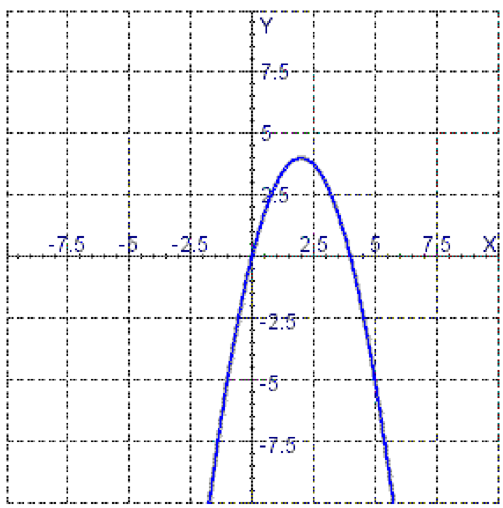
Precalculus Chapter 2 Quiz Part II (sections 5 – 8)

Submit your answers by midnight, Monday, March 2.

Multiple Choice

Identify the choice that best completes the statement or answers the question.

____ 1. The graph of the function $y = -x^2 + 4x$ is:



Find the coordinates of its vertex and its intercepts:

a. vertex (4, 2); *x*-intercepts 0; *y*-intercept 0, 4

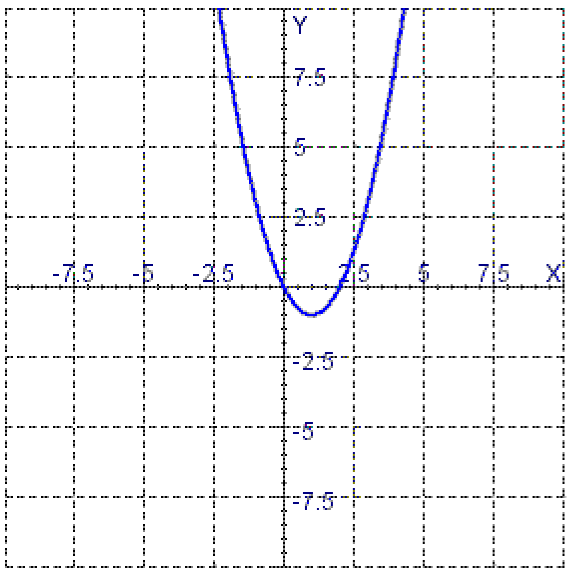
b. vertex (4, 8); *x*-intercepts 0, 3; *y*-intercept 0

c. vertex (2, 4); *x*-intercepts 0, 4; *y*-intercept 0

d. vertex (3, –4); *x*-intercepts 0, 6; *y*-intercept 4

e. vertex (–2, –3); *x*-intercepts 0, 6; *y*-intercept 0

____ 2. The graph of the function $y = x^2 - 2x$ is:



Find the coordinates of its vertex and its intercepts:

a. vertex (1, –1); *x*-intercepts 0, 2; *y*-intercept 0

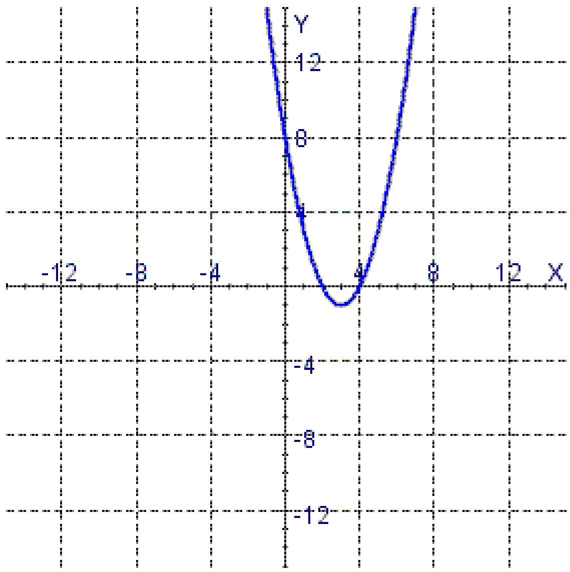
b. vertex (2, 2); *x*-intercepts 0, 1; *y*-intercept 0

