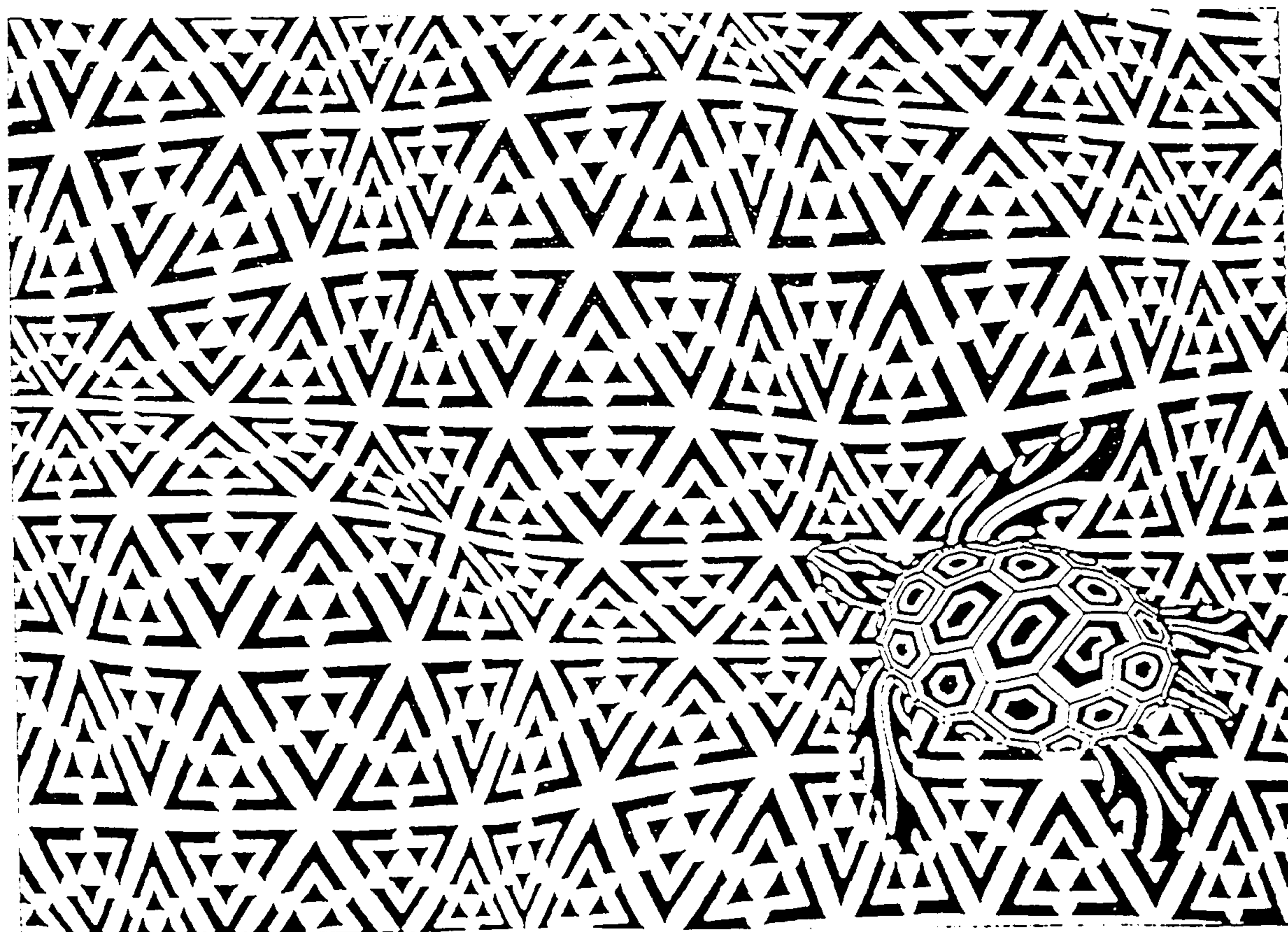


***Pre-Calculus Algebra***  
***MTH 1112***

**Practice Test 3**



### Practice Test 3

- \* Relations, distance formula, mid-point formula, circles
- \* Equations of line
- \* Functions (definition, graphs, domain)
- \* Linear functions
- \* Quadratic functions
- \* Function operations (sum, difference, product, quotient, composition)

#### Relations

- (1) For the given relation, give three ordered pairs that belong to the relation. State its domain and its range.

$$Y = 3X - 2$$

- (2) For the given relation, give three ordered pairs that belong to the relation. State its domain and its range.

$$Y = \sqrt{X}$$

- (3) For the given relation, give three ordered pairs that belong to the relation. State its domain and its range.

$$Y = |X - 5|$$

**Distance between two points**

- (4) Find the distance between the points  $(1, -1)$  and  $(1, 4)$ .
- (5) Find the distance between the points  $(6, -3)$  and  $(6, 5)$ .
- (6) Find the distance between the points  $(-3, 6)$  and  $(5, 0)$ .
- (7) Determine whether the points  $(2, 1)$ ,  $(4, 0)$ , and  $(5, 7)$  are vertices of a right triangle.
- (8) Determine whether the points  $(3, -1)$ ,  $(0, -3)$ , and  $(12, 5)$  are collinear.

**Midpoint**

- (9) Find the midpoint of the line segment joining the points  $(-5, -3)$  and  $(9, 3)$ .
- (10) Find the midpoint of the line segment joining the points  $(2, 10)$  and  $(10, 2)$ .
- (11) Find the coordinates of the other endpoint of the line segment having a midpoint of  $(12, -8)$  and an endpoint of  $(2, 6)$ .
- (12) Find the coordinates of the other endpoint of the line segment having a midpoint of  $(-2, -6)$  and an endpoint of  $(0, 4)$ .

Circles

- (13) Find the center-radius form of the equation of the circle described. Graph the circle and give the domain and range.

$$\text{center : } (1, -3)$$

$$\text{radius : } 2$$

- (14) Find the center-radius of the equation of the circle described. Graph the circle and give the domain and the range.

$$\text{center : } (6, 4)$$

$$\text{radius : } 3$$

- (15) Describe a circle with a radius of zero.

- (16) Find the center and the radius of the circle  $X^2 + Y^2 - 2X + 6Y + 6 = 0$ .

- (17) Find the center and radius of the circle  $X^2 + Y^2 = 25$ .

- (18) Find the center and radius of the circle  $X^2 + Y^2 - 4X + 2Y + 3 = 0$ .

- (19) Write the equation of a circle with center at  $(2, -4)$  which has a diameter with one endpoint at  $(9, 8)$ .

**Equations of lines**

- (20) Find the slope of the line passing through the points  $(-2, 0)$  and  $(3, 1)$ .

- (21) Find the slope of the line passing through the points  $(-1, 2)$  and  $(2, 2)$ .

- (22) Find the slope of the line passing through the points  $(0, 4)$  and  $(1, -1)$ .

- (23) A vertical line has what slope?

- (24) A horizontal line has what slope?

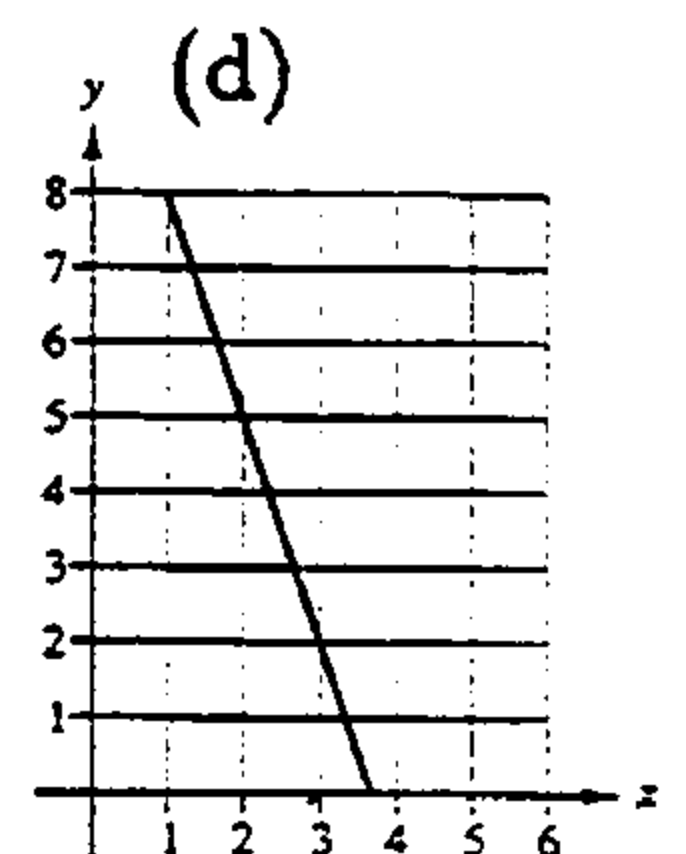
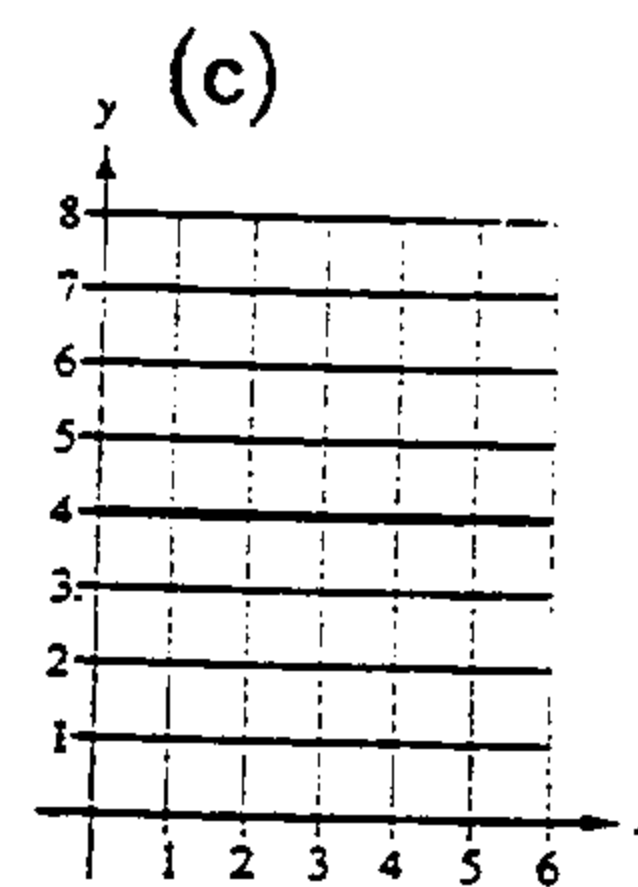
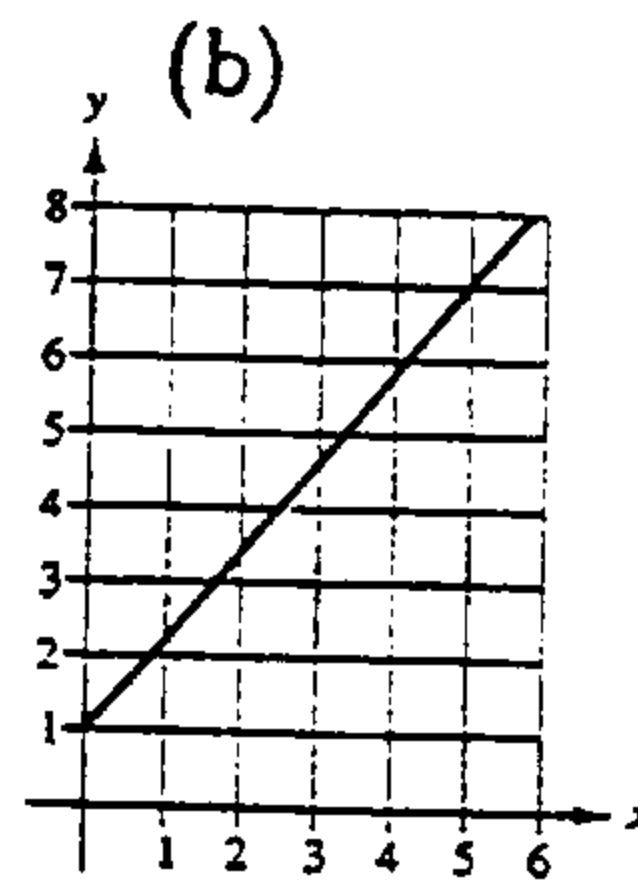
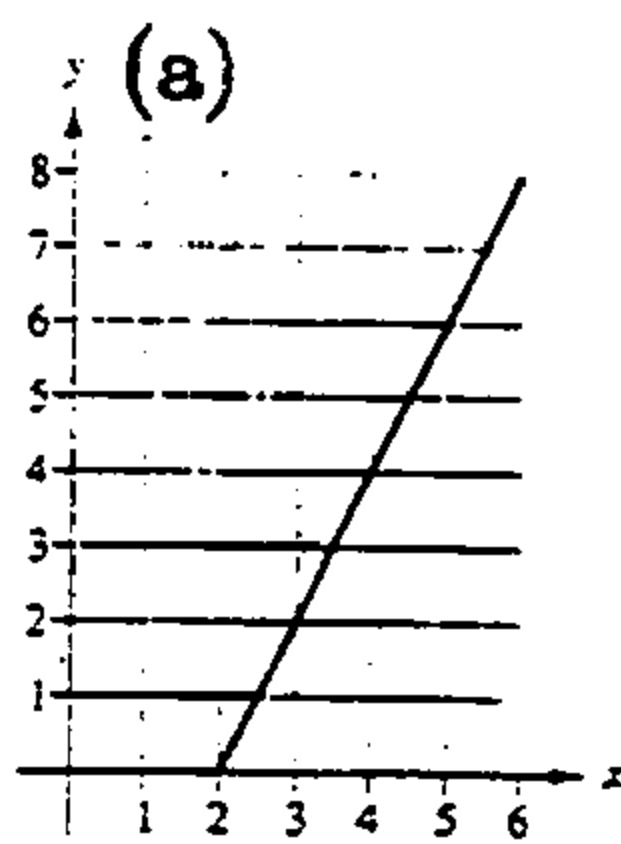
- (25) Find the equation of the line that passes through the point  $(1, -2)$  and has a slope of 3. Give your answer in standard form.

