Stewart - Calculus 8e ET Chapter 1 Form A

1. If $f(x) = 3x + \ln x$, find $f^{-1}(3)$.

2. Solve each equation for x.

   (a) $\ln x = 4$ (b) $e^{e^x} = 2$

3. Simplify the expression.

   $$\sin\left(2\cos^{-1}4x\right)$$

4. Fill in the blanks.

   Let $f(x) = 5 + x^2 + \tan\left(\dfrac{\pi x}{2}\right)$, where $-1 < x < 1$.

   $f^{-1}\left(f(5)\right) = $_____ $f\left(f^{-1}(3)\right) = $_____

5. Determine whether f is even, odd, or neither.

   $$f(x) = \frac{8x^2}{x^4 + 1}$$

6. Find the range of the function.

   $$h(x) = \sqrt{4 - x^2}$$

7. The graphs of $f(x)$ and $g(x)$ are given.
    a) For what values of x is $f(x) = g(x)$?
    b) Find the values of $f(-2)$ and $g(4)$.
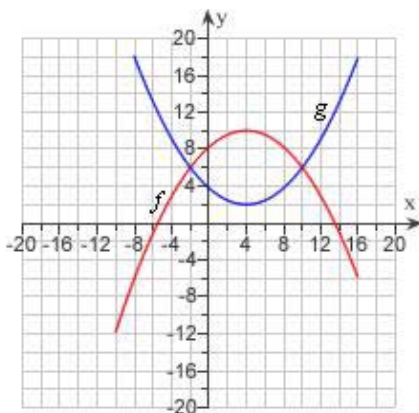
8. A spherical balloon with radius r inches has volume
    $$\frac{4}{3}\pi r^3.$$
    Find a function that represents the amount of air required to inflate the balloon from a radius of r inches to a radius of $r+1$ inches.

9. It makes sense that the larger the area of a region, the larger the number of species that inhabit the region. Many ecologists have modeled the species-area relation with a power function and, in particular, the number of species S of bats living in caves in central Mexico has been related to the surface area A measured in m^2 of the caves by the equation

    $$S = 0.7A^{03}$$

    (a) The cave called mission impossible near puebla, mexico, has suface area of $A = 90\,m^2$.
        How many species of bats would expect to find in that cave?

    (b) If you discover that 5 species of bats live in cave estimate the area of the cave.

10. The relationship between the Fahrenheit and Celsius temperature scales is given by the linear function.

    $$F = \frac{9}{5}C + 32$$

    Complete the table and find the slope.

^{0}C	^{0}F
10	
−18	
slope	

11. Plot the graph of the function in (a) the standard viewing window and (b) the indicated window.
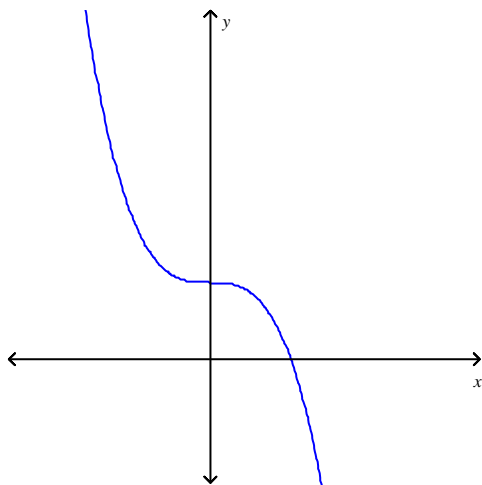
    $f(x) = x\sqrt{7 - x^4}$, [-3, 3] × [-5, 5]

12. Plot the graph of the function f in an appropriate viewing window.

    $f(x) = 2x^3 - 5x^2 + 4x + 27$

13. Find the points of intersection of the graphs of the functions. Express your answers accurate to five decimal places.

    $f(x) = 0.3x^2 - 1.1x - 3.5$; $g(x) = -0.2x^2 + 0.4x + 6.9$
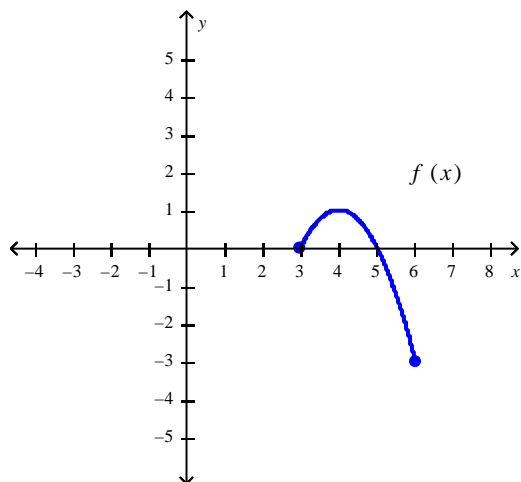
14. Determine whether f is one-to-one.

15. If $f(x) = \begin{cases} x^2 + 3 & \text{if } x \leq 0 \\ \sqrt{x} & \text{if } x > 0 \end{cases}$

    find $f(-4)$, $f(0)$, and $f(1)$.

16. Refer to the graph of the function f in the following figure.

    a. Find $f(3)$.
    b. Find the value of x for which (i) $f(x) = 1$ and (ii) $f(x) = 0$.
    c. Find the domain and range of f.

17. Let $f(x) = x^2 - 6x + 7$ and $g(x) = \sqrt{x+3}$. Find $(g \circ f)(9)$.

18. Find $f \circ g \circ h$ if
    $f(x) = \sqrt{x}$, $g(x) = 7x + 4$, and $h(x) = x^2 - 4$

19. Let $f(x) = x^2 - 18x + 75$ and $g(x) = \sqrt{x+7}$. Find $(f \circ g)(74)(g \circ g)(74)$.

20. Find the function g such that $h(x) = (g \circ f)(x)$.

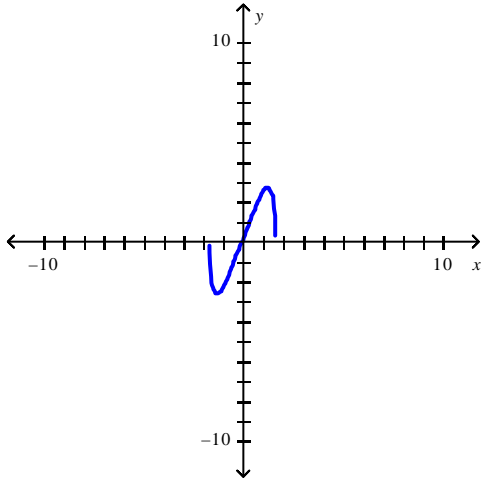 $h(x) = \sin^5 x$ and $f(x) = \sin x$

Stewart - Calculus 8e ET Chapter 1 Form A
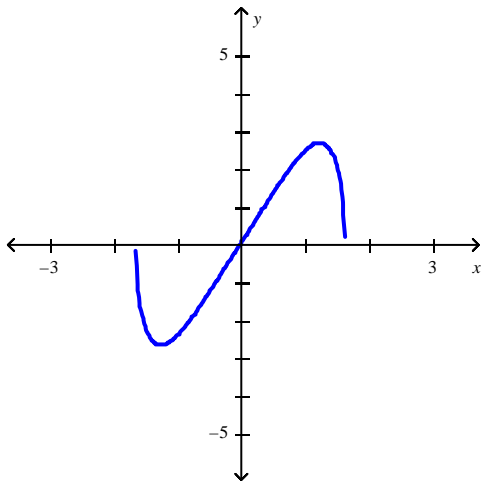
Answer Key

1. $f^{-1}(3) = 1$
2. $x = e^4$, $x = \ln(\ln 2)$
3. $8x\sqrt{1 - 16x^2}$
4. $5, 3$
5. even
6. $0 \le h(x) \le 2$
7. a) -2, 10
   b) $f(-2) = 6$, $g(4) = 2$
8. $\dfrac{4}{3}\pi\left(3r^2 + 3r + 1\right)$
9. a) 3 species
   b) $702\,\mathrm{m}^2$
10. $(10, 50)(-18, 0)$; slope $= 2$

11. **a.**

b.

12.
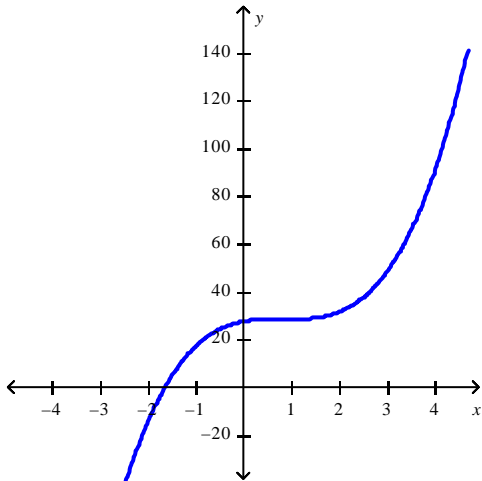
13. (−3.30104, 3.40021), (6.30104, 1.47979)

14. Yes
15. $f(-4) = 19$, $f(0) = 3$, $f(1) = 1$.
16. **a.** 0
    b. (i) 4 **(ii)** 3, 5
    c. D: [3, 6], **R**: [–3, 1]
17. $\sqrt{37}$
18. $\sqrt{7x^2 - 24}$
19. –6
20. $g(x) = x^5$