c. vertex (2, 1); *x*-intercepts 0, 4; *y*-intercept 0

d. vertex (–1, –0); *x*-intercepts 0, 4; *y*-intercept 0

e. vertex (1, –1); *x*-intercepts 0; *y*-intercept 0, 2

_____ 3. The graph of the function $y = x^2 - 6x + 8$ is:



Find the coordinates of its vertex and its intercepts:

a. vertex (–3, 1); *x*-intercepts –2, 4; *y*-intercept 7

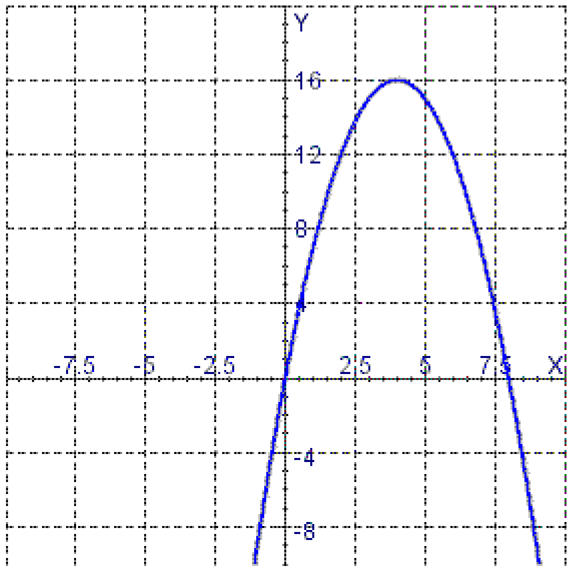
b. vertex (3, –1); *x*-intercepts 8; *y*-intercept 2, 4

c. vertex (4, 2); *x*-intercepts 8, 7; *y*-intercept 2

d. vertex (3, –1); *x*-intercepts 2, 4; *y*-intercept 8

e. vertex (6, –2); *x*-intercepts 3, 6; *y*-intercept 6

____ 4. The graph of the function $y = -x^2 + 8x$ is:



Find its maximum or minimum value:

a. min = 16

b. max = 16

c. max = 24

d. min = –32

e. min = –16

_____ 5. Find the minimum or maximum value of the function $f(x) = x^2 + x + 2$:

a. $f\left(-\frac{1}{2}\right) = \frac{7}{4}$

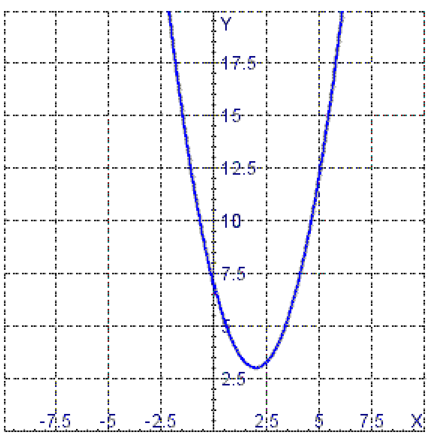
b. $f\left(\frac{1}{2}\right) = \frac{3}{4}$

c. $f(-2) = -\frac{7}{4}$

d. $f\left(-\frac{1}{2}\right) = \frac{7}{2}$

e. $f\left(\frac{1}{2}\right) = \frac{7}{2}$

_____ 6. The graph of the function $y = x^2 - 4x + 7$ is:



Find its maximum or minimum value:

a. max = 6

b. min = 3

c. min = 3.5

d. max = –7

e. min = –4

____ 7. Find the maximum value of the function.

$f(x) = -4x^2 + 48x - 50$

a. $f(-6) = 94$
b. $f(94) = 6$
c. $f(-94) = -6$
d. $f(6) = 99$
e. $f(6) = 94$

____ 8. Find the minimum value of the function.

$g(x) = 7x^2 - 28x$

a. $f(2) = -28$
b. $f(-28) = 2$
c. $f(2) = 28$
d. $f(-2) = 28$
e. $f(-28) = -2$

____ 9. Find the domain and range of the function.

$f(x) = x^2 - 12x + 2$

a. $D = (-\infty, -34)), R = [-34, \infty)$
b. $D = [-34, \infty), R = (-\infty, \infty)$
c. $D = (-\infty, \infty), R = (-34, \infty)$
d. $D = (-\infty, \infty), R = [-34, \infty)$
e. $D = (-34, \infty), R = [-34, \infty)$

____ 10. Find the local maximum and minimum values of the function below, and the value of *x* at which it occurs.

$U(x) = x\sqrt{6-x}$

All of the values were rounded to the nearest hundredth.

a. max = 5.66, $x = 4$
b. max = 7.66, $x = 4.05$
c. min = 6.7, $x = -4$
d. min = 5.66, $x = 4$
e. min = –5.66, $x = 4$

____ 11. If a ball is thrown directly upward with a velocity of 80 ft/s, its height (in feet) after *t* seconds is given by $y = 80t - 16t^2$. What is the maximum height attained by the ball?