- (26) Write the equation of the line which passes through the point  $(-2, -5)$  with a slope of  $\frac{3}{4}$ . Leave your answer in standard form.

- (27) Write the equation of the line through the point  $(6, -1)$  with an undefined slope.
- (28) Write the equation of the line through  $(-10, 4)$  with a slope of zero.
- (29) Write the equation of the line with X-intercept of 2 and Y-intercept of 3. Leave your answer in standard form.
- (30) Write the equation of the line through the points  $(5, -1)$  and  $(-5, 5)$ . Leave your answer in standard form.
- (31) Write the equation of the line through the points  $(-3, 6)$  and  $(8, -16)$ . Leave your answer in standard form.
- (32) Write the equation of the line through the origin and the point  $(2, 8)$ . Leave your answer in standard form.
- (33) Write the equation of the line through the point  $(2, 1)$  and parallel to the line  $4X - 2Y = 3$ . Leave your answer in standard form.

- (34) Write the equation of the line through the point  $(2, 1)$  and perpendicular to the line  $4X - 2Y = 3$ . Leave your answer in standard form.
- (35) Write the equation of the line through  $(-3, 2)$  and parallel to the line  $X + Y = 7$ . Leave your answer in standard form.
- (36) Write the equation of the line through  $(-6, 4)$  and perpendicular to the line  $3X + 4Y = 7$ . Leave your answer in standard form.
- (37) Write the equation of the line through the point  $(2, 5)$  and parallel to the line  $X = 4$ .
- (38) Write the equation of the line through  $(-1, 0)$  and perpendicular to the line  $Y = -3$ .

- (39) What are the slopes of the lines shown?



- (40) Sketch a graph of  $5X - Y + 3 = 0$ .

(41) Sketch a graph of  $7X + 6Y - 30 = 0$

(42) Sketch a graph of  $2X + Y = 0$

(43) Sketch a graph of  $Y - 2 = 0$ .

**Functions**

(44) Does the set  $\{(4, 5), (5, 6), (6, 7), (7, 8)\}$  represent  $Y$  as a function of  $X$ ?

(45) Does the set  $\{(4, 5), (5, 5), (6, 5), (7, 5)\}$  represent  $Y$  as a function of  $X$ ?

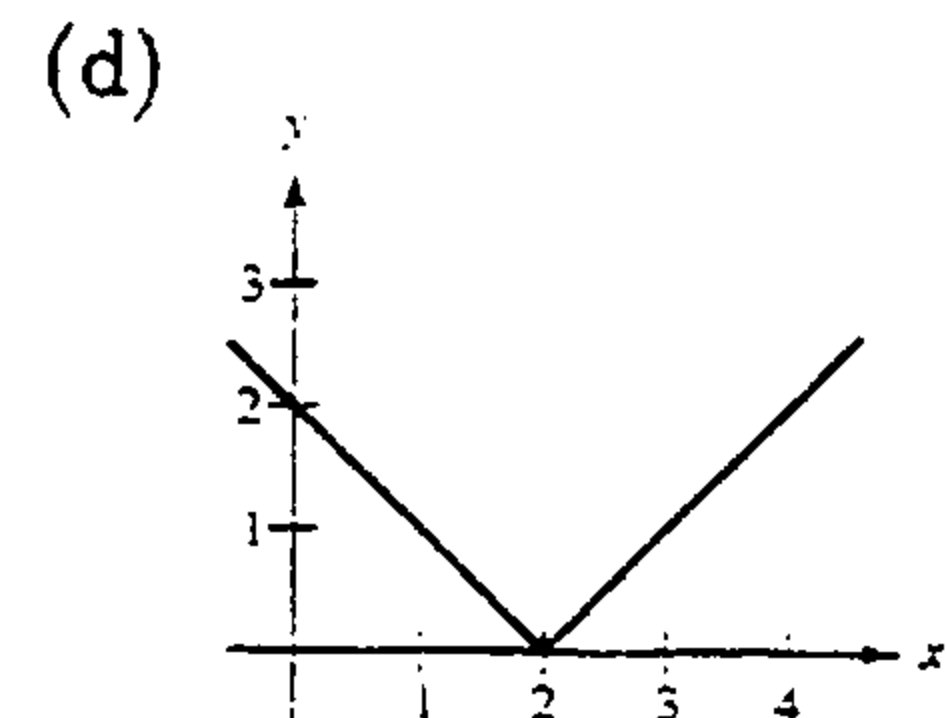
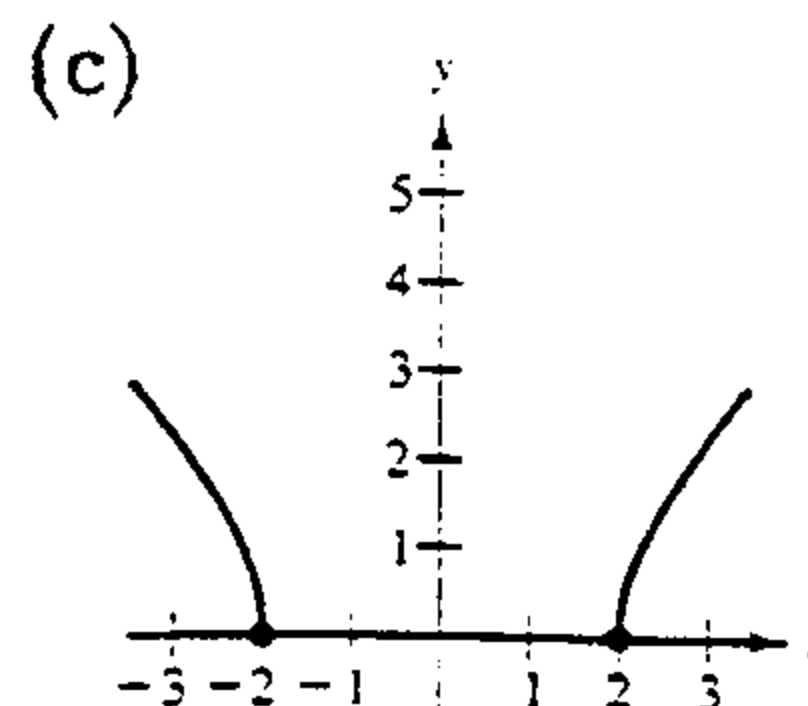
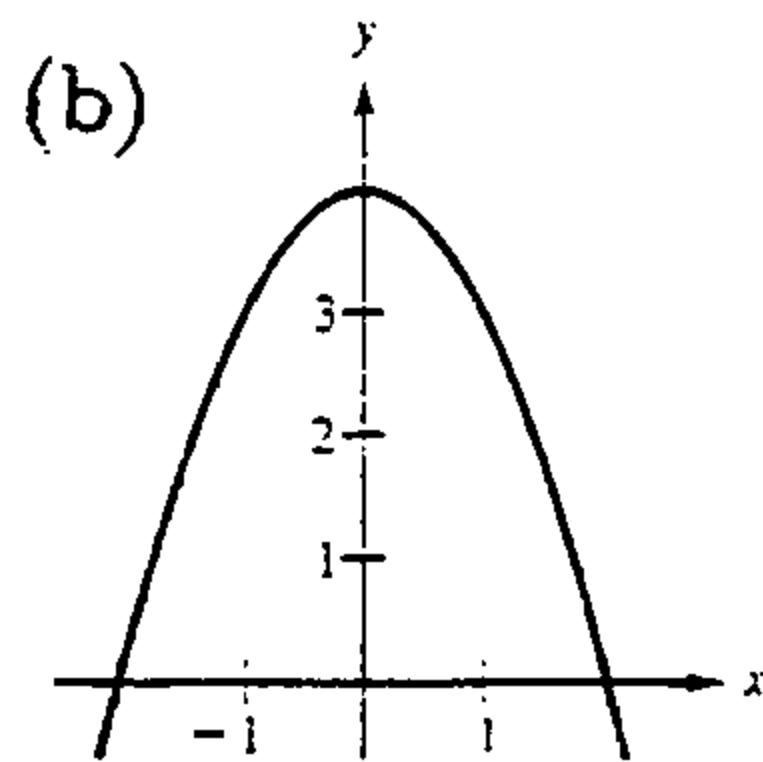
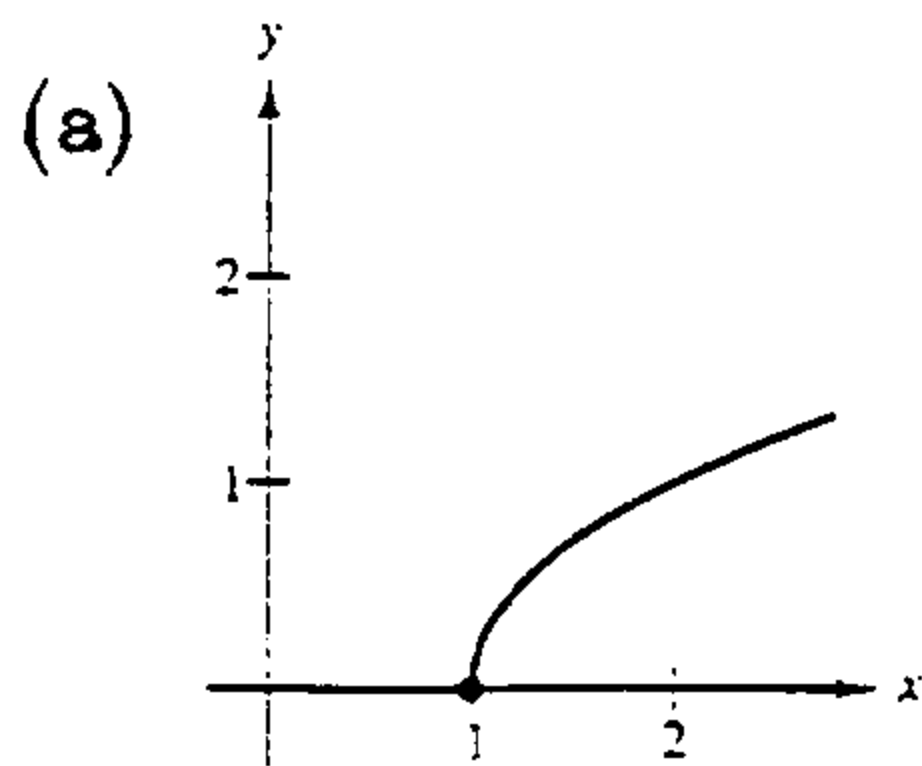
(46) Does the set  $\{(1, 2), (2, 4), (2, 5), (3, 6)\}$  represent  $Y$  as a function of  $X$ ?

(47) Does  $X = Y^2$  represent  $Y$  as a function of  $X$ ?