Stewart - Calculus 8e ET Chapter 1 Form B

1. Find all solutions of the equation correct to two decimal places.

    $\sqrt{x} = x^3 - 4$

2. Solve each equation for x.

    (a) $\ln x = 6$ (b) $e^{e^x} = 2$

3. Find the exact value of the expression.

    $$\tan\left(\arcsin\frac{1}{2}\right)$$

4. Find the range of the function.

    $h(x) = \sqrt{25 - x^2}$

5. Express the function in the form of $f \circ g \circ h$.

    $H(x) = 3 - 6^{x^3}$

6. Plot the graph of the function f in an appropriate viewing window.

    $f(x) = 5x^4 - 3x^3 + 3x^2 - x + 26$

7. Find the points of intersection of the graphs of the functions. Express your answers accurate to five decimal places.
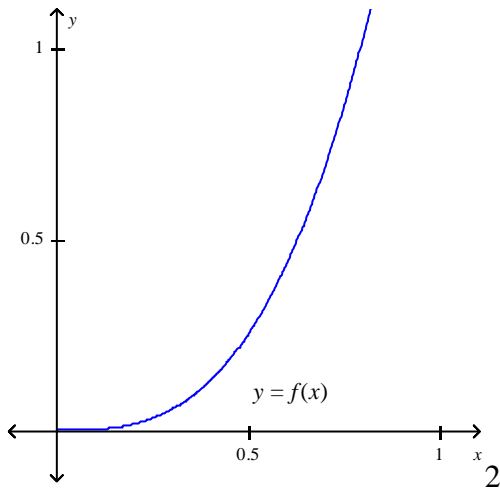
    $f(x) = 0.3x^2 - 1.2x - 3.4;\ g(x) = -0.2x^2 + 0.2x + 6.3$

8. Determine whether f is one-to-one.
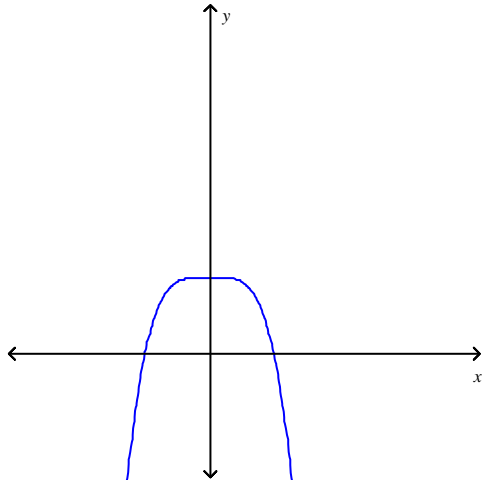
9. The graph of f is given. Sketch the graph of f^{-1} on the same set of axes.

$y = f(x)$

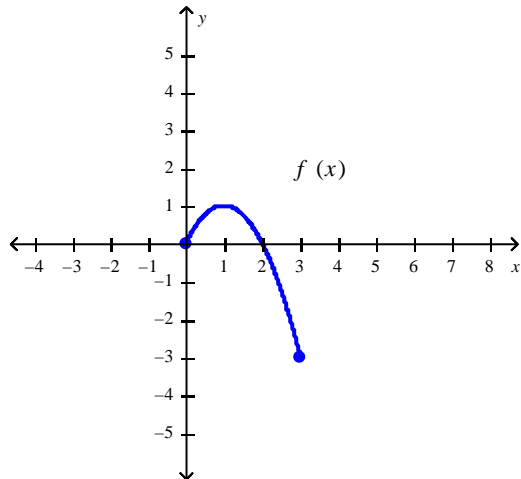10. Find the inverse of f. Then sketch the graphs of f and f^{-1} on the same set of axes.

$$f(x) = \cos^{-1}\left(\frac{x}{2}\right), \ -2 \le x \le 2$$

11. If $f(x) = \begin{cases} x^2 + 8 & \text{if } x \le 0 \\ \sqrt{x} & \text{if } x > 0 \end{cases}$

find $f(-1)$, $f(0)$, and $f(1)$.

12. Refer to the graph of the function f in the following figure.

$f(x)$

a. Find $f(0)$.
b. Find the value of x for which (i) $f(x) = 1$ and (ii) $f(x) = 0$.
c. Find the domain and range of f.

13. Determine whether the function is even, odd, or neither.

$$f(x) = 2x^2 + 9x$$

14. The following figure shows a portion of the graph of a function f defined on the interval $[-1, 1]$. Sketch the complete graph of f if it is known f is odd.
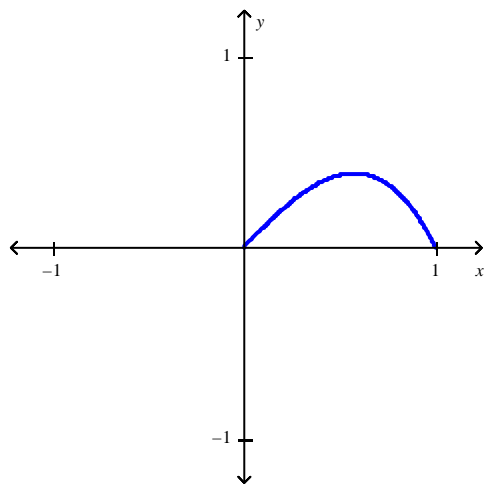
15. By cutting away identical squares from each corner of a rectangular piece of cardboard and folding up the resulting flaps, an open box can be made. If the cardboard is 13 in. long and 9 in. wide and the square cutaways have dimensions of x in. by x in., find a function that gives the volume of the resulting box.
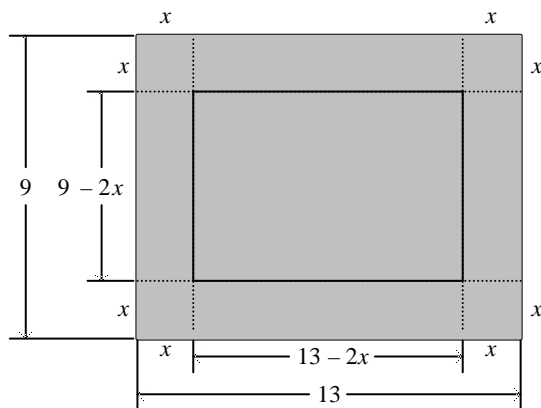
16. Use the vertical line test to determine whether the curve is the graph of a function of x.
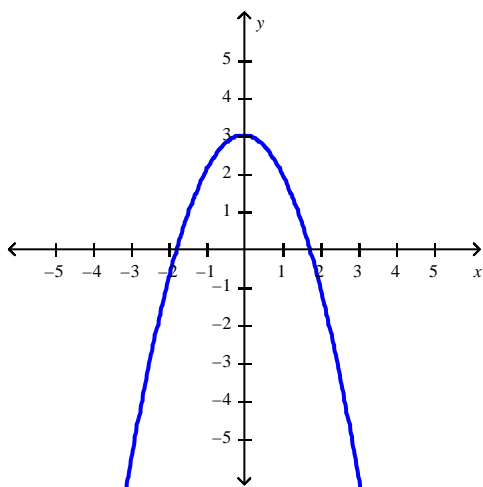
17. Let $f(x) = x^2 - 18x + 80$ and $g(x) = \sqrt{x+2}$. Find $(g \circ f)(17)$.

18. Find $f \circ g \circ h$ if

$$f(x) = \frac{x-1}{x+1}, \quad g(x) = \sqrt[4]{x}, \quad \text{and} \quad h(x) = x+1$$

19. Let $f(x) = x^2 - 14x + 38$ and $g(x) = \sqrt{x+12}$. Find $(f \circ f)(10)(g \circ g)(13)$.

20. Find the function g such that $h(x) = (g \circ f)(x)$.

$h(x) = \dfrac{1}{6x - 5}$ and $f(x) = 6x - 5$

Answer Key

1. 1.75
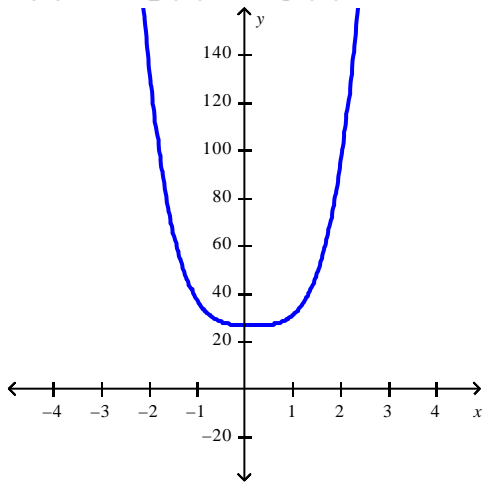2. $x = e^6$, $x = \ln(\ln 2)$
3. $\dfrac{\sqrt{3}}{3}$
4. $0 \le h(x) \le 5$
5. $h(x) = x^3$, $g(x) = 6^x$, $f(x) = 3 - x$
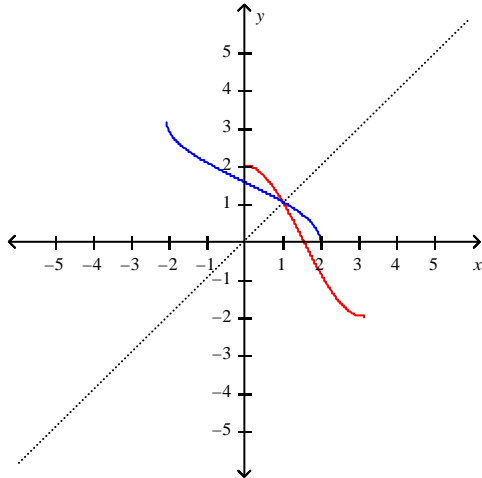
6.

7. (−3.22169, 3.57981), (6.02169, 0.25219)
8. No

9.
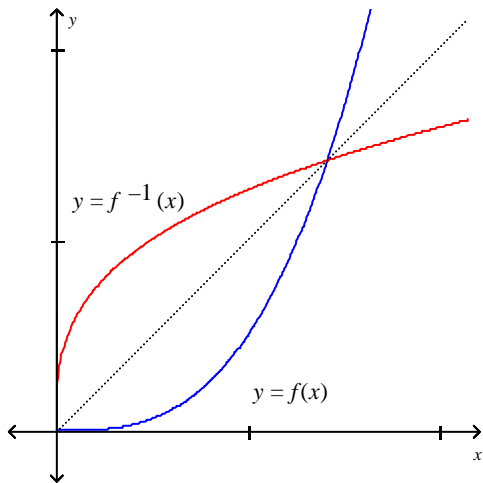
10. $f^{-1}(x) = 2\cos x, \ 0 \le x \le \pi$

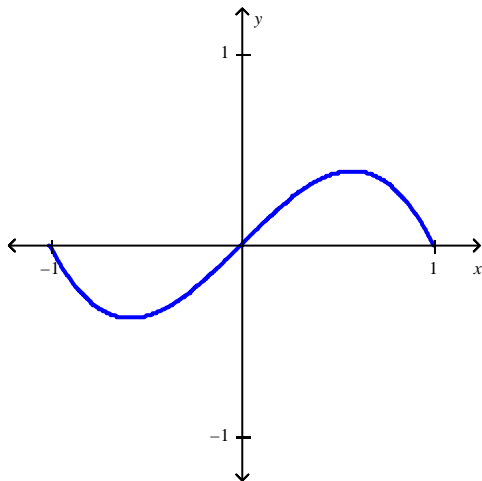11. $f(-1) = 9, \quad f(0) = 8, \quad f(1) = 1.$
12. **a.** 0
    b. (**i**) 1 (**ii**) 0, 2
    c. D: [0, 3], R: [–3, 1]
13. Neither
14.