Select the correct answer.

a. 50 feet
b. 25 feet
c. 80 feet
d. 100 feet
e. 176 feet

____ 12. A manufacturer finds that the revenue generated by selling x units of a certain commodity is given by the function

$R(x) = 192x - 0.4x^2$

where the revenue $R(x)$ is measured in dollars. What is the maximum revenue, and how many units should be manufactured to obtain this maximum?

a. $23,050, 230 units

b. $23,030, 250 units

c. $0, 480 units

d. $23,040, 245 units

e. $23,040, 240 units

__ 13. A fish swims at a speed v relative to the water, against a current of 9 mph. Using a mathematical model of energy expenditure, it can be shown that the total energy E required to swim a distance of 11 miles is given by the following function.

$$E(v) = 2.59v^3 \frac{11}{v-9}$$

Biologists believe that migrating fish try to minimize the total energy required to swim a fixed distance. Find the value of v that minimizes energy required.

a. 6.75 mph

b. 13.5 mph

c. 14 mph

d. 14.5 mph

e. 27 mph

____ 14. Find the maximum value of the function below.

$f(x) = -x^4 + 6x^2 + 5$ (Hint: Let $t = x^2$.)

a. 9
b. 15
c. 14
d. 7
e. 13

____ 15. Express the function in the form $f \circ g$.

$G(x) = \dfrac{x^3}{x^3 + 2}$

a. $f(x) = x^3$, $g(x) = \dfrac{x}{x - 2}$

b. $f(x) = x^3$, $g(x) = \dfrac{x}{x + 2}$

c. $f(x) = \dfrac{x}{x + 2}$, $g(x) = x^3$

d. $f(x) = x^3 + 2$, $g(x) = \dfrac{x}{x + 2}$

e. $f(x) = \dfrac{x}{x - 2}$, $g(x) = x^3$

____ 16. Express the function in the form $f \circ g$.

$H(x) = \sqrt{4 + \sqrt{x}}$

a. $f(x) = \sqrt{x}$, $g(x) = \sqrt{4 + x}$

b. $f(x) = \sqrt{4 + x}$, $g(x) = \sqrt{x}$

c. $f(x) = \sqrt{4 - x}$, $g(x) = x^2$

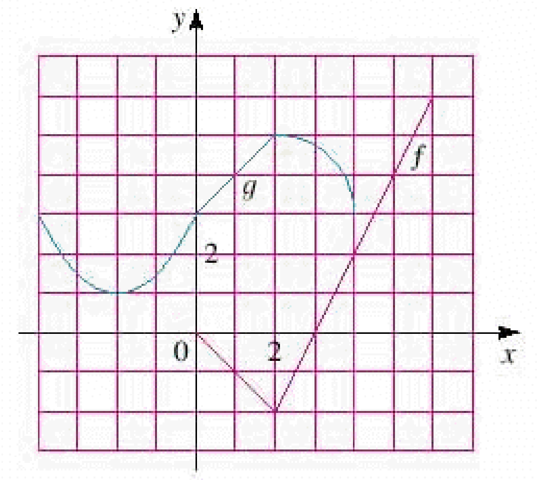
d. $f(x) = \sqrt{x}$, $g(x) = \sqrt{4 - x}$

e. $f(x) = \sqrt{x - 4}$, $g(x) = \sqrt{x}$

____ 17. Use $f(x) = 2x - 8$ and $g(x) = 4 - x^2$ to evaluate $f(g(-1))$.

a. –2
b. 6
c. –28
d. –7
e. –96

____ 18. Use the given graphs of *f* and *g* to evaluate *g* (*f* (5)).



a. 3
b. 4
c. 9
d. 5
e. 2

____ 19. Find the domain of $g \circ f$, if $f(x) = x^2$ and $g(x) = \sqrt{x - 20}$.

a. $\left(-\infty, -\sqrt{20}\right] \cup \left[\sqrt{20}, \infty\right)$
b. $x \geq 20$
c. $\left(-\infty, -\sqrt{20}\right) \cup \left(\sqrt{20}, \infty\right)$
d. $\left(-\infty, -20\right] \cup \left[20, \infty\right)$
e. $\left(-\infty, -20\right) \cup \left(20, \infty\right)$