(48) Does  $-X + Y^2 = 1$  represent  $Y$  as a function of  $X$ ?



(49) Find the domain and range of the functions graphed below.



(50) Given that  $f(X) = \frac{|-X|}{X}$  find  $f(-2)$ .

### Linear Functions

(51) Graph the function  $2X - 3Y = 7$  Give the domain and the range.

(52) Graph the function  $Y = 2X + 1$ .

(53) Graph the function  $Y = 2$

(54) Graph the function  $Y = -X + 2$

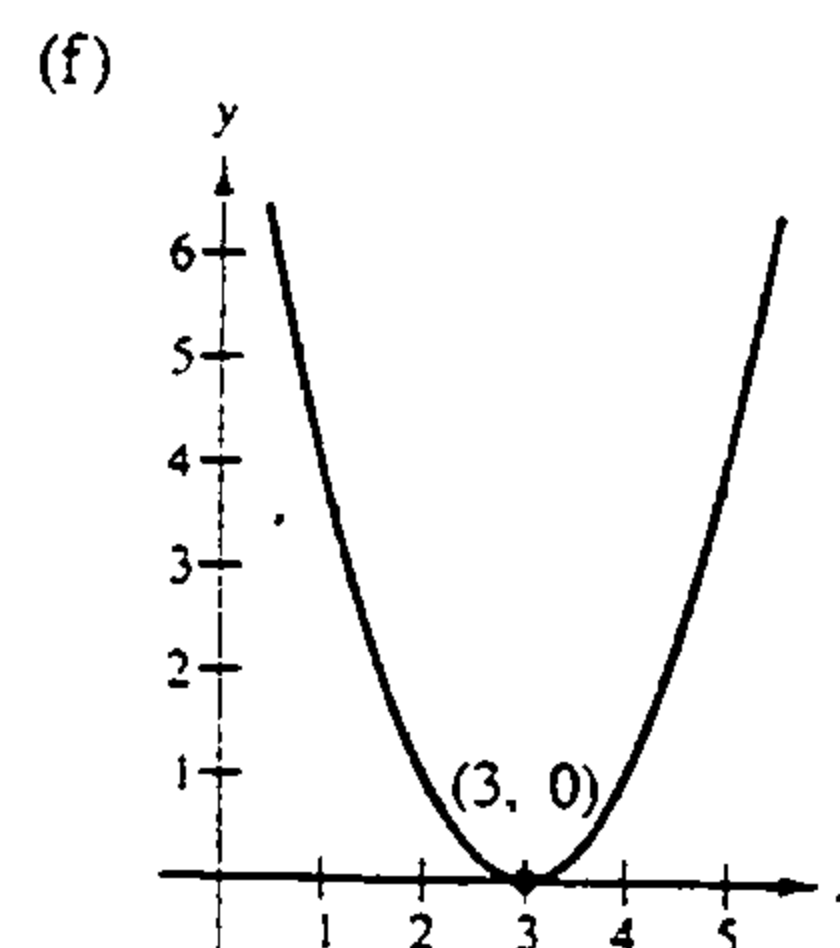
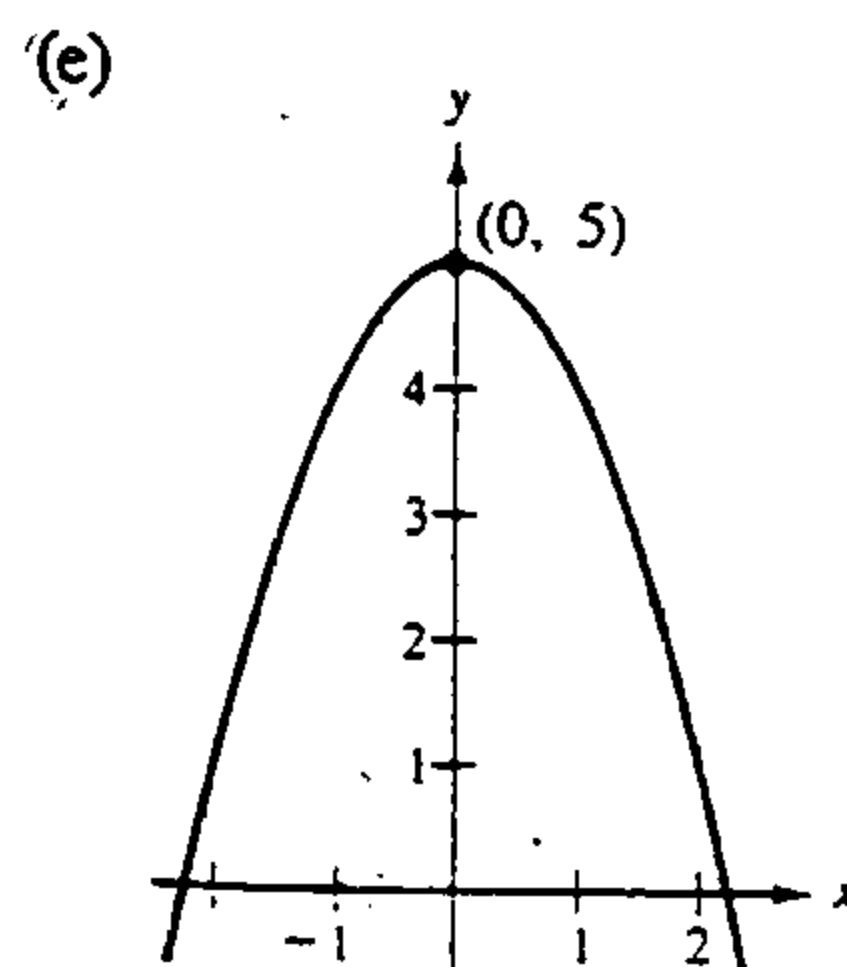
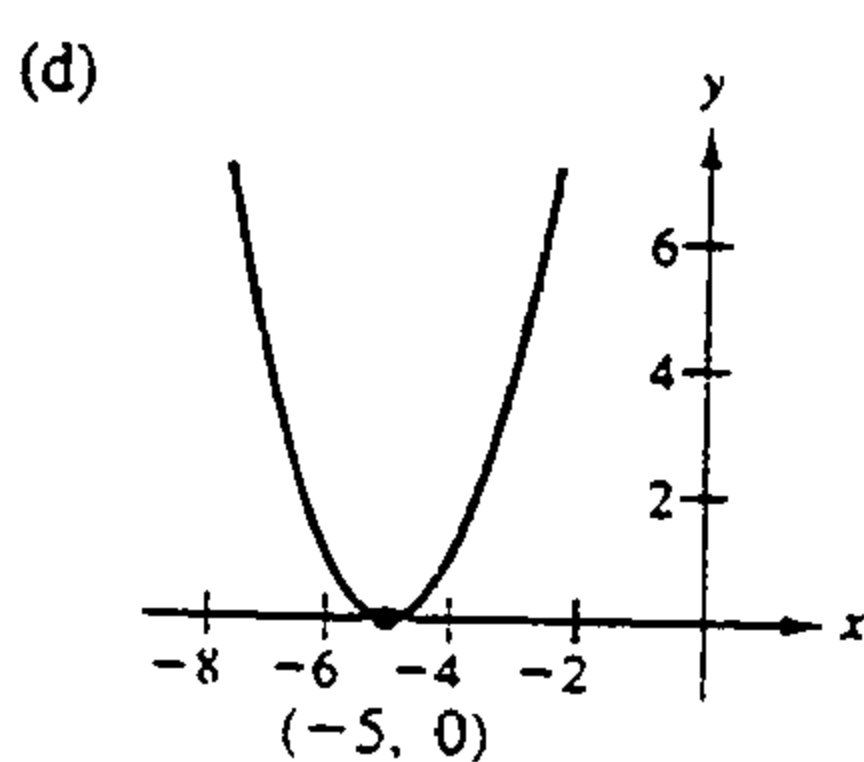
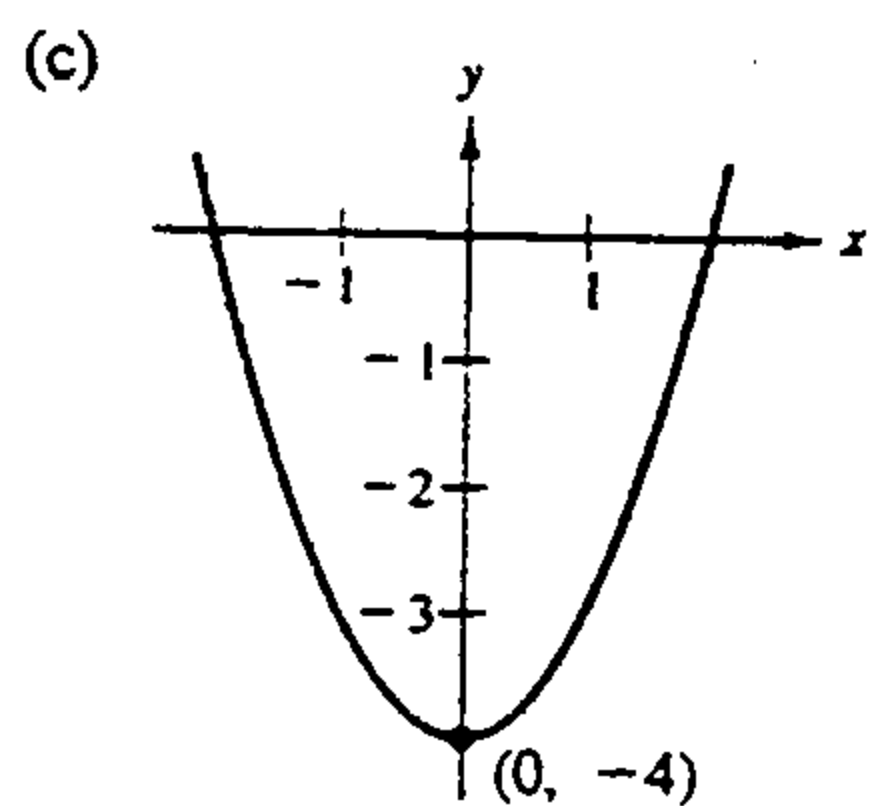
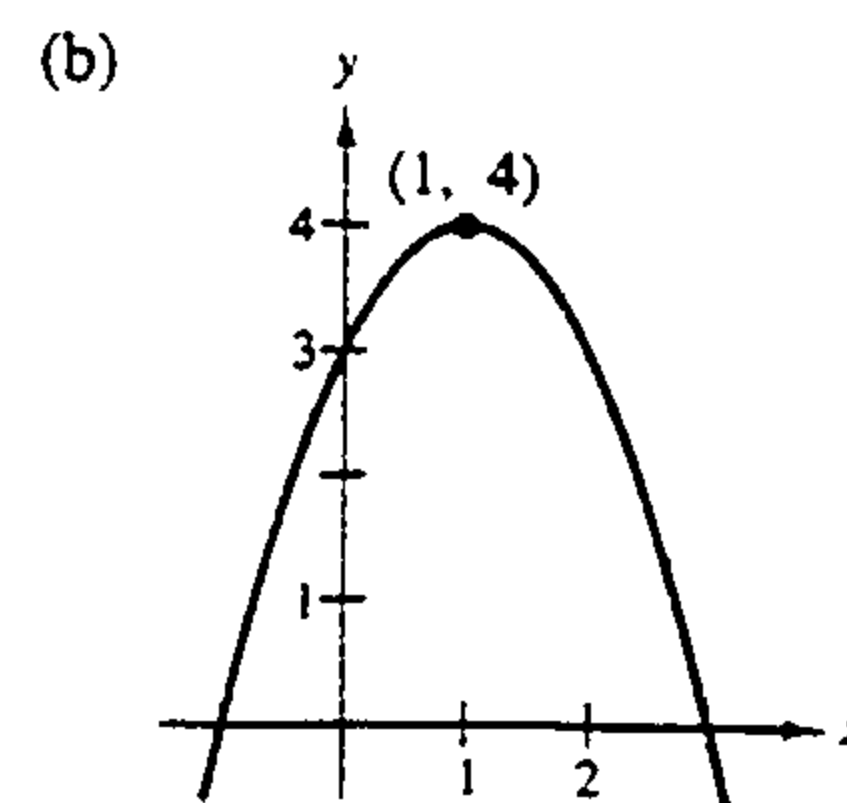
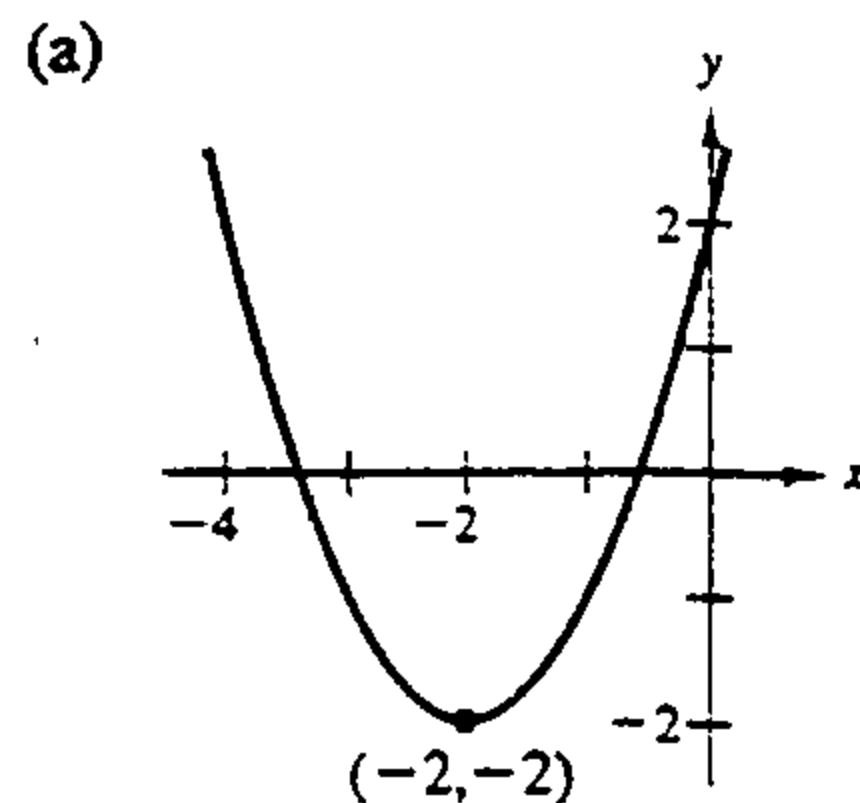
Function Operations