15. $V = 4x^3 - 44x^2 + 117x$
16. Yes
17. $\sqrt{65}$
18. $\dfrac{\sqrt[4]{x+1} - 1}{\sqrt[4]{x+1} + 1}$
19. 70
20. $g(x) = \dfrac{1}{x}$

Select the correct answer for each question.

_____ 1. Find the points of intersection of the graphs of the functions. Express your answers accurate to five decimal places.

$f(x) = 0.5x^3 - 1.8x^2 + 2.2x - 4; \ g(x) = 2.8x - 4.3$

    a. (–0.55126, –5.84352),
       (3.87001, 6.53604)
    b. (–0.55126, –1.54352)
       (0.28124, 10.83604)
       (3.87001, 0.78748)
    c. (–0.55126, –1.54352)
       (3.87001, 0.78748)
    d. (–0.55126, –5.84352),
       (0.28124, –3.51252)
       (3.87001, 6.53604)

_____ 2. Starting with the graph of $y = e^x$, find the equation of the graph that results from reflecting about the line $y = 3$.

    a. $y = -e^x$
    b. $y = -e^x + 6$
    c. $y = -e^{-3x} + 6$
    d. $y = e^{-x} + 6$
    e. $y = -e^{x+6}$

_____ 3. Use the Law of Exponents to rewrite and simplify the expression.

$$\frac{x^{4x} \cdot x^{5x+1}}{x^{x-5}}$$

    a. x^{8x+6}
    b. x^{8x+7}
    c. x^{6x-10}
    d. x^{3x+9}
    e. x^{4x-8}

____   4. Starting with the graph of $y = e^x$, write the equation of the graph that results from shifting 5 units right.

    a. $y = e^{x+5}$
    b. $y = e^x - 5$
    c. $y = e^{x-5}$
    d. $y = e^x + 5$
    e. $y = 5e^{x-5}$

____   5. Suppose that the graph of $y = \log_3 x$ is drawn on a coordinate grid where the unit of measurement is an inch. How many miles to the right of the origin do we have to move before the height of the curve reaches 2 ft? Rounded to the nearest mile.

    a. 754.9 mi
    b. 4,457,536.9 mi
    c. 53,490,543 mi
    d. 53,490,442.5 mi
    e. 53,490,343 mi

____   6. Find the exact value of the given expression.

$\tan^{-1} 1$

    a. 2π

    b. $\dfrac{\pi}{4}$

    c. $\dfrac{4}{\pi}$

    d. 4π

_____ 7. Use the laws of logarithms to expand the expression.

$$\ln \left(\frac{x+5}{x-6} \right)^{\frac{1}{2}}$$

a. $\dfrac{1}{2} \ln \left[(x+5)(x-6) \right]$

b. $\dfrac{1}{2} \ln (x+5) - \dfrac{1}{2} \ln (x-6)$

c. $\dfrac{1}{2} \ln \left(x - \dfrac{5}{6} \right)$

d. $\dfrac{1}{2} \ln \left(\dfrac{x+5}{x-6} \right)$

_____ 8. Simplify the expression.

$$e^{3\ln 6}$$

a. 9
b. 18
c. 216
d. 729

_____ 9. Find a formula for the inverse of the function.

$$y = \ln(x+6)$$

a. $y = e^x - 6$
b. $y = e^x + 6$
c. $y = -6e^x$
d. $y = 6e^x$
e. $y = e^{x+6}$

_____ 10. Find the exact value of the expression.

$$\log_5 100 + \log_5 25 - 2\log_5 2$$

    a. 7
    b. 8
    c. 6
    d. 4
    e. 5

_____ 11. The graphs of $f(x)$ and $g(x)$ are given. For what values of x is $f(x) = g(x)$?
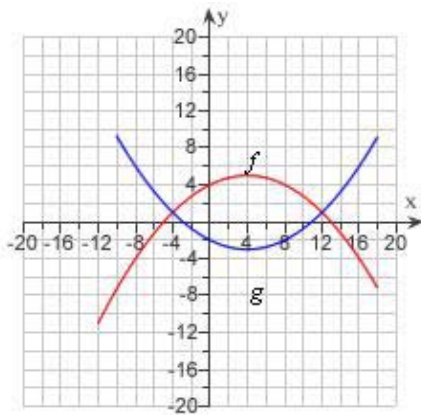
    a. 4, 2
    b. 0
    c. -1
    d. $-2, 5$
    e. $-4, 12$

_____ 12. Which of the following graphs is neither even nor odd?

    a. $f(x) = \dfrac{4x^2}{x^4 + 1}$

    b. $f(x) = 8x^3 + 10x^2 + 1$

    c. $f(x) = x^3 - 9x$

_____ 13. A rectangle has perimeter 14 m. Express the area of the rectangle as a function $A(l)$ of the length l of one of its sides.

    a. $A(l) = 7l - l^2$
    b. $A(l) = l - 7l^2$
    c. $A(l) = 14l - l^2$
    d. $A(l) = 14l + l^2$
    e. $A(l) = 7l + l^2$

_____ 14. What is the equation of this graph?
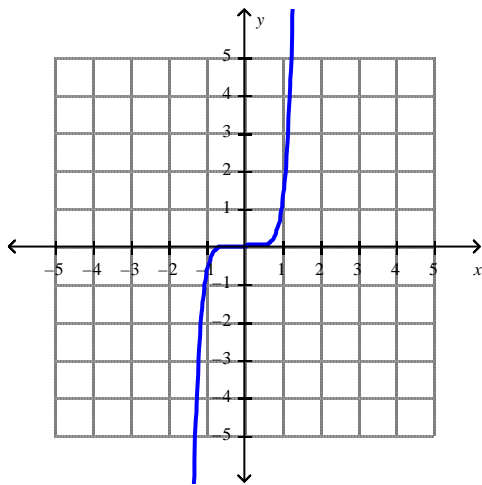
    a. $y = x^8$
    b. $y = x^4$
    c. $y = x^2$
    d. $y = \sqrt[3]{x}$
    e. $y = x^7$

_____ 15. Find the domain.

$$g(u) = \sqrt{u} - \sqrt{3-u}$$

a. $(0, 3)$

b. $(-\infty, 0]$

c. $(-3, \infty]$

d. $[0, 3]$

e. $[0, \infty)$

_____ 16. Find the range of the function.

$$y = 2 + \cos x$$

a. $(-\infty, \infty)$
b. $(2, \infty)$
c. $[-1, 1]$
d. $(-1, 3)$
e. $[1, 3]$

_____ 17. The relationship between the Fahrenheit and Celsius temperature scales is given by the linear function.

$$F = \frac{9}{5}C + 32$$

What is the *F*-intercept and what does it represent?

a. $\frac{9}{5}$, Fahrenheit temperature corresponding to $0°C$

b. $\frac{9}{5}$, Celsius temperature corresponding to $32°C$

c. 32, Celsius temperature corresponding to $0°F$

d. 0, Fahrenheit temperature corresponding to $32°C$

e. 32, Fahrenheit temperature corresponding to $0°C$

____ 18. If $f(x) = x + 5$ and $h(x) = 4x - 10$, find a function g such that $g \circ f = h$.

    a. $g(x) = 4x + 30$
    b. $g(x) = 4x$
    c. $g(x) = x - 30$
    d. $g(x) = 4x - 30$
    e. $g(x) = x + 30$

_____ 19. The graph of the function f follows. Choose the graph of $y = f(|x|)$.
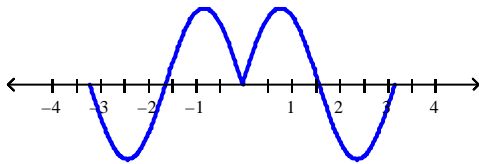

a.

c.

b.