____ 20. For $f(x) = x^7 + 3,\ g(x) = x - 10,$ and $h(x) = \sqrt{x}$ find $f \circ g \circ h$.

a. $(f \circ g \circ h)(x) = \left(\sqrt{x} - 10\right)^7 + 3$

b. $(f \circ g \circ h)(x) = x^7 + x - 7 + \sqrt{x}$

c. $(f \circ g \circ h)(x) = \left(\sqrt{x} - 7\right)^7$

d. $(f \circ g \circ h)(x) = \sqrt{x^7 - 7}$

e. $(f \circ g \circ h)(x) = \left(x^7 + 3\right) + (x - 10)\sqrt{x}$

____ 21. The function

$F(x) = (x - 10)^5 = (f \circ g)(x)$

What are two possible functions *f* and *g*?

a. $f(x) = x, \quad g(x) = -10$

b. $f(x) = x - 10, \quad g(x) = x^5$

c. $f(x) = x^5, \quad g(x) = (x - 10)^5$

d. $f(x) = x^5, \quad g(x) = 10^5$

e. $f(x) = x^5, \quad g(x) = x - 10$

____ 22. The graphs of the function $f(x) = m_1x + b_1$ and $q(x) = m_2x + b_2$ are lines with slopes m_1 and m_2 respectively. What is the slope of the graph of $f(q(x))$?

a. $\frac{m_1}{m_2}$

b. $m_1 \cdot m_2 + b_1$

c. $m_1 + m_2$

d. $m_1 \cdot m_2$

e. $m_1 \cdot m_2 + b_2$

____ 23. Suppose that $g(x) = 5x + 3$ and $h(x) = 25x^2 + 30x + 19$. Find a function *f*, such that $f(g(x)) = h(x)$. (Think about what operations you would have to perform on the formula for *g* to end up with the formula for *h*.)

a. $f(x) = x^2 + 19$

b. $f(x) = 5x^2 + 6x + 3.2$

c. $f(x) = x^2 + 10$

d. $f(x) = (x + 10)^2$

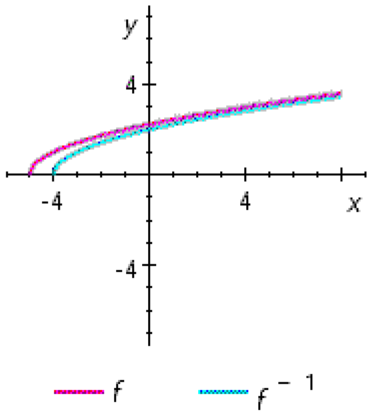
e. $f(x) = x^2 + 13$

_____ 24. A function f is given.

$f(x) = \sqrt{x+5}$

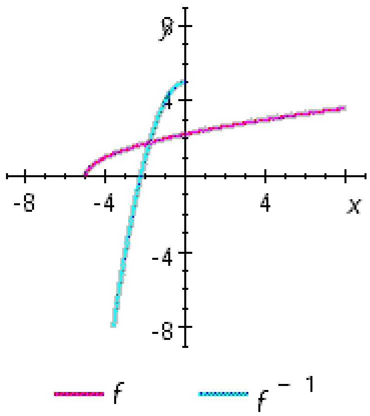
Sketch the graph of f. Use the graph of f to sketch the graph of f^{-1}. Find f^{-1}.

a.



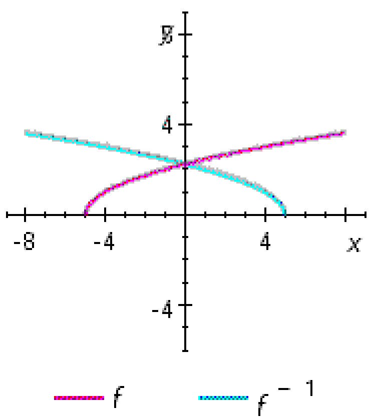
$f^{-1} = \sqrt{x+4}$

b.



