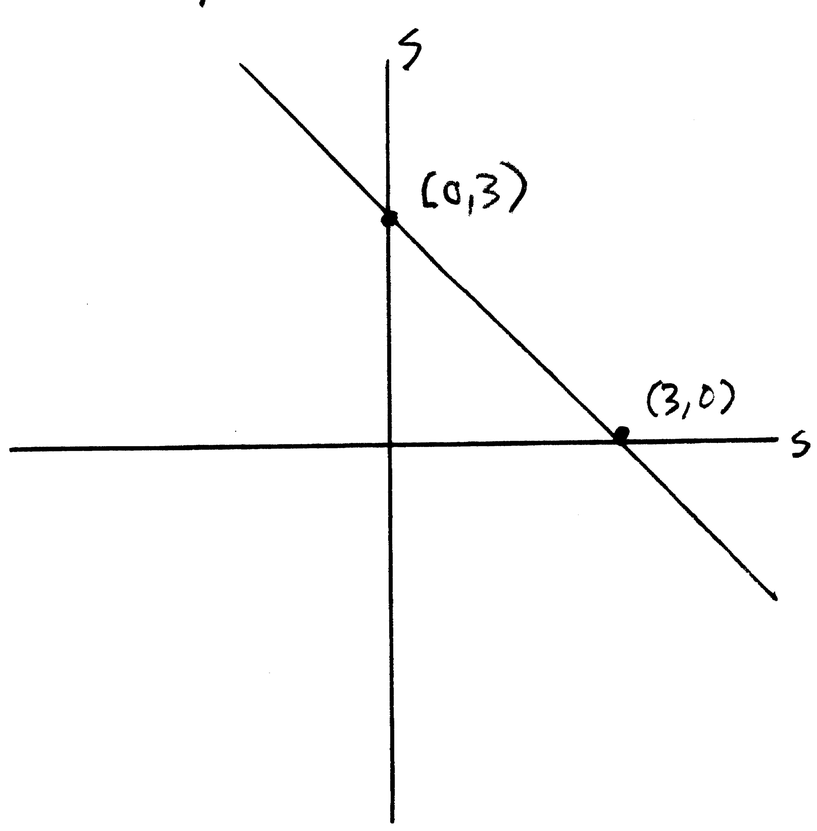
38. $(3,5)$ $(3,-2)$

$$m = \frac{5+2}{3-3} = \infty$$
$$x = 3$$

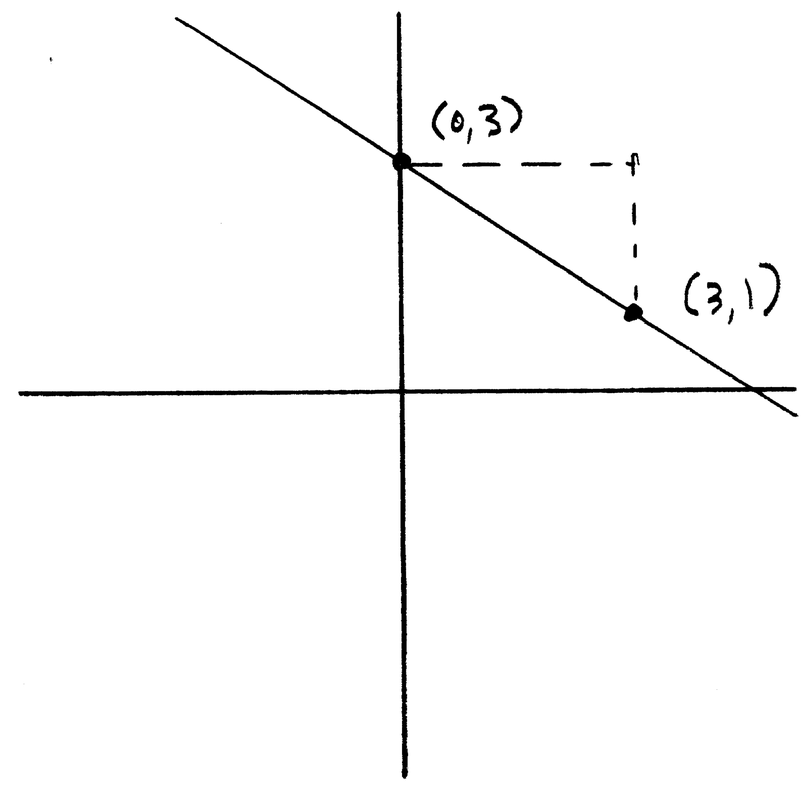
42. $(1,1)$ $(6,-\frac{2}{3})$

$$m = \frac{1+2/3}{1-6}$$
$$= \frac{5/3}{-5}$$
$$= \frac{5}{3}\cdot\left(-\frac{1}{5}\right)$$
$$m = -\frac{1}{3}$$
$$y-1 = -\frac{1}{3}(x-1)$$
$$y-1 = -\frac{1}{3}x + \frac{1}{3}$$
$$y = -\frac{1}{3}x + \frac{4}{3}$$