d.
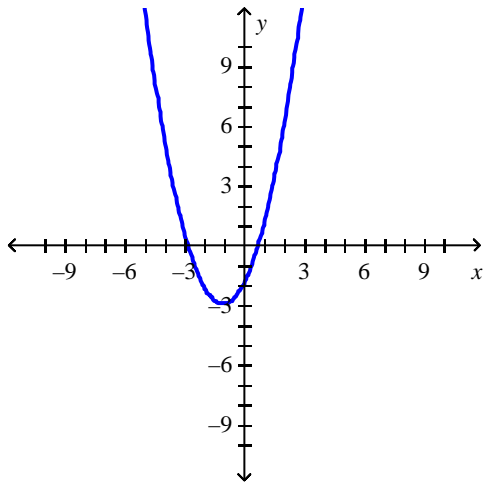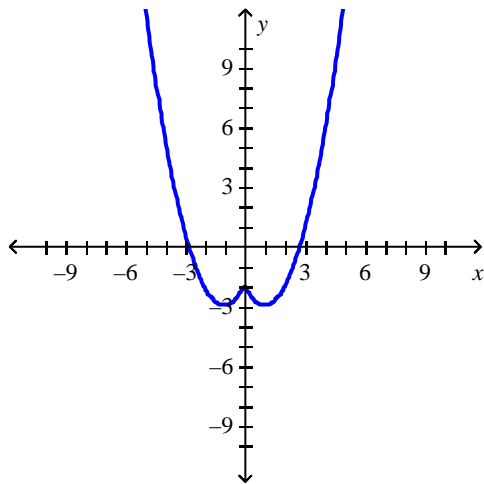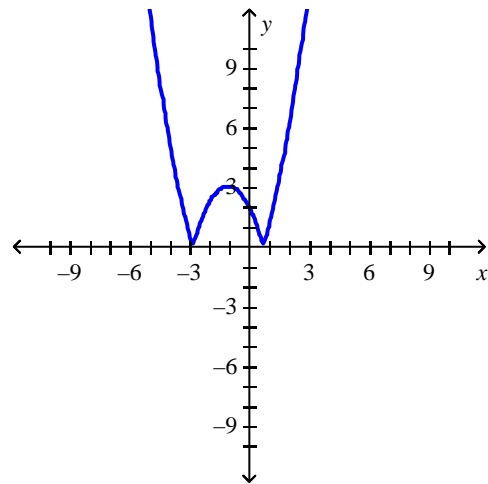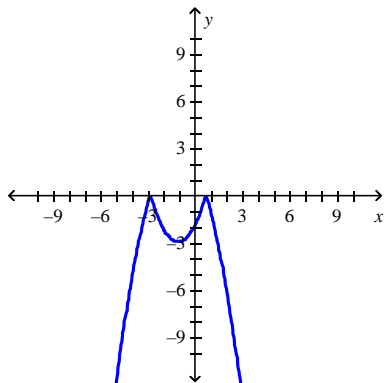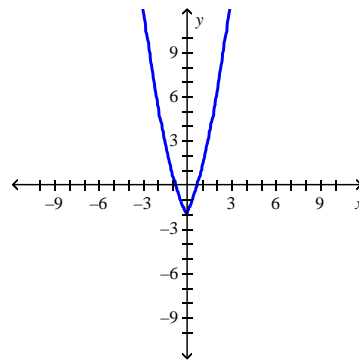
_____ 20. Which of the following graphs is the graph of the function?

$f(x) = \sin|2x|$
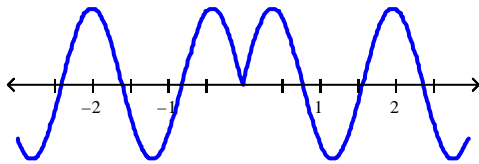
Graph 1
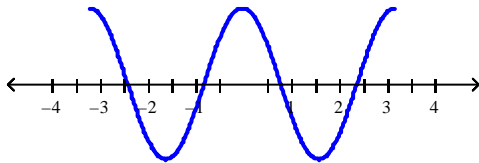
Graph 2

Graph 3

a. Graph 2
b. Graph 1
c. Graph 3

Answer Key

1. D
2. B
3. A
4. C
5. B
6. B
7. B
8. C
9. A
10. D
11. E
12. B
13. A
14. E
15. D
16. E
17. E
18. D
19. D
20. A

Stewart - Calculus 8e ET Chapter 1 Form D

Select the correct answer for each question.

____ 1. Find all solutions of the equation correct to two decimal places.

$$x^3 - 9x^2 - 100 = 0$$

   a. $x = 10$
   b. $x = 0,\ x = 9.05$
   c. $x = 0,\ x = 4.01,\ x = 9.05$
   d. $x = -4.00,\ x = 9.05$
   e. $x = 4.00,\ x = 9.05$

____ 2. Use the Law of Exponents to rewrite and simplify the expression.

$$\frac{\sqrt{a\sqrt{b}}}{\sqrt[5]{ab}}$$

   a. $\dfrac{a^{\frac{3}{10}}}{b^{\frac{1}{20}}}$

   b. $a^{\frac{3}{10}} b^{\frac{1}{20}}$

   c. $\dfrac{a}{b^{\frac{1}{20}}}$

   d. $\dfrac{a}{b}$

   e. $\left(\dfrac{a}{b}\right)^{\frac{3}{10}}$

_____ 3. Starting with the graph of $y = e^x$, write the equation of the graph that results from shifting 3 units right.

    a. $y = 3e^{x-3}$
    b. $y = e^x + 3$
    c. $y = e^{x+3}$
    d. $y = e^x - 3$
    e. $y = e^{x-3}$

_____ 4. Find the inverse function of $f(x) = \dfrac{x+1}{4x+1}$.

    a. $f^{-1}(x) = -\dfrac{4x+1}{x-1}$
    b. $f^{-1}(x) = \dfrac{x}{4x-1}$
    c. $f^{-1}(x) = -(x+1)(4x+1)$
    d. $f^{-1}(x) = (x+1)(4x+1)$
    e. $f^{-1}(x) = -\dfrac{x-1}{4x-1}$

_____ 5. Find $f^{-1}(a)$ for the function f and the real number a.

$$f(x) = x^3 + x - 3; \quad a = -1$$

    a. 2
    b. 1
    c. 3
    d. 0

_____ 6. Find the inverse of f. Then sketch the graphs of f and f^{-1} on the same set of axes.

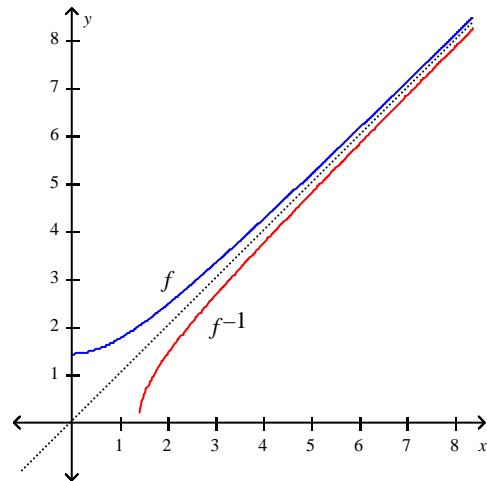$$f(x) = \sqrt{4-x^2}, \ x \ge 0$$

a. $f^{-1}(x) = \sqrt{4-x^2}, \ x \ge 0$
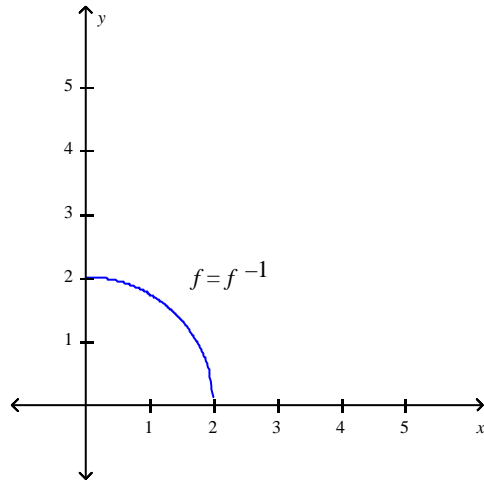
c. $f^{-1}(x) = -\sqrt{4-x^2}, \ x \ge 0$
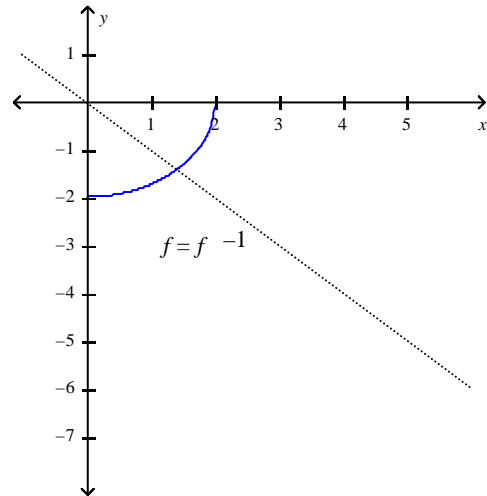
b. $f^{-1}(x) = -\sqrt{2+x^2}, \ x \ge 0$
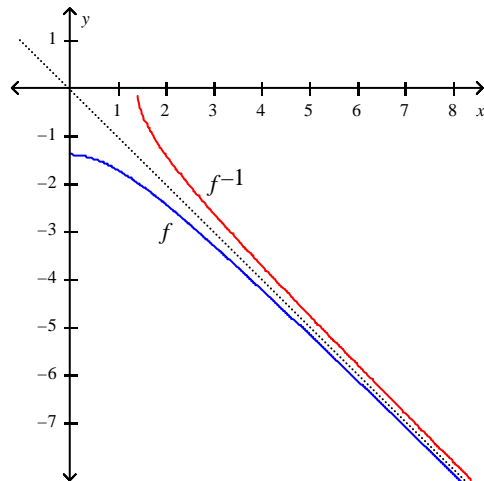
d. $f^{-1}(x) = \sqrt{2+x^2}, \ x \ge 0$

_____ 7. Find the exact value of the given expression.

$$\sin\left(\sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)\right)$$
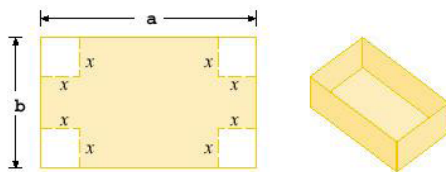
    a. $-\dfrac{1}{2}$

    b. 0

    c. $-\dfrac{\sqrt{3}}{2}$

    d. 1

_____ 8. Simplify the expression.

$$e^{2\ln 6}$$

    a. 12
    b. 36
    c. 8
    d. 64

_____ 9. A box with an open top is to be constructed from a rectangular piece of card board with dimensions $b = 9$ in. by $a = 24$ in. by cutting out equal squares of side x at each corner and then folding up the sides as in the figure.