- (55) Given  $f(X) = 2X + 1$  and  $g(X) = X^2 + 2X - 1$ , find  $(f + g)(X)$ .  
Then evaluate when  $X = 2$ .
- (56) Given  $f(X) = 2X + 1$  and  $g(X) = X^2 + 2X - 1$ , find  $(f - g)(X)$ .  
Then evaluate this difference when  $X = 2$ .
- (57) Given that  $f(X) = X + 1$  and  $g(X) = X - 1$ , find (a)  $(f + g)(X)$   
(b)  $(f - g)(X)$ , (c)  $(fg)(X)$ , and (d)  $(f/g)(X)$ .
- (58) Given that  $f(X) = X^2 + 1$  and  $g(X) = X - 4$ . Find the following.  
(a)  $(f + g)(3)$   
(b)  $(f - g)(0)$   
(c)  $(f - g)(2t)$   
(d)  $(fg)(4)$   
(e)  $\left(\frac{f}{g}\right)(5)$   
(f)  $\left(\frac{f}{g}\right)(-1) - g(3)$   
(g)  $(f + g)(t - 1)$
- (59) Given that  $f(X) = X^2$  and  $g(X) = X - 1$ . Find the following.  
(a)  $(f \circ g)(X)$   
(b)  $(g \circ f)(X)$   
(c)  $(f \circ f)(X)$
- (60) Given that  $f(X) = X^3$ , find  $(f \circ f)(X)$
- (61) Given that  $f(X) = 3X + 2$  and  $g(X) = X^2 - 9$ , find  
(a)  $(f \circ g)(X)$   
(b)  $(g \circ f)(X)$   
(c)  $(f \circ g)(4)$

**Quadratic Function**

(62) Match the given quadratic function with the correct graph.

- (1)  $f(X) = (X - 3)^2$
- (2)  $f(X) = (X + 5)^2$
- (3)  $f(X) = X^2 - 4$
- (4)  $f(X) = 5 - X^2$
- (5)  $f(X) = 4 - (X - 1)^2$
- (6)  $f(X) = (X + 2)^2 - 2$



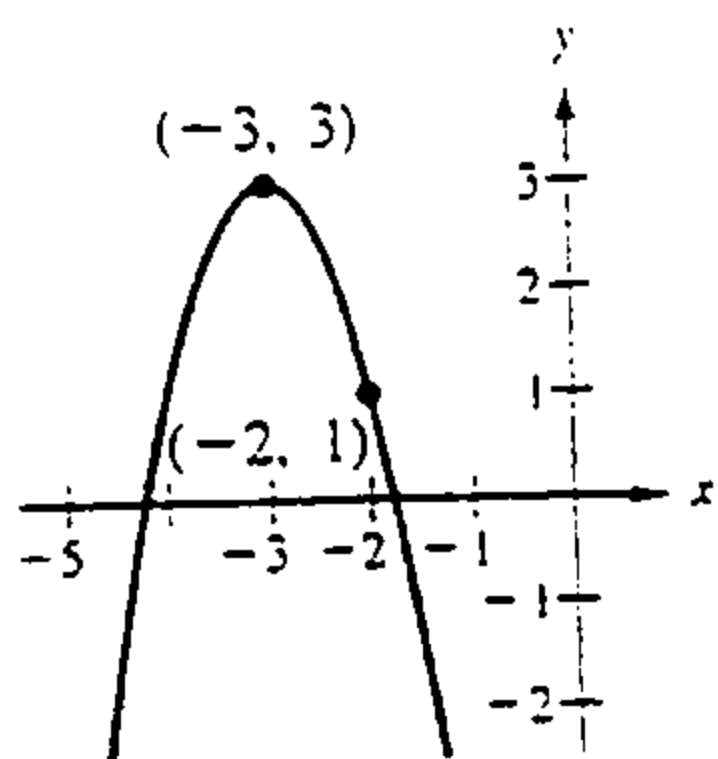
(63) Graph  $f(X) = (X - 2)^2$ . Give the domain and the range.

(64) Graph  $f(X) = -X^2 + 4$ . Give the domain and the range.

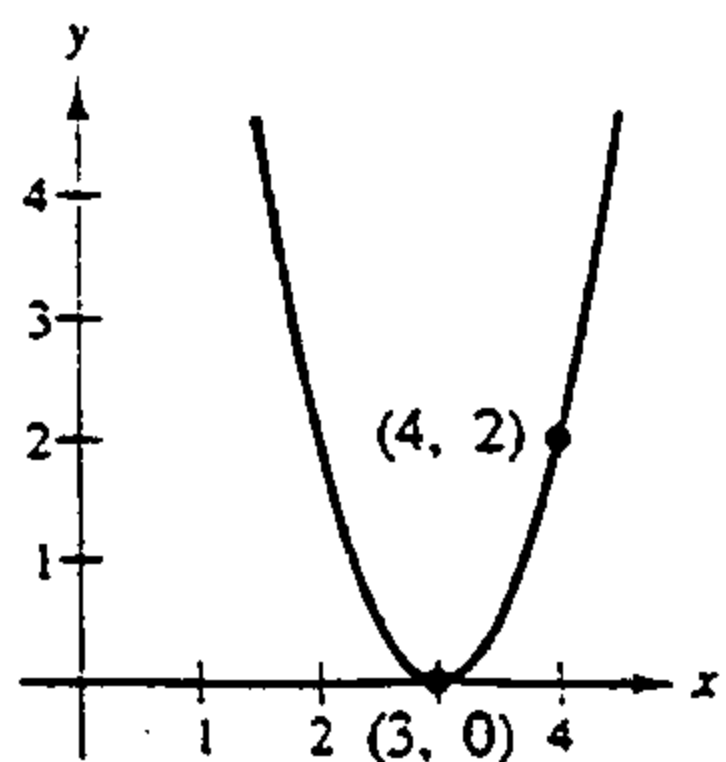
(65) Graph  $f(X) = -(X + 2)^2 + 4$ . Give the domain and the range.

(66) Graph  $f(X) = (X + 2)^2 - 2$ . Give the domain and the range.

(67) Find an equation for the parabola.



(68) Find an equation for the parabola.



- (69) Sketch the graph of the quadratic function. Identify the vertex and intercepts. Find the equation of the axis.

$$f(X) = 16 - X^2$$

- (70) Sketch the graph of the quadratic function. Identify the vertex and intercepts. Find the equation of the axis.

$$f(X) = (X - 6)^2 + 3$$

- (71) Sketch the graph of the quadratic function. Identify the vertex and intercepts.

$$h(X) = X^2 - 8X + 16$$

- (72) Sketch the graph of the quadratic function. Identify the vertex and intercepts.

$$g(X) = X^2 + 2X + 1$$

- (73) Sketch the graph of the quadratic function. Identify the vertex and intercepts.

$$h(X) = 4X^2 - 4X + 21$$

**ANSWERS**

- (1) three possible ordered pairs are  $(0, -2)$ ,  $(1, 1)$ , and  $(2, 4)$   
(There are, however, an infinite number of ordered pairs which belong to the relation.)  
domain:  $(-\infty, \infty)$   
range:  $(-\infty, \infty)$
- (2) three possible ordered pairs are  $(0, 0)$ ,  $(4, 2)$ , and  $(9, 3)$   
(There are, however, an infinite number of ordered pairs which belong to the relation.)  
domain:  $(0, +\infty)$   
range:  $(0, +\infty)$
- (3) three possible ordered pairs are  $(0, 5)$ ,  $(1, 4)$ , and  $(2, 3)$   
(There are, however, an infinite number of ordered pairs which belong to the relation.)  
domain:  $(-\infty, +\infty)$   
range:  $[0, +\infty)$
- (4) 5
- (5) 8
- (6) 10

(7) Yes. The distances between the points are  $\sqrt{45}$ ,  $\sqrt{5}$ , and  $\sqrt{50}$ .

$$(\sqrt{45})^2 + (\sqrt{5})^2 = (\sqrt{50})^2$$

(8) Yes.

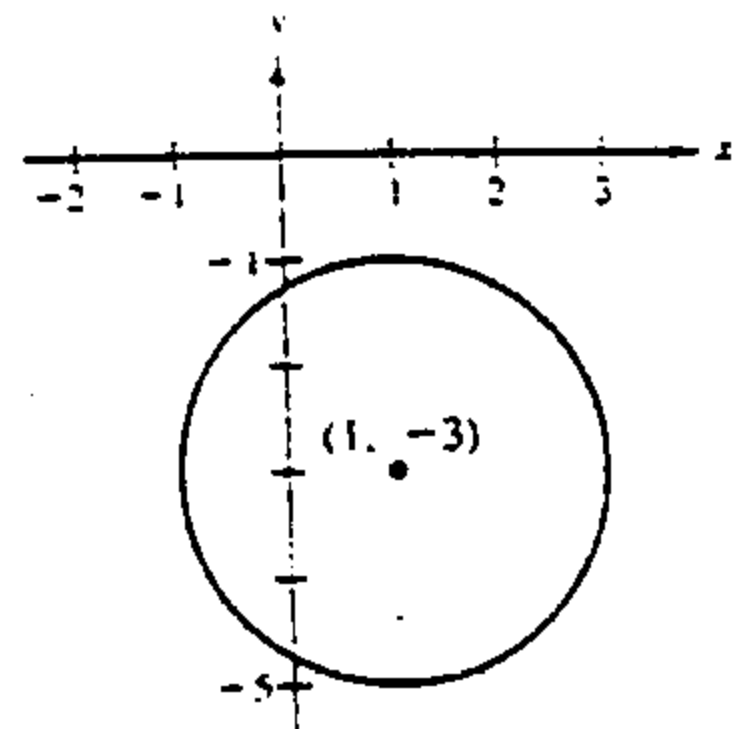
(9) (2, 0)

(10) (6, 6)

(11) (22, -22)

(12) (-4, -16)

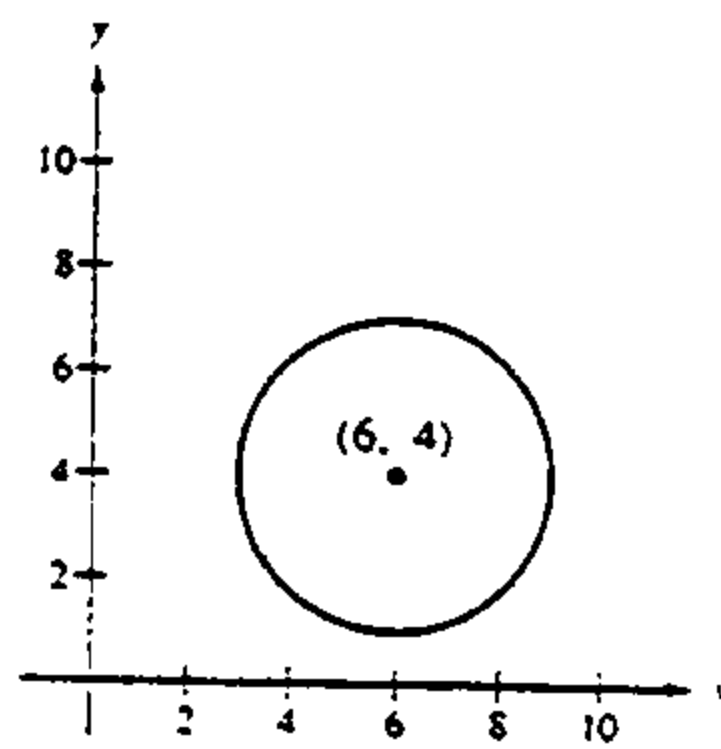
(13)  $(x - 1)^2 + (y + 3)^2 = 4$



$$(X - 1)^2 + (Y + 3)^2 = 4$$

Domain:  $[-1, 3]$       Range:  $[-1, -5]$

(14) Center: (6, 4)  
Radius: 3



$$(X - 6)^2 + (Y - 4)^2 = 9$$

Domain:  $[3, 9]$       Range:  $[1, 7]$

(15) A circle with a radius of zero would be a dot or a point.