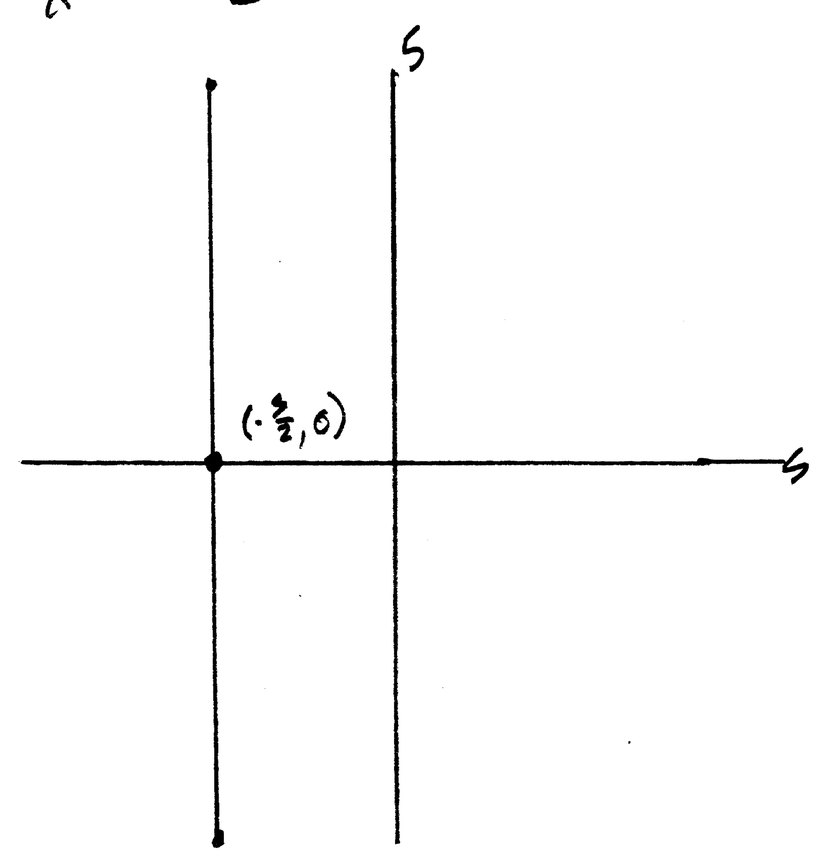
48. $y = 3-x$
$= -x+3$
$m=-1,\ b=3$



50. $2x+3y-9=0$
$3y = -2x+9$
$y = -\frac{2}{3}x+3$
$m = -\frac{2}{3},\ b=3$



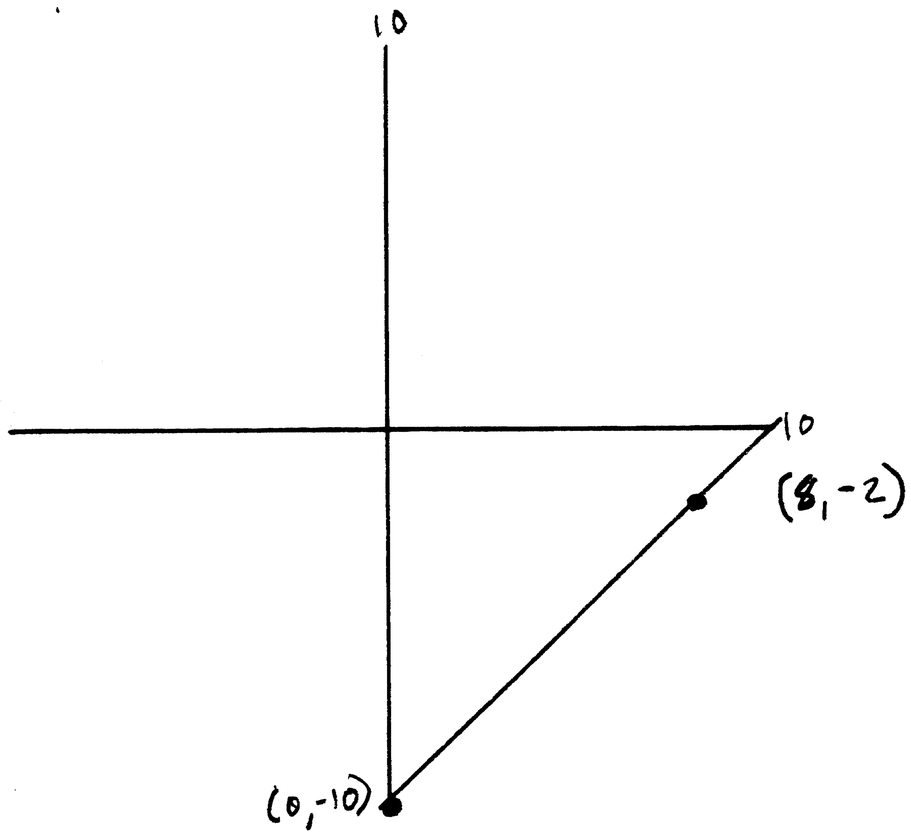
52. $2x+5=0$
$2x=-5$
$x=-\frac{5}{2}$



54. $x - y - 10 = 0$

$y = x - 10$

$m = 1, \quad b = -10$