Express the volume V of the box as a function of x.

    a. $V(x) = 4x^3 + 66x^2 + 216x$
    b. $V(x) = 4x^3 + 33x^2 + 196x$
    c. $V(x) = 4x^3 - 66x^2 + 216x$
    d. $V(x) = x^3 - 33x^2 + 196x$
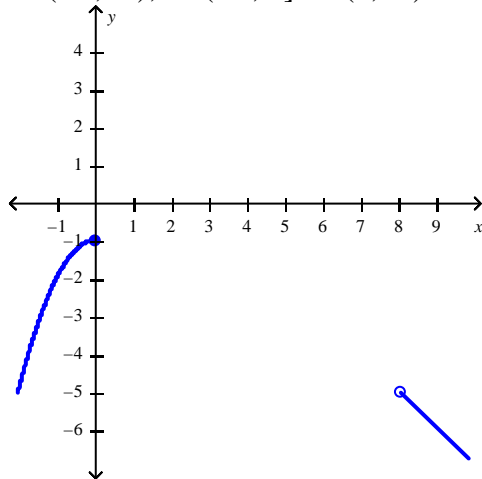   e. $V(x) = x^3 - 66x^2 + 216x$

_____   10. A rectangle has perimeter 22 m. Express the area of the rectangle as a function $A(l)$ of the length l of one of its sides.

        a. $A(l) = 11l + l^2$
        b. $A(l) = 22l - l^2$
        c. $A(l) = 22l + l^2$
        d. $A(l) = 11l - l^2$
        e. $A(l) = l - 11l^2$

_____   11. If $f(x) = 4x^2 + 2$, find and simplify $\dfrac{f(1+h) - f(1)}{h}$, where $h \neq 0$.

        a. $4h$
        b. $2 + 4h^2$
        c. $4 + 8h$
        d. $8 + 4h$

____ 12. Find the domain and sketch the graph of the function. What is its range?

$$f(x) = \begin{cases} -x+3 & \text{if } x \geq 3 \\ x^2 - 1 & \text{if } x < 3 \end{cases}$$

a. **D**: (–∞, ∞); **R**: (–∞, 0] ∪ (8, ∞)

c. **D**: (–∞, ∞); **R**: (–∞, ∞)
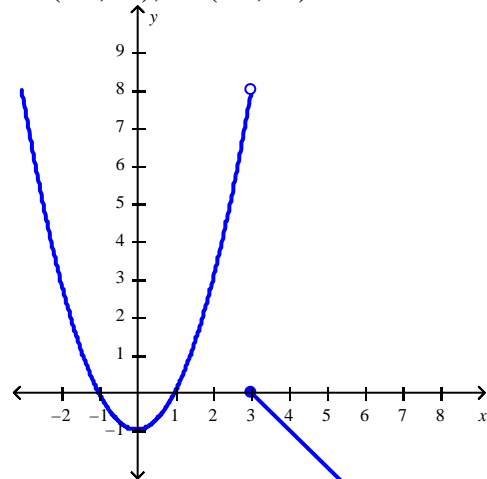
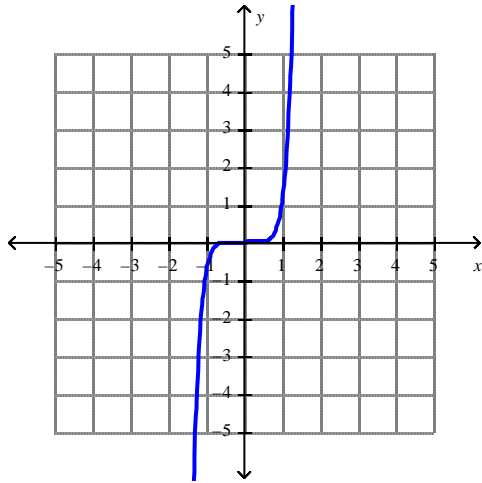b. **D**: (–∞, ∞); **R**: [0, ∞)
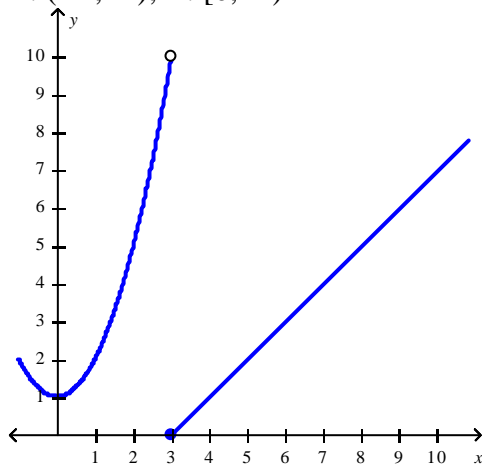
d. **D**: (–∞, ∞); **R**: [–1, ∞)
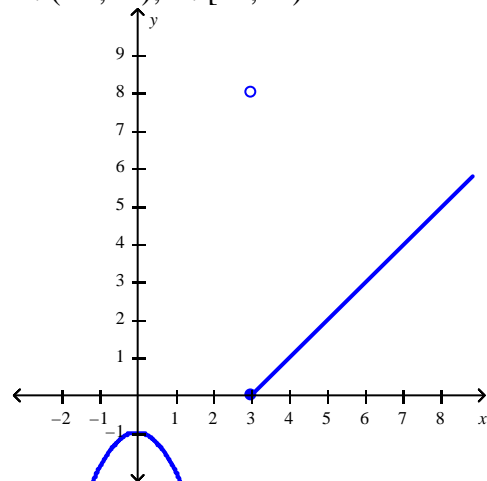
_____ 13. The graph of the function f is given. State the value of $f(0)$.
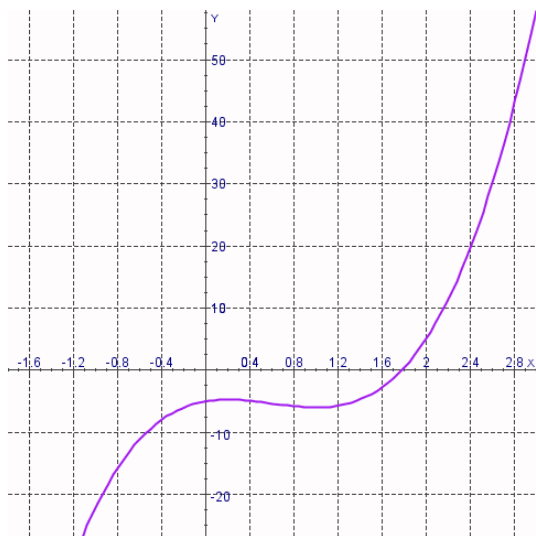
a. $f(0) = -10$
b. $f(0) = 5$
c. $f(0) = 10$
d. $f(0) = -5$
e. $f(0) = 0$

_____ 14. What is the equation of this graph?

a. $y = \sqrt[3]{x}$

b. $y = x^2$

c. $y = x^7$

d. $y = x^{10}$

e. $y = x^8$

_____ 15. The relationship between the Fahrenheit and Celsius temperature scales is given by the linear function.

$$F = \frac{9}{5}C + 32$$

What is the F-intercept and what does it represent?

a. $\frac{9}{5}$, Fahrenheit temperature corresponding to $0\,^{\circ}C$

b. $\frac{9}{5}$, Celsius temperature corresponding to $32\,^{\circ}C$

c. 32, Celsius temperature corresponding to $0\,^{\circ}F$

d. 0, Fahrenheit temperature corresponding to $32\,^{\circ}C$

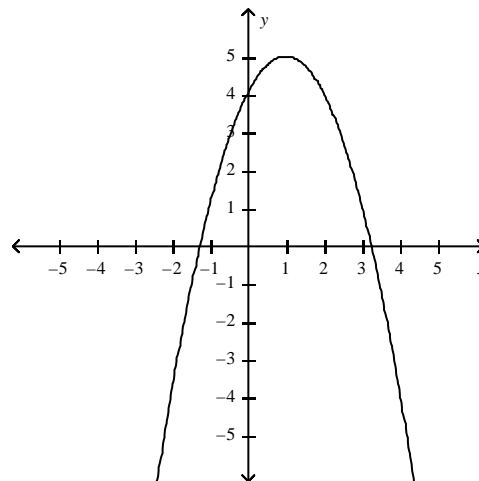e. 32, Fahrenheit temperature corresponding to $0\,^{\circ}C$

_____ 16. Graph the function by hand, not by plotting points, but by starting with the graph of one of the standard functions and then applying the appropriate transformations.
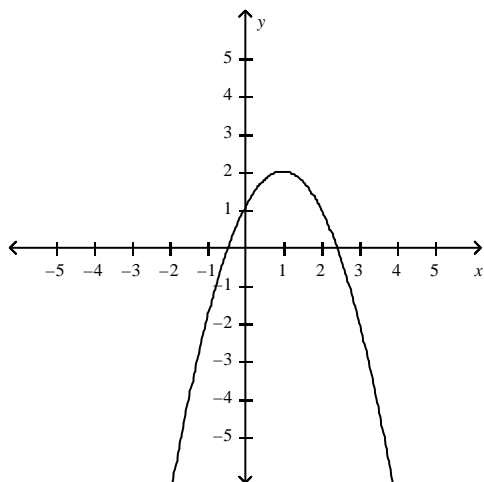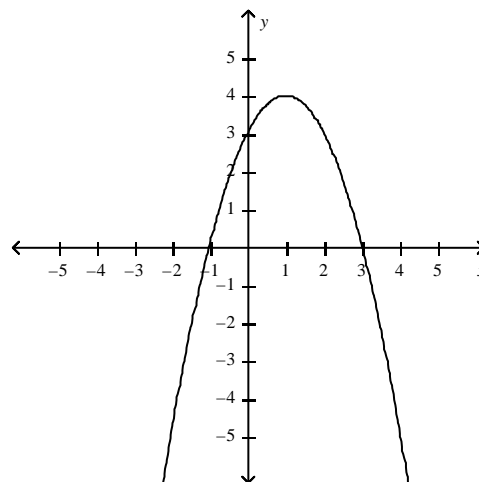
$$y = 1 + 2x - x^2$$

a.
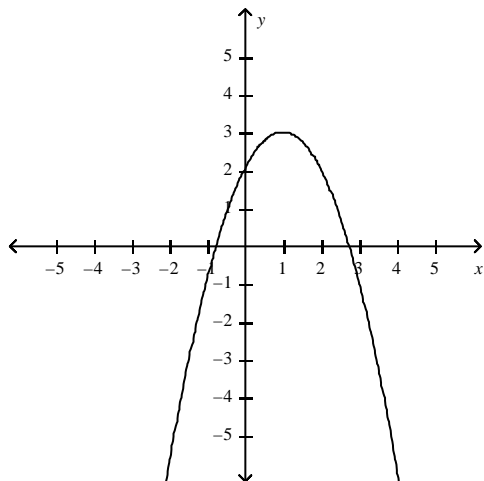
c.

b.

d.