(16) The center is at the point (1, -3) and the radius is 2.

(17) The center is at the origin (0, 0) and the radius is 5.

(18) The center is at the point (2, -1) and the radius is  $\sqrt{2}$ .

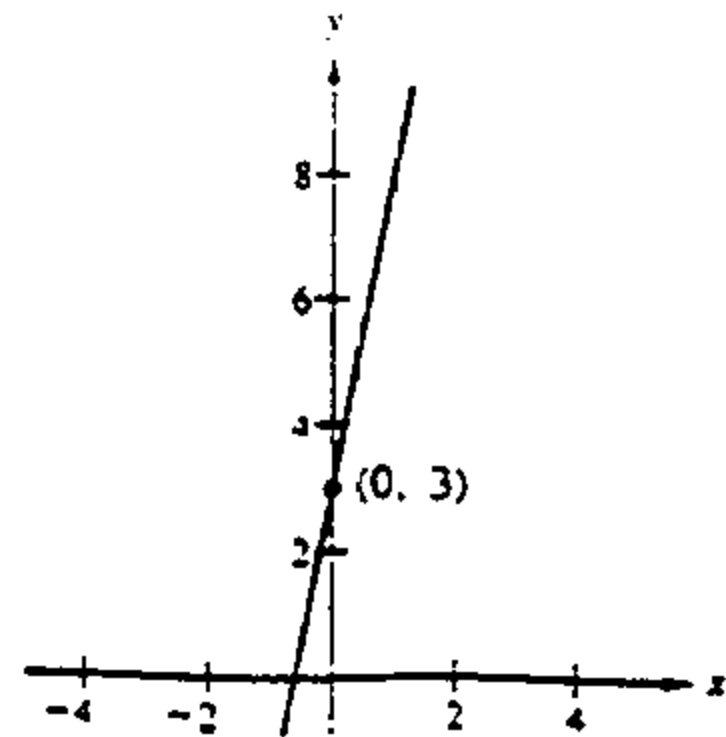
(19)  $(X - 2)^2 + (Y + 4)^2 = 193$

- (20)  $\frac{1}{5}$
- (21)  $m = 0$
- (22)  $m = -5$
- (23) The slope of a vertical line is undefined.
- (24) The slope of a horizontal line is zero.
- (25)  $3X - Y = 5$
- (26)  $3X - 4Y = 14$
- (27)  $X = 6$  or  $X - 6 = 0$
- (28)  $Y = 4$  or  $Y - 4 = 0$
- (29)  $3X + 2Y = 6$
- (30)  $3X + 5Y = 10$
- (31)  $2X + Y = 0$
- (32)  $4X - Y = 0$
- (33)  $2X - Y = 3$
- (34)  $X + 2Y = 4$
- (35)  $X + Y = -1$
- (36)  $4X - 3Y = -36$
- (37)  $X = 2$
- (38)  $X = -1$
- (39) (a) 2 (b)  $\frac{6}{5}$  (c) 0 (d) -3

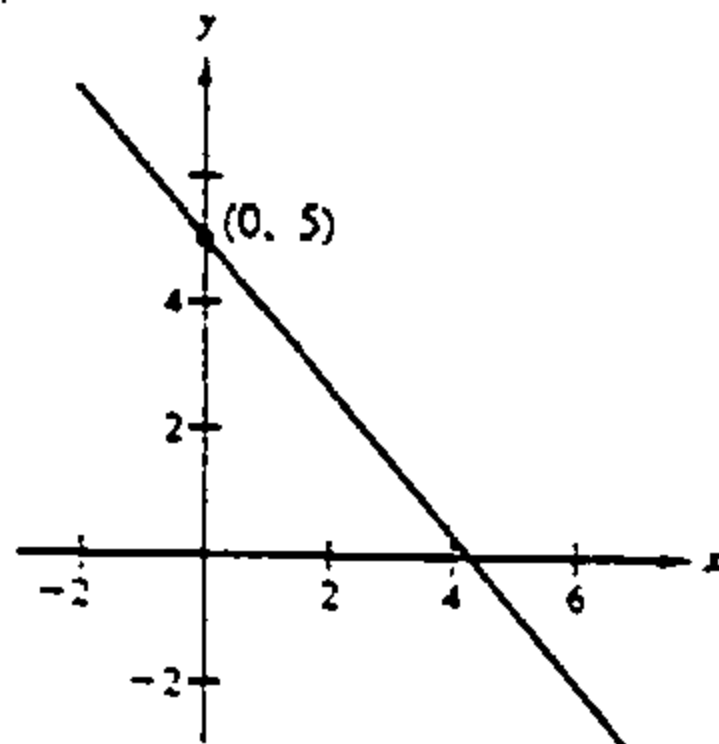


$m = 5$ , Intercept:  $(0, 3)$

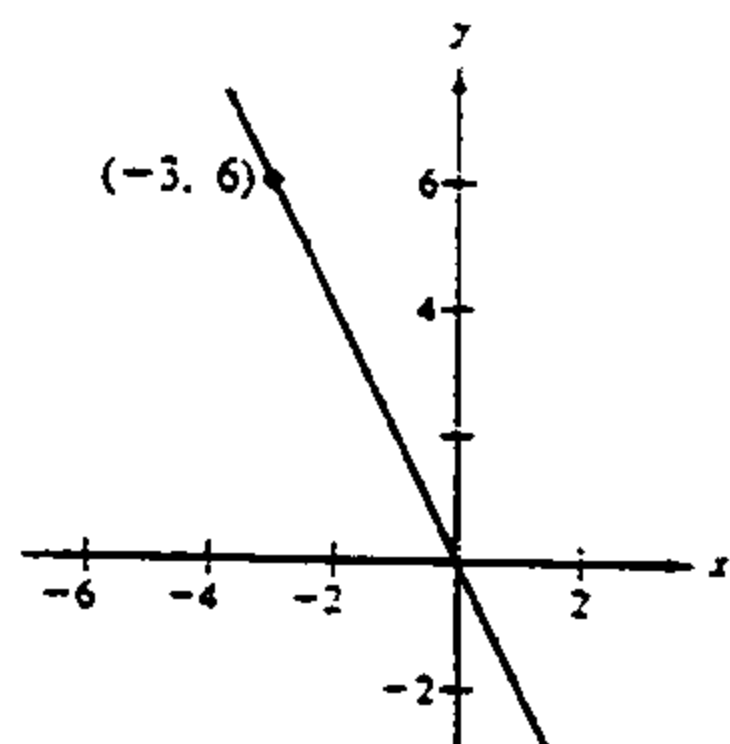
(40)



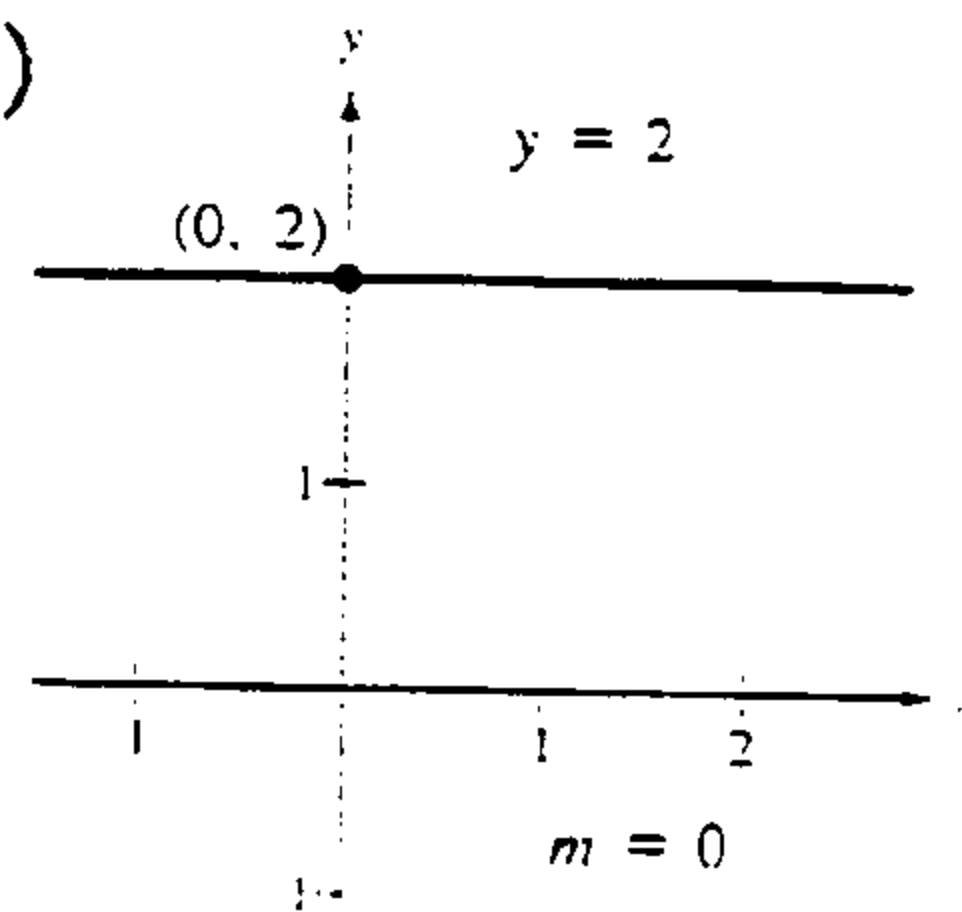
(41)  $m = -\frac{7}{6}$ , Intercept:  $(0, 5)$



(42)  $2x + y = 0$



(43)



(44) Yes. Note that for every value of  $X$  there is a single value of  $Y$ .

(45) Yes. Note that for every value of  $X$  there is a single value of  $Y$ .

(46) No. Note that some of the  $X$  values are paired with more than one  $Y$  value.

(47) No.

(48) No.