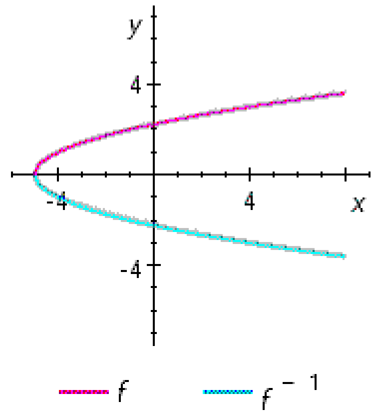
$f^{-1} = -x^2 + 5$

c.



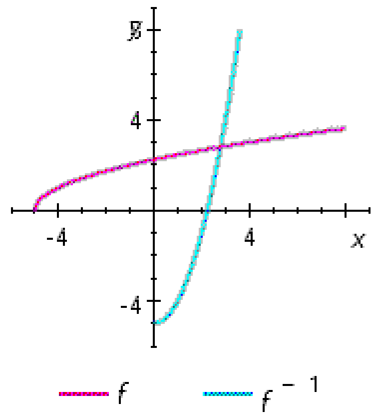
$f^{-1}(x) = \sqrt{x-5}$

d.



$f^{-1}(x) = -\sqrt{x+5}$

e.



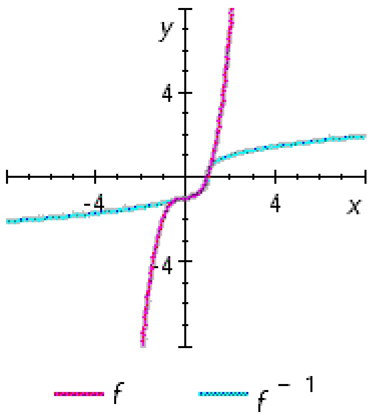
$f^{-1}(x) = x^2 - 5$

_____ 25. A function f is given.

$f(x) = x^3 - 1$

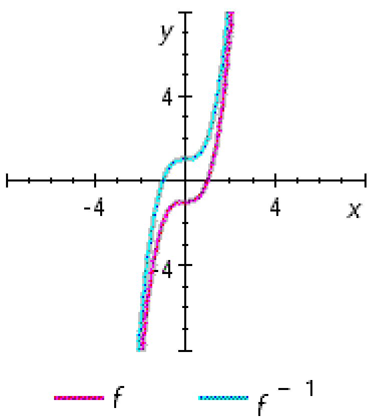
Sketch the graph of *f*. Use the graph of *f* to sketch the graph of f^{-1}. Find f^{-1}.

a.



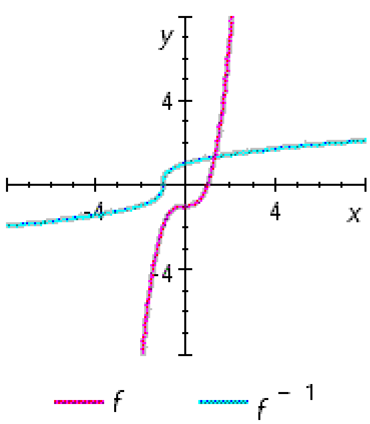
$f^{-1}(x) = \sqrt[3]{x-1}$

b.



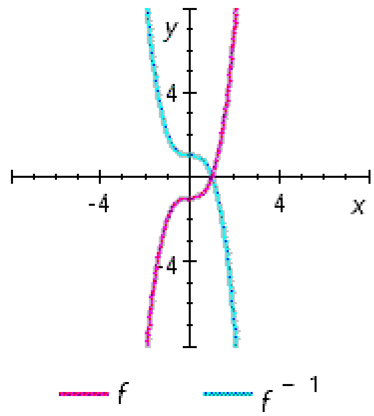
$f^{-1} = x^3 + 1$

c.