_____ 17. Suppose that the graph of is given f is given. Describe how the graph of the function $y = f(x-3) - 3$ can be obtained from the graph of f.
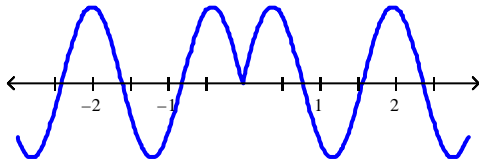
   a. Shift the graph 3 units to the right and 3 units down.
   b. Shift the graph 3 units to the right and 3 units up.
   c. Shift the graph 3 units to the left and 3 units down.
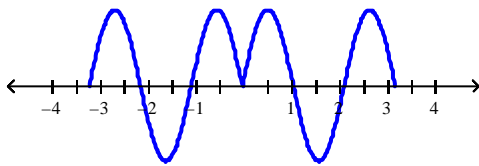   d. Shift the graph 3 units to the left and 3 units up.
   e. None of these

_____ 18. Which of the following graphs is the graph of the function?

$$f(x) = \sin|3x|$$

Graph 1

Graph 2

Graph 3
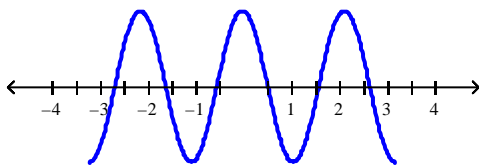
a. Graph 3
b. Graph 1
c. Graph 2

_____ 19. Find the function $\dfrac{f}{g}$ and its domain if $f(x) = \dfrac{x}{x-7}$ and $g(x) = \dfrac{x}{x+7}$.

  a. $\dfrac{x+7}{x-7}$

  $D = (-\infty,-7) \cup (-7,0) \cup (0,7) \cup (7,\infty)$

  b. $\dfrac{x+7}{x-7}$

  $D = (-7,7)$

  c. $\dfrac{x-7}{x+7}$

  $D = (-7,7)$

  d. $\dfrac{x-7}{x+7}$

  $D = (-\infty,-7) \cup (-7,0) \cup (0,7) \cup (7,\infty)$

_____ 20. The graph of the function $f(x) = x^2 - 9x + 5$ has been compressed horizontally by a factor of 2. Find the function for the transformed graph.

  a. $g(x) = 4x^2 - 18x + 5$

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

  c. $g(x) = 2x^2 - 18x + 10$

  d. $g(x) = \dfrac{x^2 - 18x + 20}{4}$

Answer Key

1. A
2. B
3. E
4. E
5. B
6. A
7. C
8. B
9. C
10. D
11. D
12. C
13. D
14. C
15. E
16. B
17. A
18. C
19. A
20. A

Stewart - Calculus 8e ET Chapter 1 Form E

_____ 1. Sandy wishes to have a rectangular garden in her backyard. She has 40 ft of fencing with which to enclose her garden. Letting x denote the width of the garden, find a function f in the variable x that gives the area of the garden. Select the correct answer.
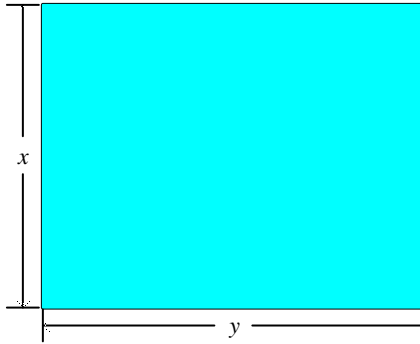

a. $f(x) = 40x - x^2$, $0 < x < 20$
b. $f(x) = 20x - x^2$, $0 < x < 20$
c. $f(x) = 40x - x^2$, $0 < x < 40$
d. $f(x) = 20x - x^2$, $0 < x < 40$

2. An open rectangular box with volume $2 \ m^3$ has a square base. Express the surface area of the box as a function $S(x)$ of the length x of a side of the base.

_____ 3. Determine whether f is even, odd, or neither. Select the correct answer.

$$f(x) = \frac{4x^2}{x^4 + 5}$$

a. neither
b. odd
c. even

4. The monthly cost of driving a car depends on the number of miles driven. Julia found that in October it cost her $\$200$ to drive 300 mi and in July it cost her $\$350$ to drive 600 mi. Express the monthly cost C as a function of the distance driven d assuming that a linear relationship gives a suitable model.

5. If $f(x) = x + 5$ and $h(x) = 4x - 10$, find a function g such that $g \circ f = h$.

_____ 6. The graph of the function f follows. Choose the graph of $y = f(|x|)$.

a.

c.

b.

d.
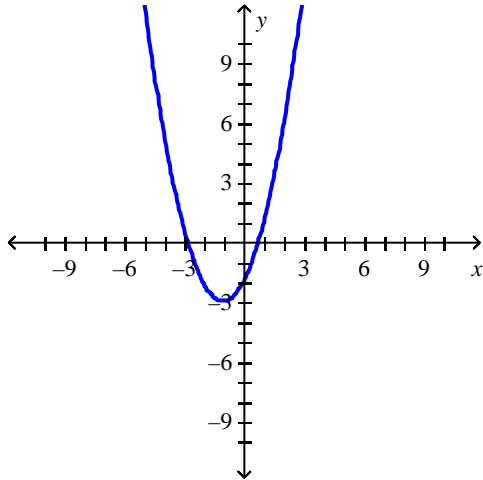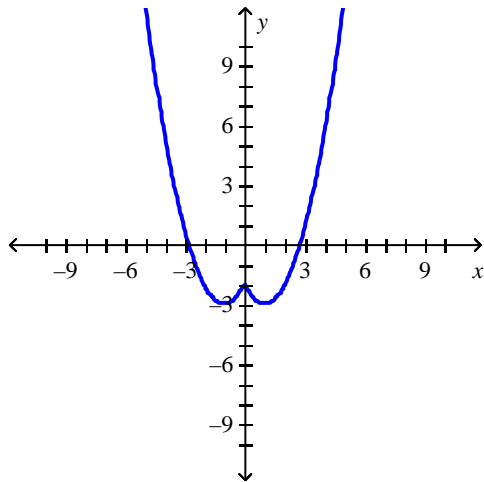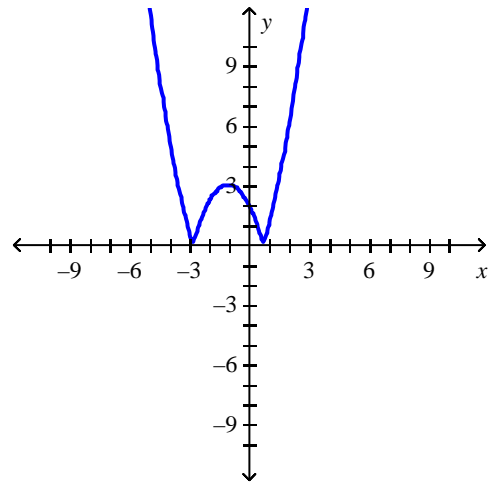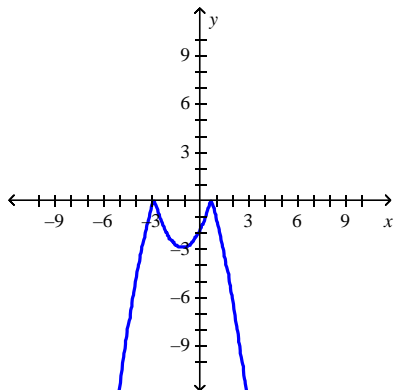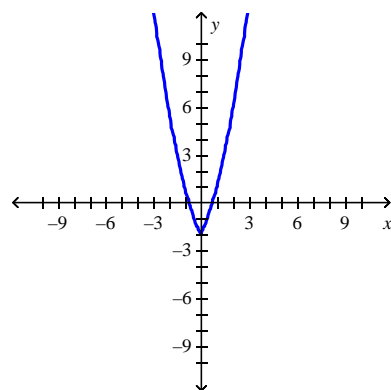
7. Sketch the graph of $y = -1 - \cos x$ over one period.

8. Find the function $f \cdot g$ and its domain if $f(x) = \sqrt{x+7}$ and $g(x) = \sqrt{x-7}$.

____ 9. If a ball is thrown into the air with a velocity of 58 ft/s, its height (in feet) after t seconds is given by

$$H = 58t - 9t^2.$$

Find the velocity when $t = 9$. Select the correct answer.

   a. -101 ft/s
   b. -104 ft/s
   c. -106 ft/s
   d. -103 ft/s
   e. -99 ft/s

10. The position of a car is given by the values in the following table.

t (seconds)	0	1	2	3	4
s (meters)	0	21.9	25.8	69.2	92.2

Find the average velocity for the time period beginning when $t = 2$ and lasting 2 seconds.