(49) (a) Domain:  $[1, \infty)$  Range:  $[0, \infty)$

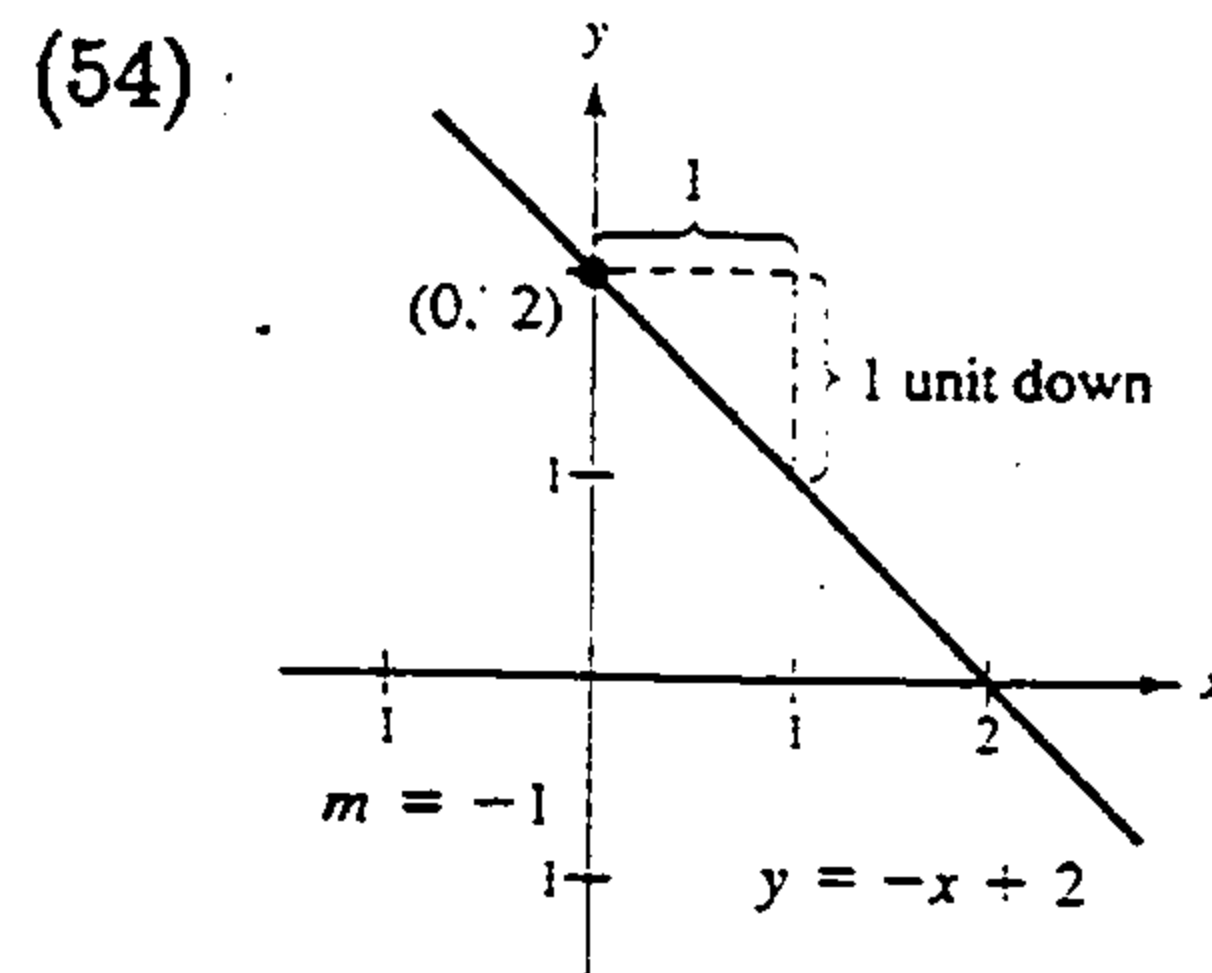
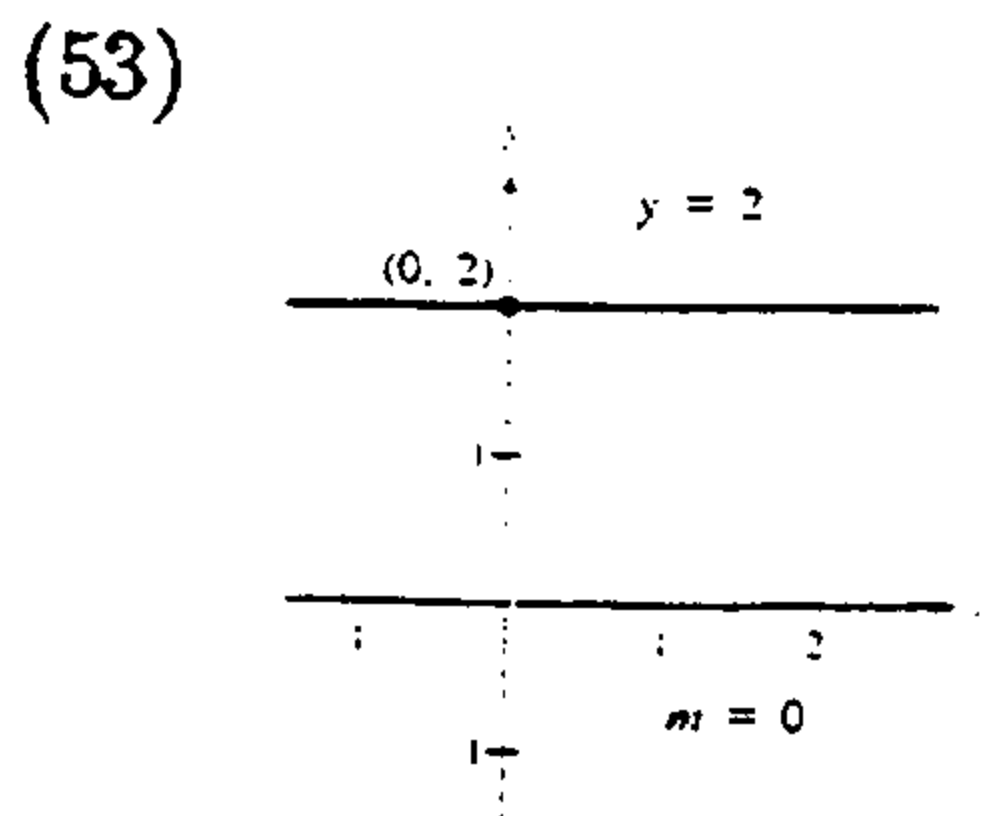
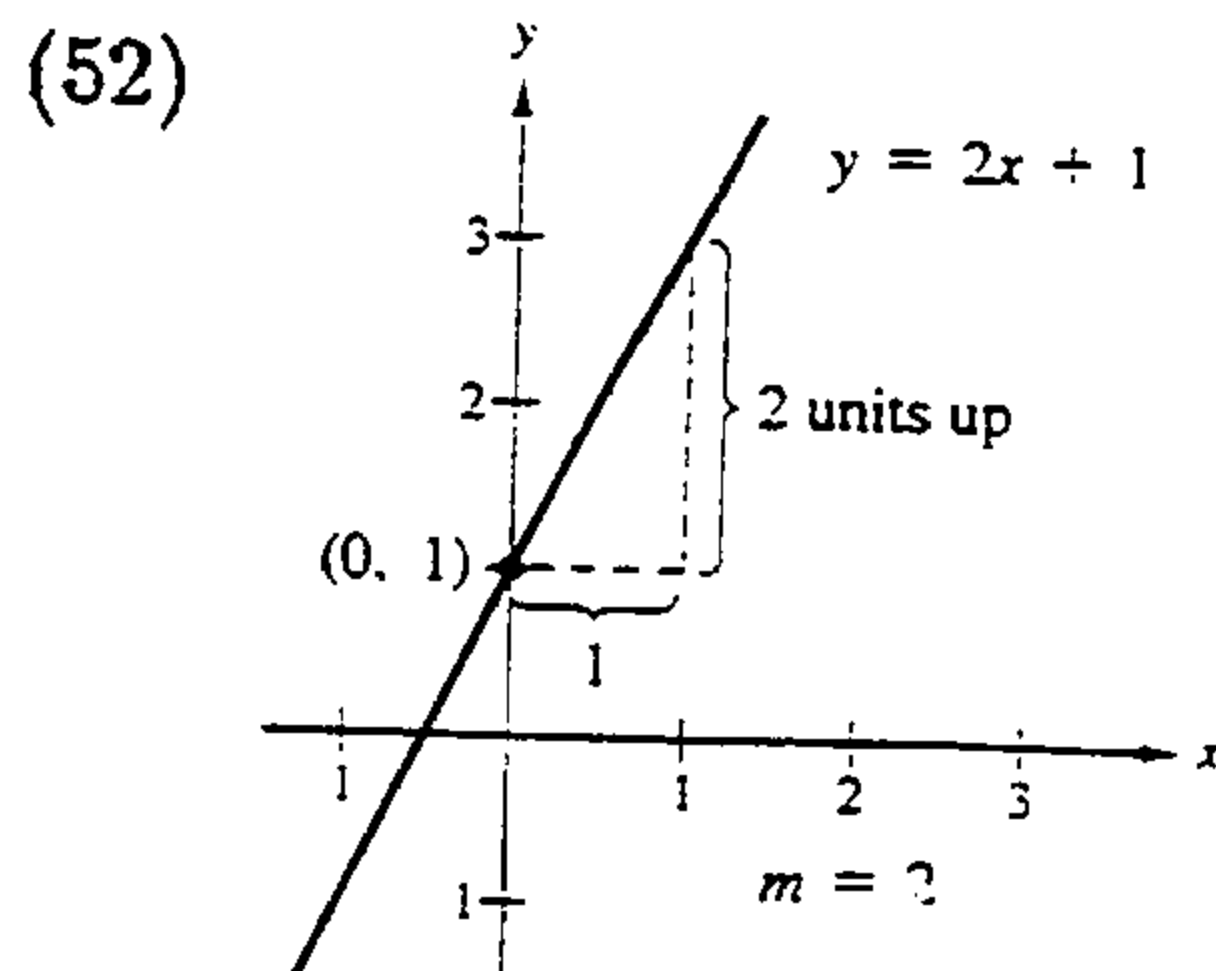
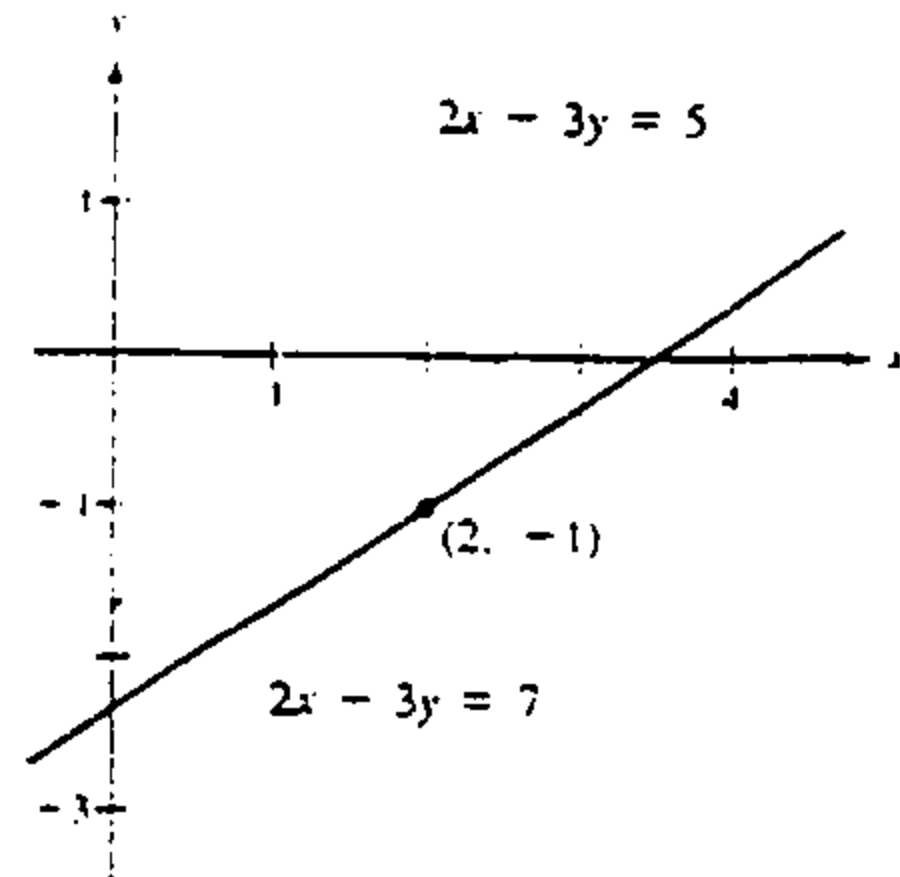
(b) Domain:  $(-\infty, +\infty)$  Range:  $(-\infty, 4]$

(c) Domain:  $(-\infty, 2] \cup [2, +\infty)$  Range:  $[0, +\infty)$

(d) Domain:  $(-\infty, +\infty)$  Range:  $[0, +\infty)$

(50) -1

(51) Domain:  $(-\infty, +\infty)$  Range:  $(-\infty, +\infty)$



(55)  $(f + g)(X) = f(X) + g(X) = (2X + 1) + (X^2 + 2X - 1) = X^2 + 4X$   
 when  $X = 2$  then  $(f + g)(2) = 12$

(56)  $(f - g)(X) = f(X) - g(X) = (2X + 1) - (X^2 + 2X - 1) = -X^2 + 2$   
 when  $X = 2$  then  $(f - g)(2) = -(2)^2 + 2 = -2$