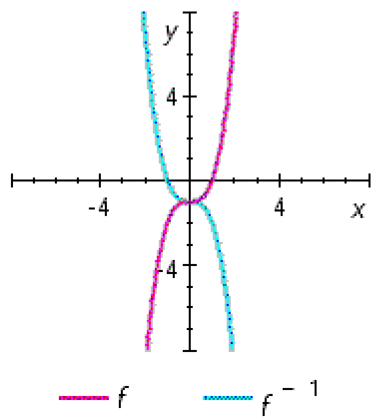
$f^{-1}(x) = \sqrt[3]{x+1}$

d.



$f^{-1} = -x^3 + 1$

e.



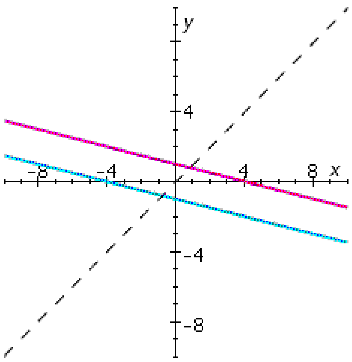
$f^{-1}(x) = -x^3 - 1$

_____ 26. A one-to-one function is given.

$$f(x) = 1 - \frac{1}{4}x$$

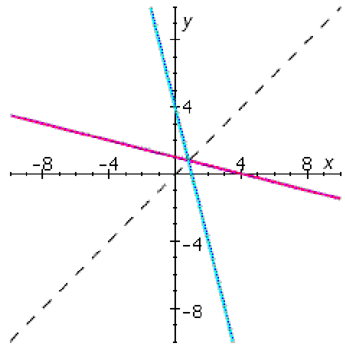
Find the inverse of the function. Graph both the function and its inverse on the same screen to verify that the graphs are reflections of each other in the line $y = x$.

a.



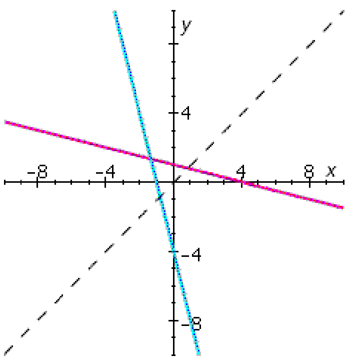
$f^{-1}(x) = 4 + 4x$

d.



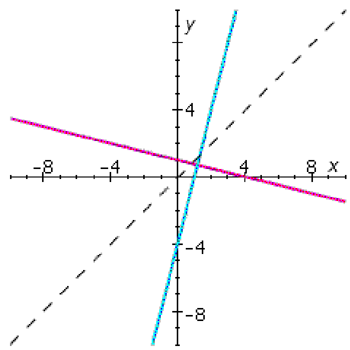
$f^{-1}(x) = 4 - 4x$

b.



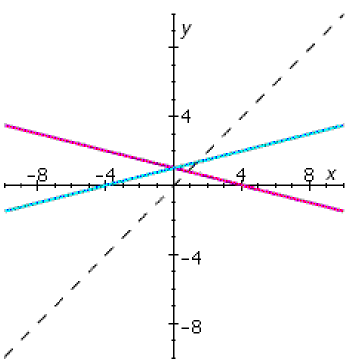
$f^{-1}(x) = 4 + 4x$

e.



$f^{-1}(x) = -4 - 4x$

c.



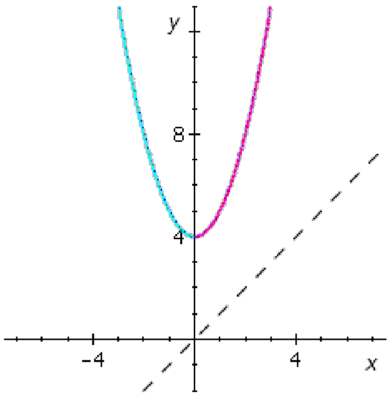
$f^{-1}(x) = -4 + 4x$

____ 27. A one-to-one function is given.

$$g(x) = x^2 + 4,\ x \geq 0$$

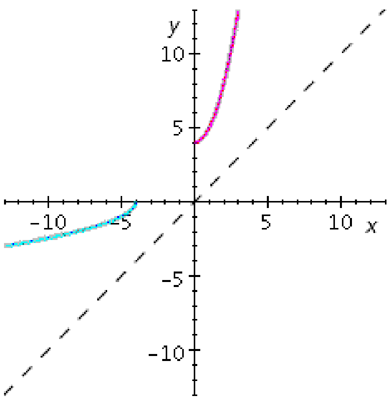
Find the inverse of the function. Graph both the function and its inverse on the same screen to verify that the graphs are reflections of each other in the line $y = x$.

a.