____ 11. Find the value of $\lim\limits_{x \to 0^+} f(x)$. Select the correct answer.

$$f(x) = \frac{1}{1 + 6^{1/x}}.$$

   a. 0
   b. -0.7
   c. -0.7
   d. -0.6
   e. 0.16

12. Find the vertical asymptotes of the function.

$$y = \frac{8x^2 + 1}{9x - 8x^2}$$

13. Find the limit $\lim\limits_{h \to 3} \left(h^4 - 3h^3 - 4h + 5 \right)$.

____ 14. Find the limit $\lim\limits_{x \to 1} \dfrac{x^2 + x - 2}{x - 1}$, if it exists.   Select the correct answer.

    a. 1
    b. 3
    c. 2
    d. Does not exist

15. Evaluate the limit, if it exists.

$$\lim\limits_{h \to 0} \frac{(x - h)^6 - x^6}{h}$$

16. Find the limit.

$$\lim\limits_{x \to 2^-} \frac{x^2 - 2x}{x^2 - 4x + 4}$$

17. Determine where f is discontinuous.

$$f(x) = \begin{cases} \sqrt{-x} & \text{if} \quad x < 0 \\ 5 - x & \text{if} \quad 0 \le x < 5 \\ (5 - x)^2 & \text{if} \quad x > 5 \end{cases}$$

____ 18. If f and g are continuous functions with $f(9) = 6$ and $\lim\limits_{x \to 9} \left[2f(x) - g(x) \right] = 9$, find $g(9)$.
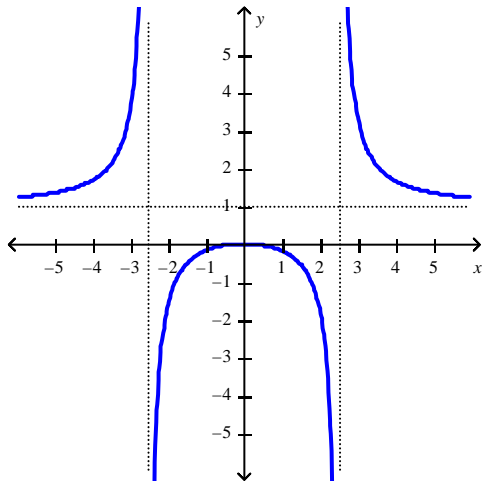
Select the correct answer.

    a. $g(9) = 21$
    b. $g(9) = 15$
    c. $g(9) = 12$
    d. $g(9) = 24$
    e. $g(9) = 3$

19. How would you define $f(7)$ in order to make f continuous at 7?

$$f(x) = \frac{x^2 - 2x - 3}{x - 7}$$

_____ 20. Use the graph to determine where the function is discontinuous. Select the correct answer.

   a. At 0

   b. On the interval $(0, 1)$

   c. At ± 2.5
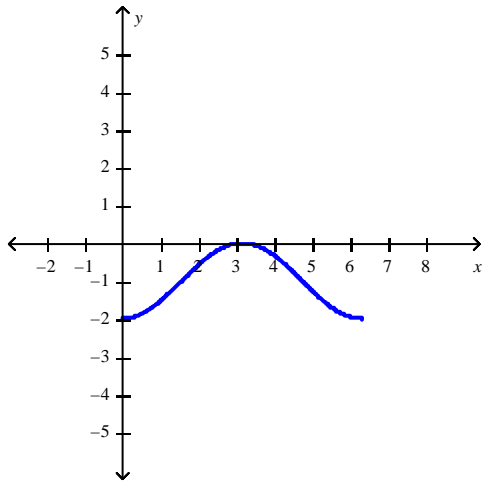
   d. At 1

Answer Key

1. B

2. $S(x) = x^2 + \dfrac{8}{x}$

3. C

4. $C = 0.5d + 50$

5. $g(x) = 4x - 30$

6. D

7.

8. $\sqrt{x^2 - 49}$

$D = [7, \infty)$

9. B

10. 33.2 ft/s

11. A

12. none of these

13. –7

14. B

15. $-6x^5$

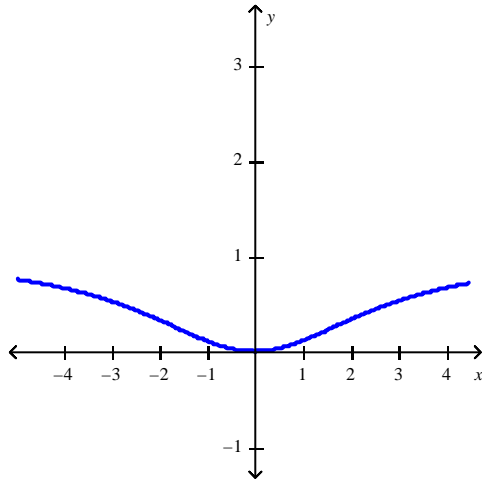16. $-\infty$

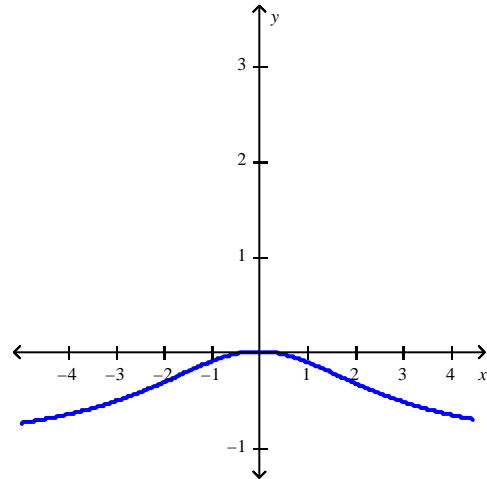17. 0 and 5

18. E

19. $f(7) = 12$

20. C

_____   1. Plot the graph of the function f in an appropriate viewing window. Select the correct answer.
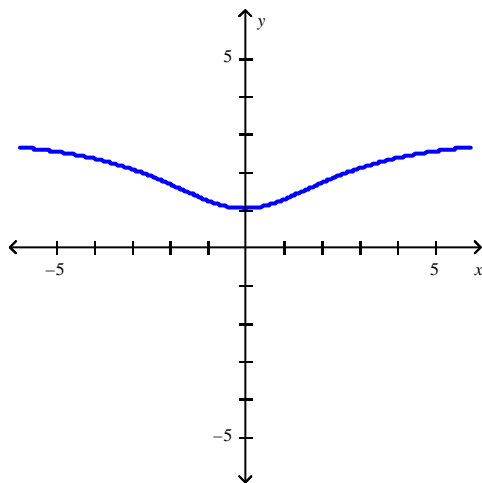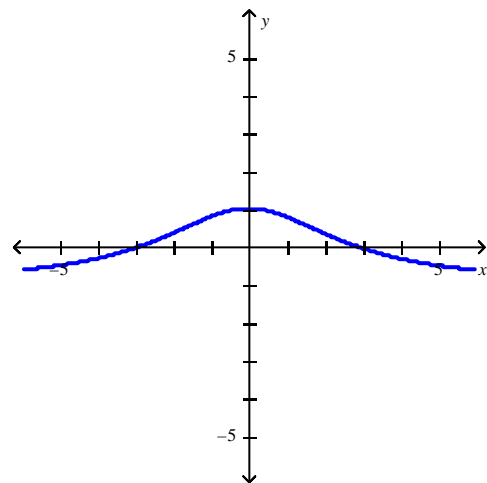
$$f(x) = \frac{x^2}{x^2 + 8}$$

a.

c.

b.

d.

2. Plot the graph of the function f in an appropriate viewing window.

$$f(x) = x + 0.02 \sin 40x$$

3. Use the Law of Exponents to rewrite and simplify the expression.

$$\frac{\sqrt{a\sqrt{b}}}{\sqrt[5]{ab}}$$

_____ 4. Starting with the graph of $y = e^x$, find the equation of the graph that results from reflecting about the line $y = 3$. Select the correct answer.

    a. $y = -e^x$
    b. $y = -e^x + 6$
    c. $y = -e^{-3x} + 6$
    d. $y = e^{-x} + 6$
    e. $y = -e^{x+6}$

5. Use the Law of Exponents to rewrite and simplify the expression.

$$\frac{x^{4x} \cdot x^{5x+1}}{x^{x-5}}$$

_____ 6. Starting with the graph of $y = e^x$, write the equation of the graph that results from shifting 5 units right. Select the correct answer.
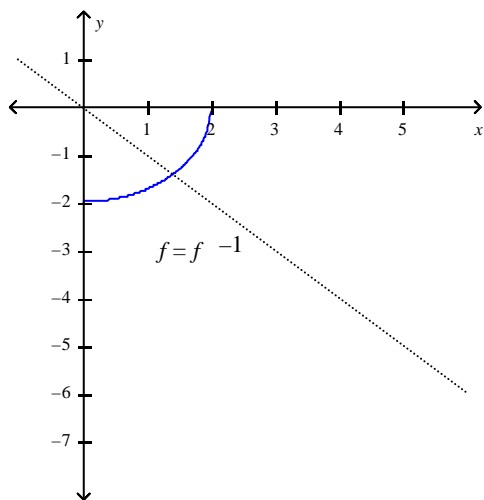
    a. $y = e^{x+5}$
    b. $y = e^x - 5$
    c. $y = e^{x-5}$
    d. $y = e^x + 5$
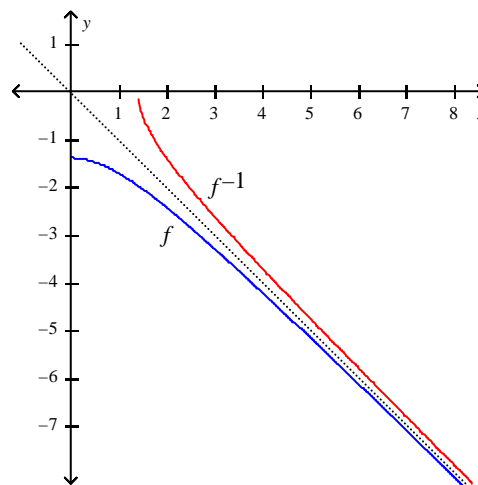   e. $y = 5e^{x-5}$