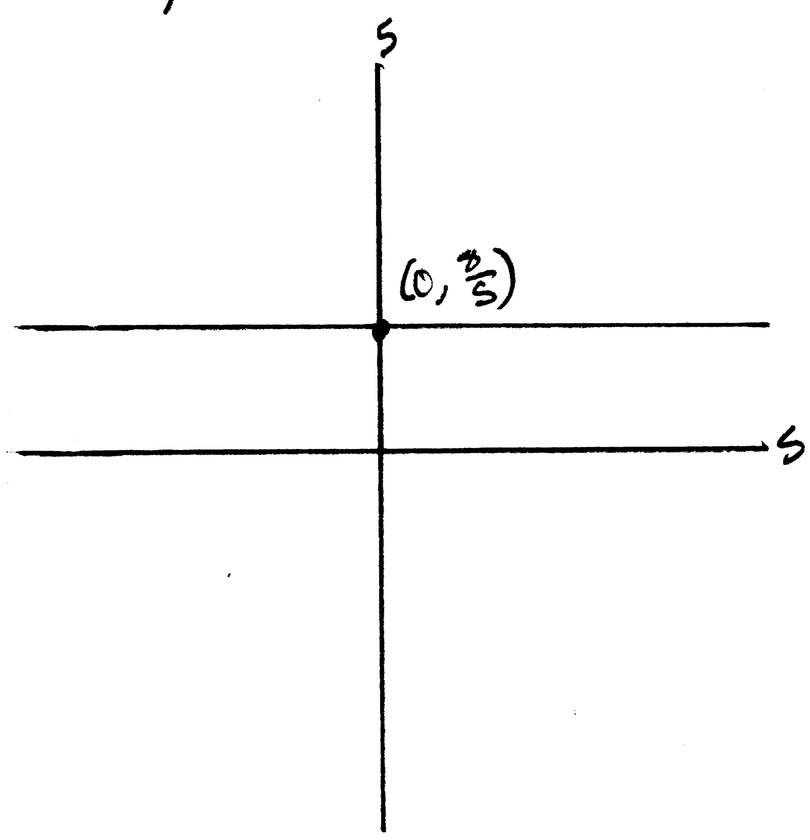


56. $8 - 5y = 0$

$5y = 8$

$y = \frac{8}{5}$

$m = 0, \quad b = \frac{8}{5}$



76. $L_1: (-1,6), \ (1,4)$

$L_2: (3,-3), \ (6,-9)$

$m_1 = \frac{6-4}{-1-1} = \frac{2}{-2} = -1$

$m_2 = \frac{-3+9}{3-6} = \frac{6}{-3} = -2$

neither.