- (57) (a)  $2X$   
 (b)  $2$   
 (c)  $X^2 - 1$   
 (d)  $\frac{X+1}{X-1}$

- (58) (a)  $9$  (b)  $5$   
 (c)  $4t^2 - 2t + 5$  (d)  $0$   
 (e)  $26$  (f)  $\frac{3}{5}$  (g)  $t^2 - t - 3$

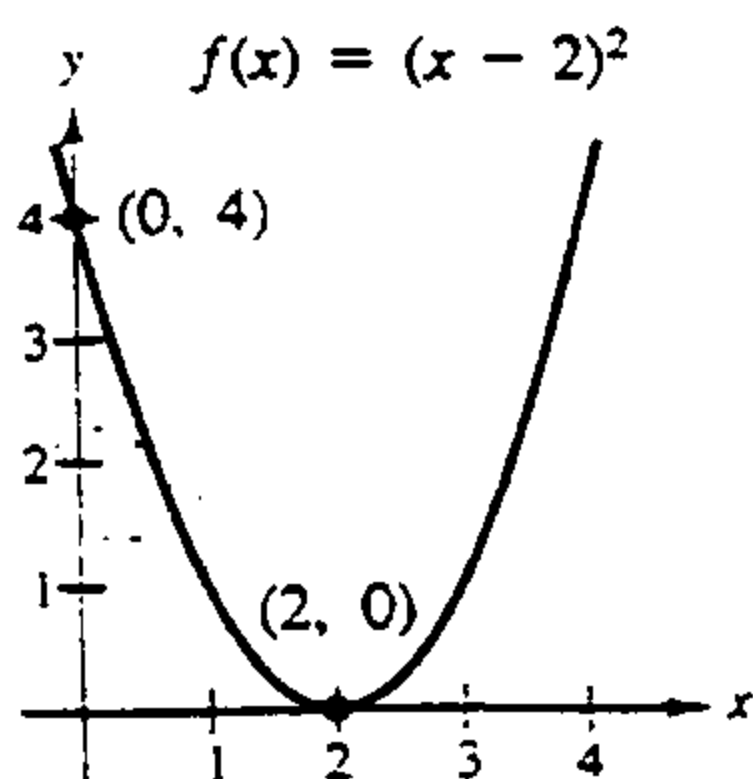
- (59) (a)  $(X - 1)^2$   
 (b)  $X^2 - 1$   
 (c)  $X^4$

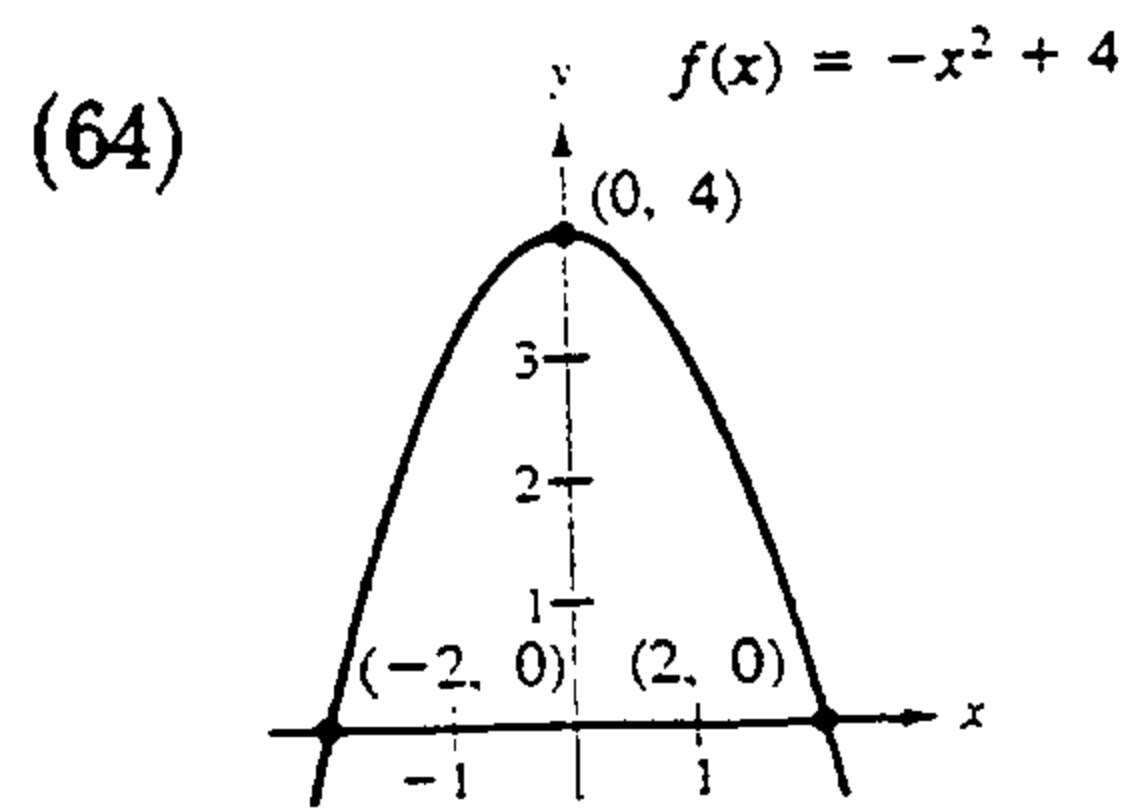
(60)  $(X^3)^3 = X^9$

- (61) (a)  $3X^2 - 25$  (b)  $9X^2 + 12X - 5$  (c)  $23$

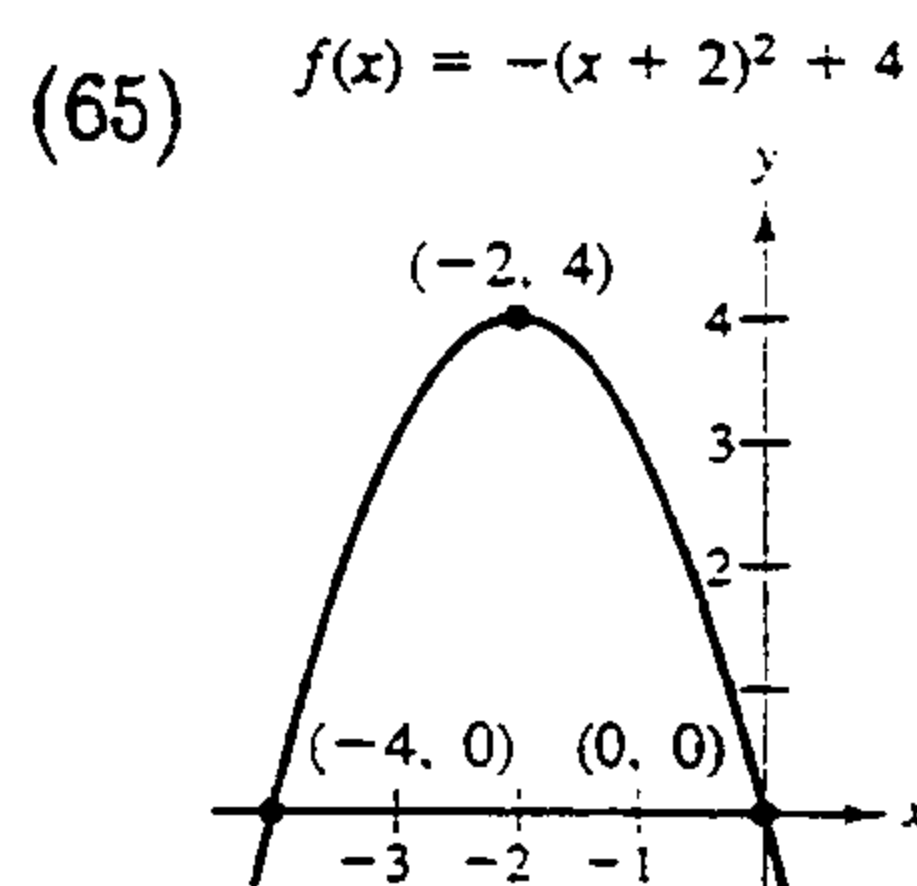
- (62) (1)  $f$   
 (2)  $d$   
 (3)  $c$   
 (4)  $e$   
 (5)  $b$   
 (6)  $a$