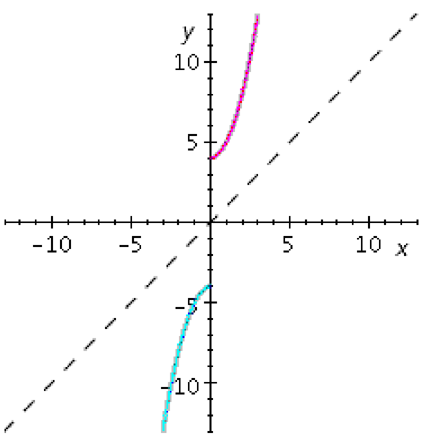
$g^{-1}(x) = x^2 + 4$

b.



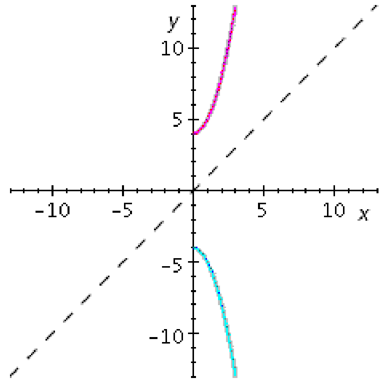
$g^{-1}(x) = -\sqrt{-x-4}$

c.



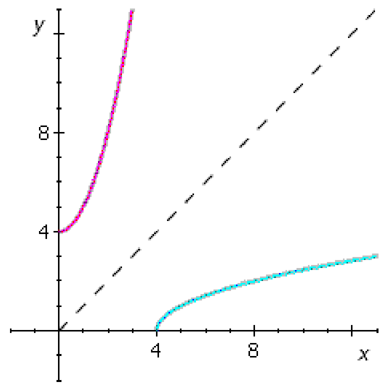
$g^{-1}(x) = -x^2 - 4$

d.



$g^{-1}(x) = -x^2 - 4$

e.



$g^{-1}(x) = \sqrt{x-4}$

____ 28. Assume f is a one-to-one function. If $f(x) = 3 - 6x$, find $f^{-1}(33)$.

a. 3
b. 5
c. –3
d. –5
e. 6

____ 29. Assume g is a one-to-one function. If $g(x) = x^2 + 10x$ with $x \geq -5$, find $g^{-1}(4)$.

a. $10 + \sqrt{10}$
b. –10
c. –6
d. 10
e. $-5 + \sqrt{29}$

____ 30. Use the Property of Inverse Functions to find the inverse function of $f(x) = x + 8$.

a. $f^{-1}(x) = x + 8$
b. $f^{-1}(x) = -x - 8$
c. $f^{-1}(x) = -x + 8$
d. $f^{-1}(x) = 1 / (x + 8)$
e. $f^{-1}(x) = x - 8$

____ 31. Find the inverse function of $f(x) = \dfrac{1}{x+3}$.

a. $f^{-1}(x) = x + 3$
b. $f^{-1}(x) = \dfrac{1}{x} - 3$
c. $f^{-1}(x) = \dfrac{1}{x-3}$
d. $f^{-1}(x) = x - 3$
e. $f^{-1}(x) = \dfrac{1}{x} + 3$

____ 32. Find the inverse function of $f(x) = \dfrac{x-2}{x-7}$.

a. $f^{-1}(x) = \dfrac{2-7x}{1-x}$
b. $f^{-1}(x) = \dfrac{2-7x}{x-1}$
c. $f^{-1}(x) = \dfrac{2-7x}{1+x}$
d. $f^{-1}(x) = \dfrac{7-x}{x-2}$
e. $f^{-1}(x) = \dfrac{-2x-7}{x-1}$