78. $L_1: (3,6) \quad (-6,0)$

$L_2: (0,-1) \quad (5, \frac{7}{3})$

$m_1 = \frac{6-0}{3+6} = \frac{6}{9} = \frac{2}{3}$

$m_2 = \frac{7/3+1}{5-0} = \frac{10/3}{5} = \frac{10}{3} \cdot \frac{1}{5} = \frac{2}{3}$

$m_1 = m_2$

$L_1 \parallel L_2$

80. $L_1: (4,8) \quad (-4,2)$

$L_2: (3,-5) \quad (-1, \frac{1}{3})$

$m_1 = \frac{8-2}{4+4} = \frac{6}{8} = \frac{3}{4}$

$m_2 = \frac{1/3+5}{-1-3} = \frac{16}{3} \cdot (-\frac{1}{4}) = -\frac{4}{3}$

$m_1 m_2 = \frac{3}{4}(-\frac{4}{3}) = -1$

$L_1 \perp L_2$

82. $L_1: (-1,3) \quad (2,-5)$

$L_2: (3,0) \quad (2,-7)$

$m_1 = \frac{-5-3}{2+1} = \frac{-8}{3} = -\frac{8}{3}$

$m_2 = \frac{-7-0}{2-3} = \frac{-7}{-1} = 7$

neither.

84. $y = -x + 8, \quad (-5,4)$

a. $m = -1$

$y - 4 = -(x+5)$

$y - 4 = -x - 5$

$y = -x - 1$

b. $m = -\frac{1}{-1} = 1$

$y - 4 = x + 5$

$y = x + 9$

86. $5x+3y=0$, $\left(\frac{7}{8}, \frac{3}{4}\right)$

a. $3y = -5x$

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

$m = -\frac{5}{3}$

$y - \frac{3}{4} = -\frac{5}{3}\left(x - \frac{7}{8}\right)$

$y - \frac{3}{4} = -\frac{5}{3}x + \frac{35}{24}$

$y = -\frac{5}{3}x + \frac{53}{24}$.

b. $m = \frac{3}{5}$

$y - \frac{3}{4} = \frac{3}{5}\left(x - \frac{7}{8}\right)$

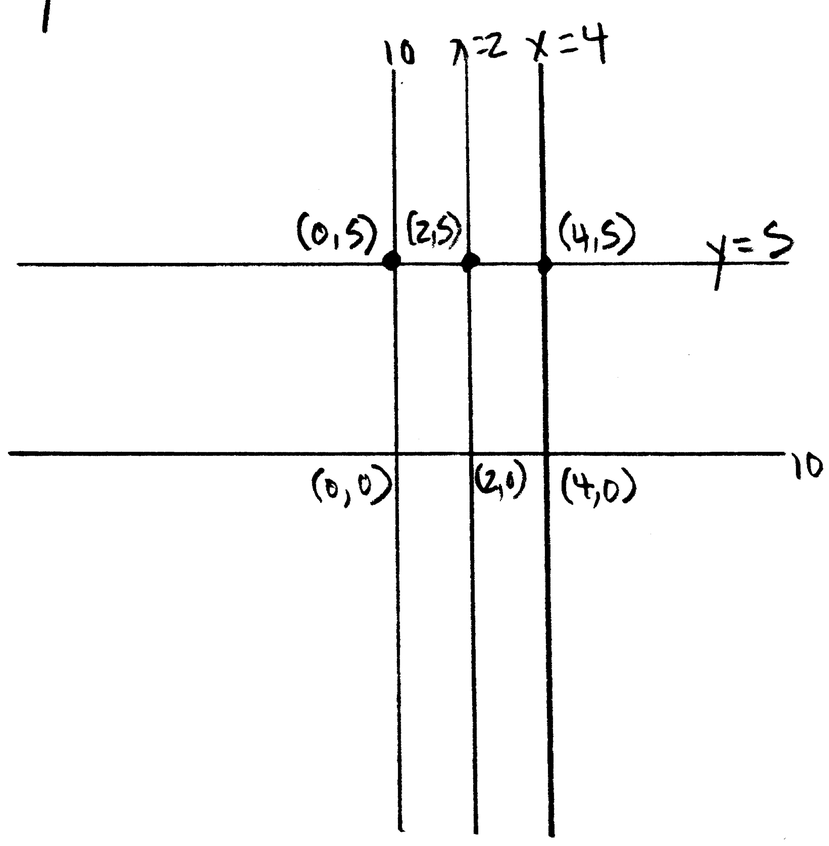
$y - \frac{3}{4} = \frac{3}{5}x - \frac{21}{40}$

$y = \frac{3}{5}x + \frac{9}{40}$.

88. $x=4$, $(2,5)$.

a. $x=2$

b. $y=5$



94. $(4, 3483)$
$(7, 4056)$

$m = \frac{4056-3483}{7-4} = 191$

$y - 3483 = 191(x-4)$

$y - 3483 = 191x - 764$

$y = 191x + 2719$

$y = 191(10) + 2719$

$= 1910 + 2719$

$y = 4629$ stores predicted.

Actual in 2010 was 4627

Good predictor! Growth is linear.