(63)  $f(x) = (x - 2)^2$  Domain:  $(-\infty, +\infty)$  Range:  $[0, +\infty)$

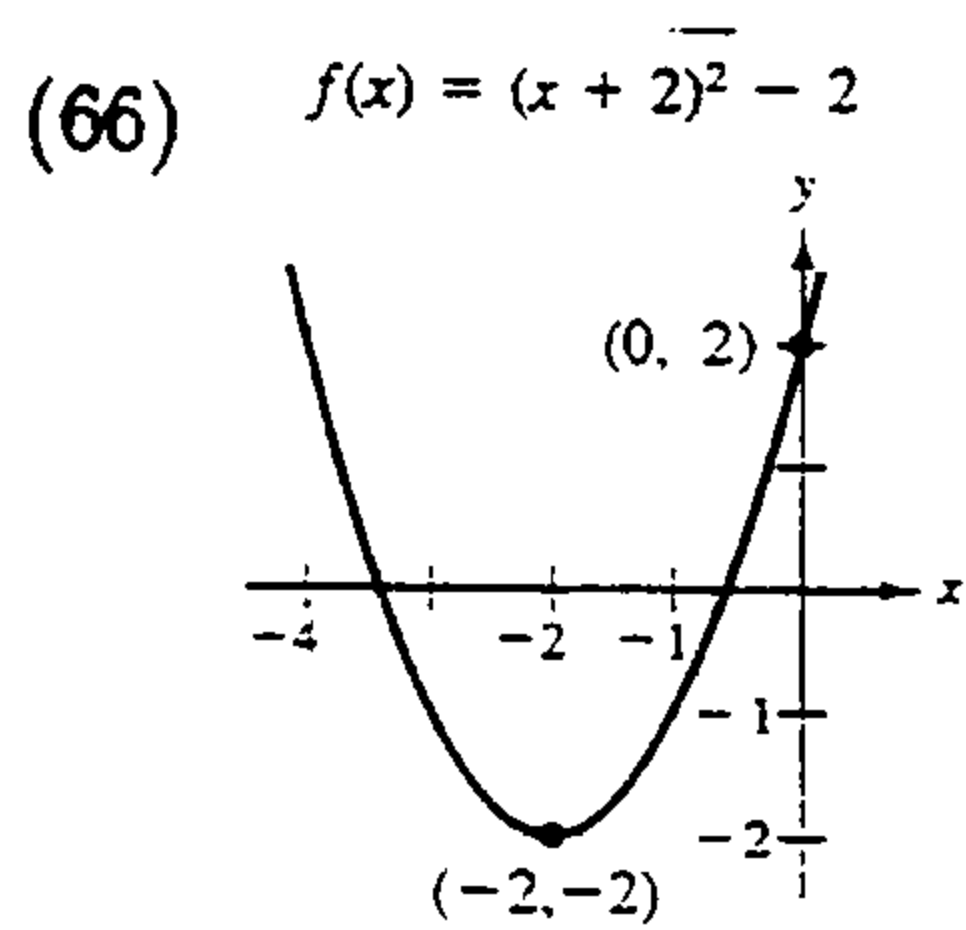




Domain:  $(-\infty, +\infty)$  Range:  $(-\infty, 4]$



Domain:  $(-\infty, +\infty)$  Range:  $(-\infty, 4]$



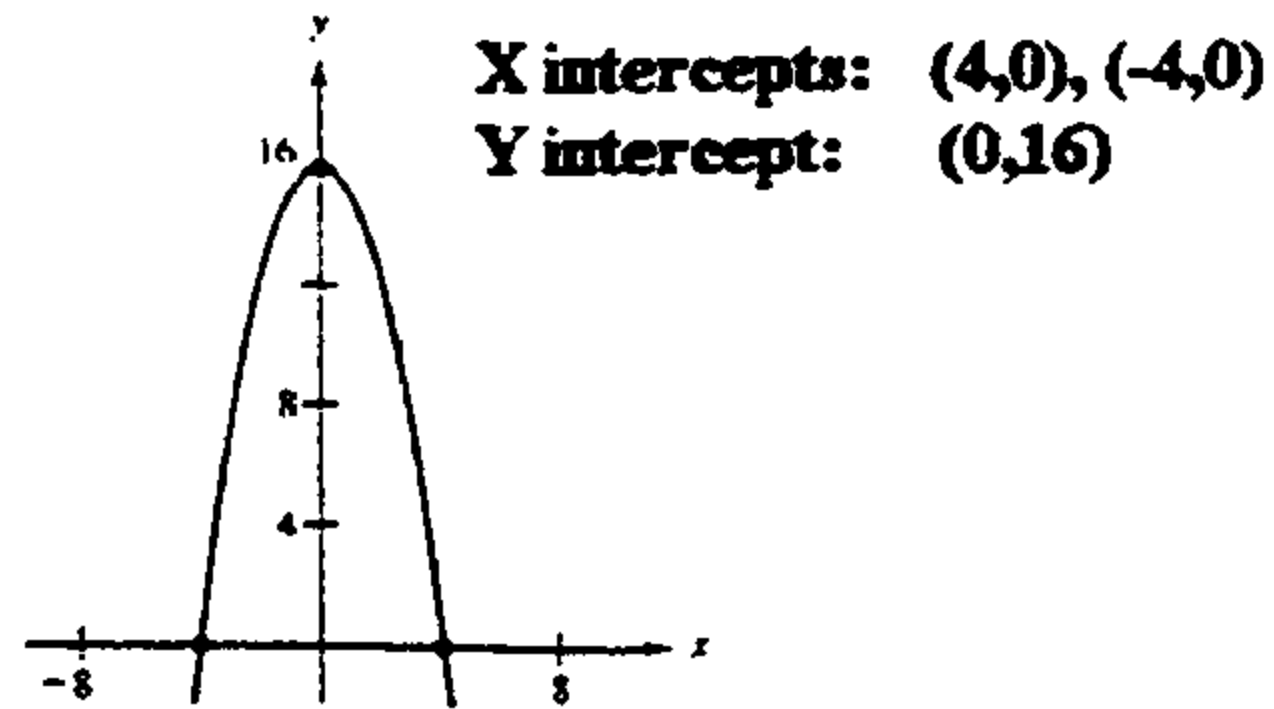
Domain:  $(-\infty, +\infty)$  Range:  $[-2, +\infty)$

(67)  $f(X) = -2(X + 3)^2 + 3$

(68)  $f(X) = 2(X - 3)^2$

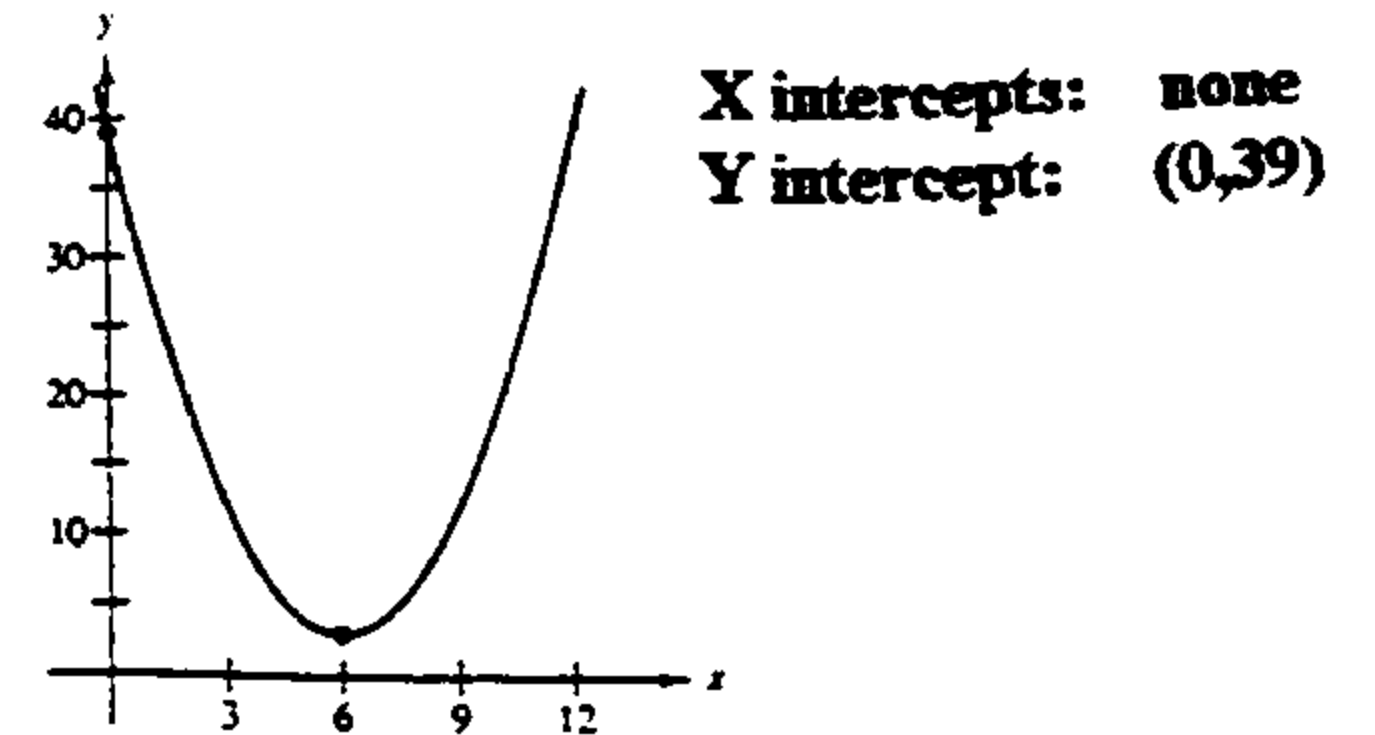
(69)

Vertex: (0, 16)



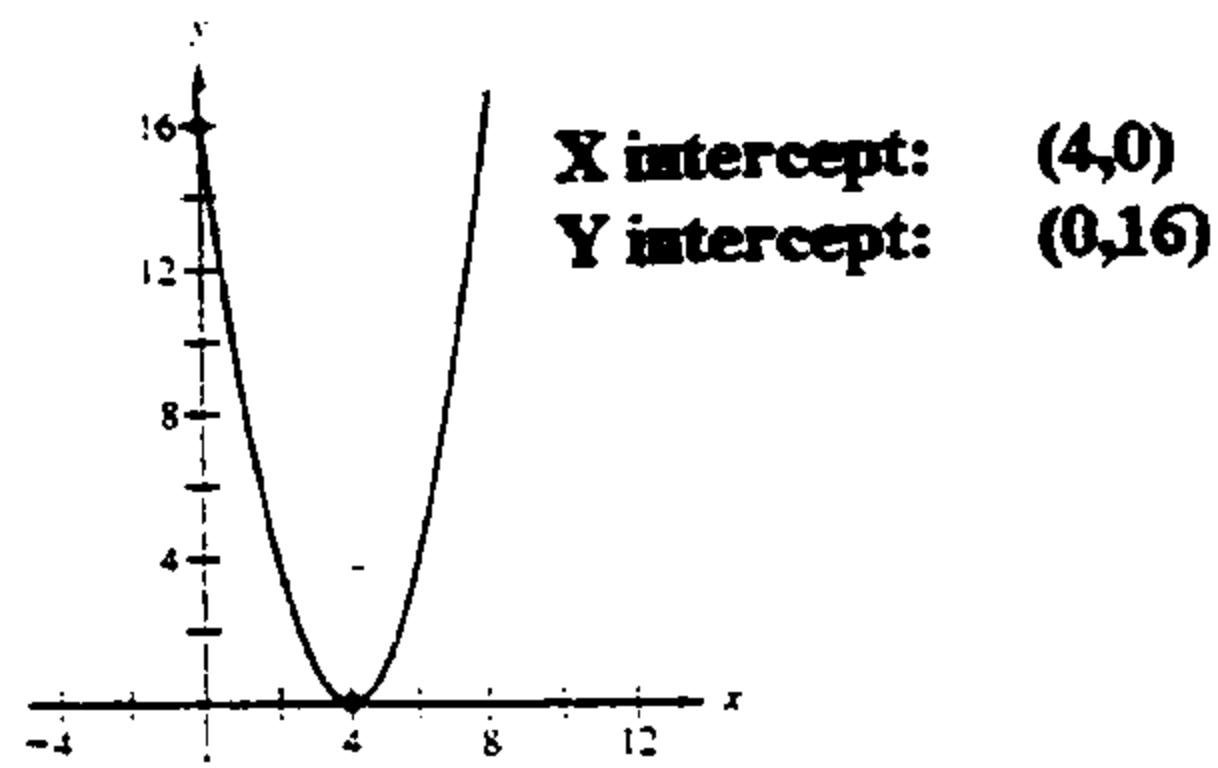
Equation of Axis:  $X = 0$

(70) Vertex: (6, 3)

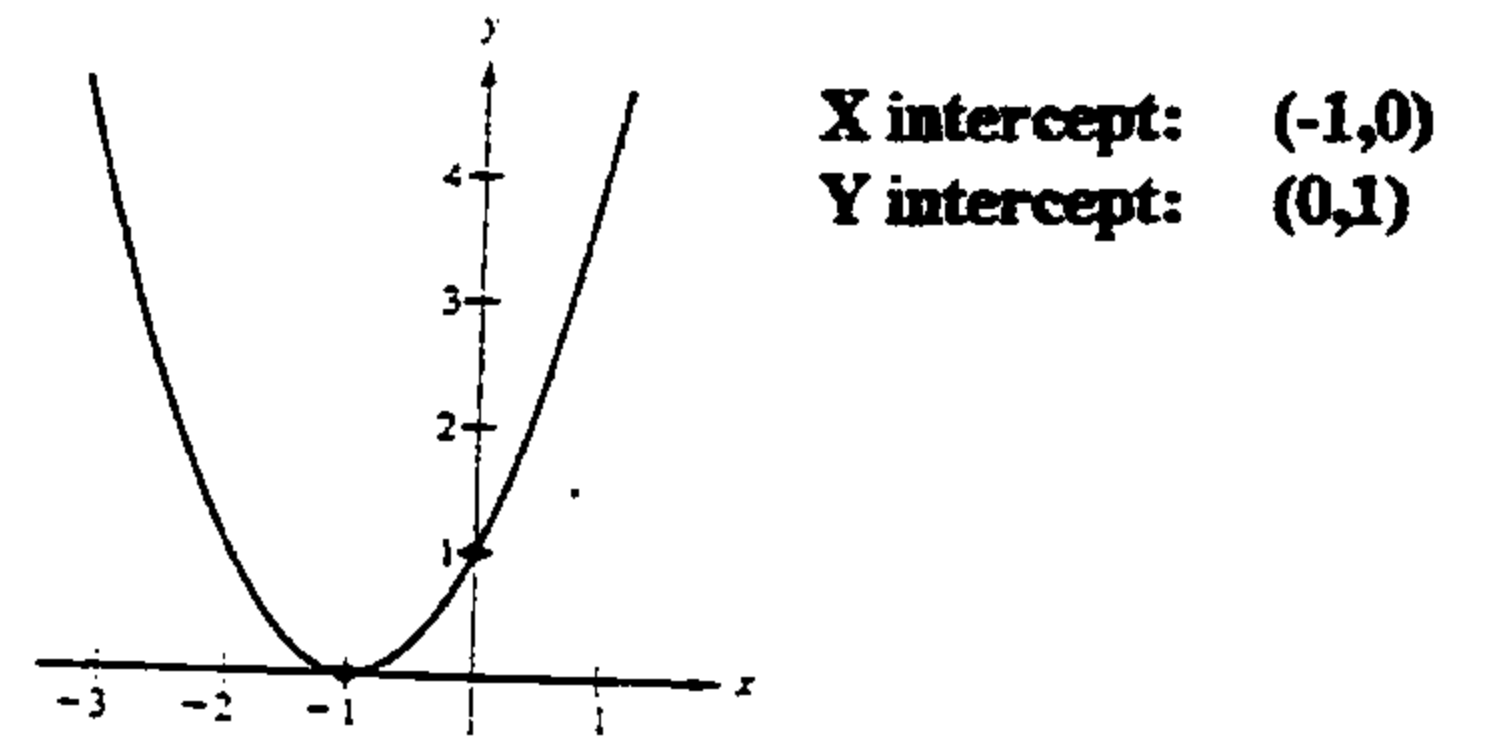


Equation of Axis:  $X = 6$

(71) Vertex: (4, 0)



(72) Vertex: (-1, 0), Intercepts:



(73) Vertex:  $(\frac{1}{2}, 20)$