____ 33. Find the inverse function of $f(x) = \dfrac{2-7x}{9-5x}$.

a. $f^{-1}(x) = \dfrac{9-x}{5-7x}$

b. $f^{-1}(x) = \dfrac{9x-2}{5x+7}$

c. $f^{-1}(x) = \dfrac{9x+2}{5x+7}$

d. $f^{-1}(x) = \dfrac{9x-2}{5x-7}$

e. $f^{-1}(x) = \dfrac{9-5x}{2-7x}$

____ 34. Find the inverse function of $f(x) = 7 + \sqrt[3]{x}$.

a. $f^{-1}(x) = (x-7)^3$

b. $f^{-1}(x) = (7-x)^3$

c. $f^{-1}(x) = x^3 - 7^3$

d. $f^{-1}(x) = \dfrac{1}{7+\sqrt[3]{x}}$

e. $f^{-1}(x) = (x+7)^3$

____ 35. Find the inverse function of $f(x) = (7 - x^3)^{\frac{1}{5}}$.

a. $f^{-1}(x) = \sqrt[3]{\left(7-x^5\right)}$

b. $f^{-1}(x) = \sqrt[3]{\left(7-x^{\frac{1}{5}}\right)}$

c. $f^{-1}(x) = \left(7-x^5\right)^3$

d. $f^{-1}(x) = 7-x^{\frac{5}{3}}$

e. $f^{-1}(x) = \dfrac{1}{\left(7-x^3\right)^{\frac{1}{5}}}$

____ 36. Find the inverse function of $f(x) = \sqrt{25 - x^2}$, $0 \le x \le 5$.

a. $f^{-1}(x) = \dfrac{1}{\sqrt{25 - x^2}}$, $0 \le x \le 5$

b. $f^{-1}(x) = \sqrt{x + 5}$, $-5 \le x \le 5$

c. $f^{-1}(x) = \sqrt{x^2 - 25}$, $0 \le x \le 5$

d. $f^{-1}(x) = 25 - x^2$, $-5 \le x \le 5$

e. $f^{-1}(x) = \sqrt{25 - x^2}$, $0 \le x \le 5$

____ 37. Find the inverse function of $f(x) = x^5 + 1$.

a. $f^{-1}(x) = \sqrt[5]{(1 - x)}$

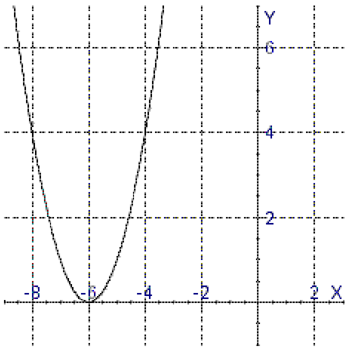
b. $f^{-1}(x) = (x - 1)^5$

c. $f^{-1}(x) = \sqrt[5]{(x - 1)}$

d. $f^{-1}(x) = \left(x^{\frac{1}{5}} - 1 \right)$

e. $f^{-1}(x) = \dfrac{1}{\sqrt[5]{(x - 1)}}$

____ 38. The given function $f(x) = (x+6)^2$ is not one-to-one. Find a restricted domain for which the function is one-to-one. Also find the inverse of the function with the restricted domain.



a. $x \geq -9; f^{-1}(x) = \sqrt{x} + 6$

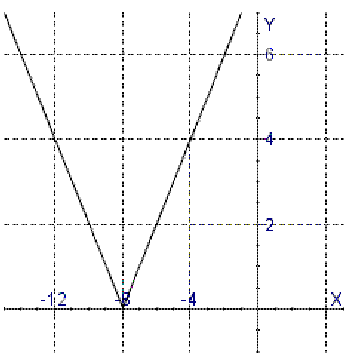
b. $x \leq -6; f^{-1}(x) = -\sqrt{x} + 6$

c. $x \geq -6; f^{-1}(x) = \sqrt{x} + 6$

d. $x \geq -6; f^{-1}(x) = \sqrt{x} - 6$

e. $x \geq -9; f^{-1}(x) = \sqrt{x} - 6$

____ 39. The given function $f(x) = |x+8|$ is not one-to-one. If the domain of this function is restricted so that it is made to be one-to-one, determine the corresponding inverse function and its domain.



a. $f^{-1}(x) = x + 8,\ x > 0$

b. $f^{-1}(x) = -8x - 1,\ x > 0$

c. $f^{-1}(x) = x + 8,\ x < 0$

d. $f^{-1}(x) = x - 8,\ x > 0$

e. $f^{-1}(x) = x - 8,\ x < 0$