_____ 7. Find the inverse of f. Then sketch the graphs of f and f^{-1} on the same set of axes. Select the correct answer.
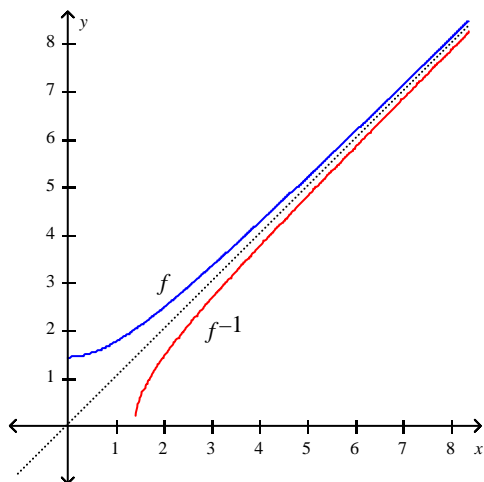
$$f(x) = \sqrt{4-x^2}, \ x \geq 0$$
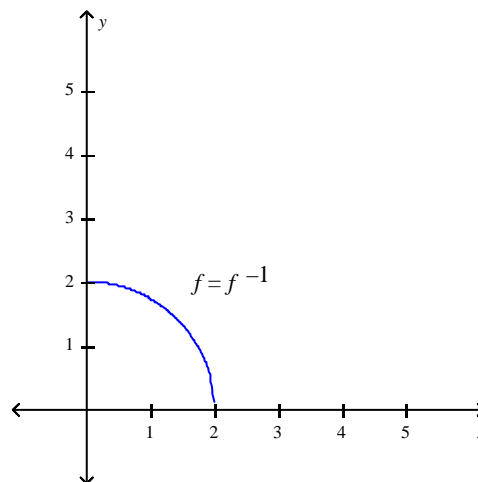
a. $f^{-1}(x) = -\sqrt{4-x^2}, \ x \geq 0$

c. $f^{-1}(x) = -\sqrt{2+x^2}, \ x \geq 0$

b. $f^{-1}(x) = \sqrt{2+x^2}, \ x \geq 0$

d. $f^{-1}(x) = \sqrt{4-x^2}, \ x \geq 0$


8. Solve the equation.

$$4e^{x+5} = 2$$

9. When a camera flash goes off, the batteries immediately begin to recharge the flash's capacitor, which stores electric charge given by

$$Q(t) = Q_0\left(1 - e^{-t/a}\right)$$

(The maximum charge capacity Q_0 is and t is measured in seconds.) How long does it take to recharge the capacitor to 90% of capacity if $a = 3$?

____ 10. If $f(x) = x^2 - x + 6$, evaluate the difference quotient $\dfrac{f(a+h)-f(a)}{h}$. Select the correct answer.

    a. $2a+h-6$
    b. $2a-6$
    c. $2a-h-6$
    d. h
    e. none of these

11. A rectangle has perimeter 14 m. Express the area of the rectangle as a function $A(l)$ of the length l of one of its sides.

12. The graph shown gives the weight of a certain person as a function of age. Find the age at which the person started an exercise program.
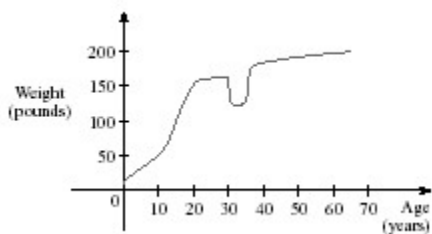
13. What is the equation of this graph?
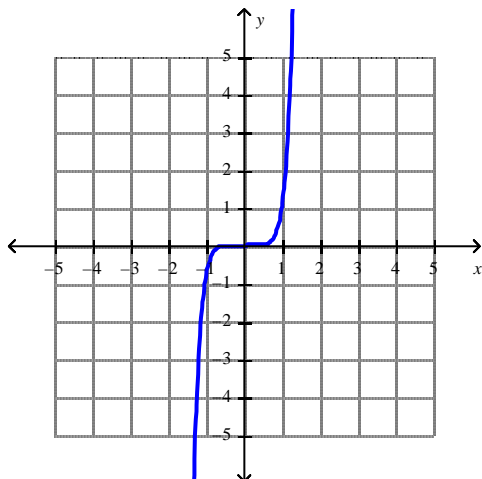
14. The relationship between the Fahrenheit and Celsius temperature scales is given by the linear function.

$$F = \frac{9}{5}C + 32$$

What is the *F*-intercept and what does it represent?

____ 15. Classify the function as a Polynomial function, a Rational function, an algebraic function, or other.

$$f(x) = -8x^{-7} - x^{-5} - 7$$

Select the correct answer.
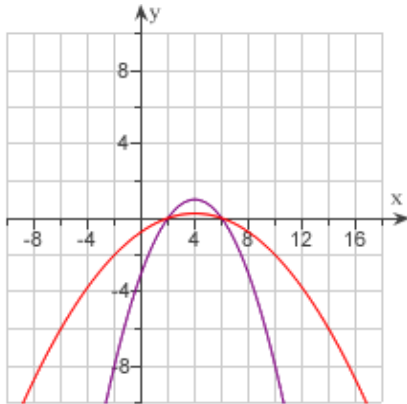
a. Other
b. Algebraic
c. Rational
d. Polynomial

16. Use the table to evaluate the expression $(f \circ g)(6)$.

x	1	2	3	4	5	6
$f(x)$	3	2	1	0	1	2
$g(x)$	6	5	2	3	4	6

17. What is $\sqrt[10]{x}$, given that $H = f \circ g \circ h$ and $H(x) = \sqrt[10]{\sqrt{x} - 3}$?

____ 18. Which of the following is the equation for the function $g(x)$? Select the correct answer.

a. $g(x) = 4f(x)$
b. $g(x) = f(x) - 4$

c. $g(x) = -f(x + 4)$
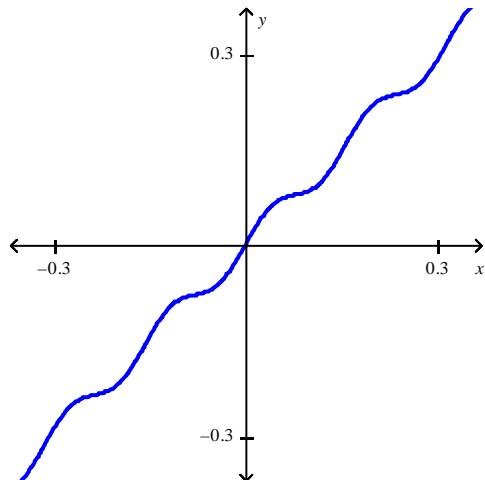
d. $g(x) = \dfrac{f(x)}{4}$

e. $g(x) = -f(x) + 4$

19. Find the function $f \circ g$ and its domain if $f(x) = \dfrac{x-1}{x}$ and $g(x) = \dfrac{x}{x+3}$.

20. The graph of the function $f(x) = x^2 - 11x + 7$ has been stretched horizontally by a factor of 2. Find the function for the transformed graph.

Answer Key

1. A

2.

3. $a^{\frac{3}{10}} b^{\frac{1}{20}}$

4. B

5. x^{8x+6}

6. C

7. D

8. $x = \ln \dfrac{1}{2} - 5$

9. $-3\ln\left(\dfrac{1}{10}\right)$ seconds

10. E

11. $A(l) = 7l - l^2$

12. 30

13. $y = x^7$

14. 32, Fahrenheit temperature corresponding to $0\,^{\circ}C$

15. C

16. 2

17. $f(x)$

18. D

19. $-\dfrac{3}{x}$,

    $D = (-\infty, -3) \cup (-3, 0) \cup (0, \infty)$

20. $g(x) = \dfrac{x^2 - 22x + 28}{4}$

Stewart - Calculus 8e ET Chapter 1 Form G

1. Plot the graph of the function f in an appropriate viewing window.

$$f(x) = \frac{x^3}{x^3 + 5}$$

2. Plot the graph of the function f in an appropriate viewing window.

$$f(x) = x + 0.05 \sin 50x$$

3. Starting with the graph of $y = e^x$, find the equation of the graph that results from reflecting about the line $y = 1$. Select the correct answer.

   a. $y = e^{-x} + 2$
   b. $y = -e^{-1x} + 2$
   c. $y = -e^x$
   d. $y = -e^x + 2$
   e. $y = -e^{x+2}$

4. Use the Law of Exponents to rewrite and simplify the expression.

$$\frac{x^{4n} \cdot x^{5n+1}}{x^{n-3}}$$

5. If a bacteria population starts with 100 bacteria and doubles every three hours, then the number of bacteria after t hours is

$$n = f(t) = 100\left(2^{\frac{t}{3}}\right).$$

   When will the population reach 55,000? Round the answer to the nearest tenth.
   Select the correct answer.

   a. 22.3 hours
   b. 27.3 hours
   c. 32.3 hours
   d. 37.3 hours
   e. 17.3 hours

_____ 6. Find $f^{-1}(a)$ for the function f and the real number a. Select the correct answer.

$$f(x) = x^3 + x - 1; \ a = -3$$

a. -2
b. -1
c. 1
d. 0

7. Find the exact value of the given expression.

$$\sin^{-1} \frac{1}{2}$$

8. Use the laws of logarithms to expand the expression.

$$\ln \left(\frac{x+4}{x-5} \right)^{\frac{1}{2}}$$

_____ 9. Simplify the expression. Select the correct answer.

$$e^{2\ln 5}$$

a. 25
b. 32
c. 7
d. 10

10. If $f(x) = x^2 - x + 6$, evaluate the difference quotient $\dfrac{f(a+h) - f(a)}{h}$.

_____ 11. A rectangle has perimeter 12 m. Express the area of the rectangle as a function $A(l)$ of the length l of one of its sides. Select the correct answer.

a. $A(l) = l - 6l^2$
b. $A(l) = 12l - l^2$
c. $A(l) = 6l - l^2$
d. $A(l) = 6l + l^2$
e. $A(l) = 12l + l^2$

12. Find the domain of the function $f(x) = \dfrac{x}{-5\sin x + 7}$.

____ 13. The graph shown gives the weight of a certain person as a function of age. Find the age at which the person started an exercise program. Select the correct answer.
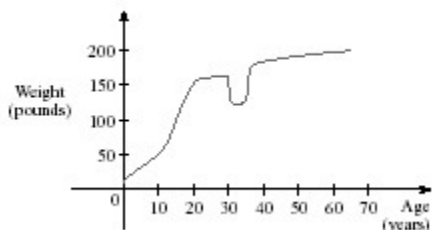
    a. 20
    b. 35
    c. 54
    d. 30
    e. 38

14. An open rectangular box with volume 6 m^3 has a square base. Express the surface area of the box as a function $S(x)$ of the length x of a side of the base.

____ 15. Determine whether f is even, odd, or neither. Select the correct answer.

$$f(x) = \frac{6x^2}{x^4 + 3}$$

    a. neither
    b. even
    c. odd

16. Find the range of the function.

$$y = 4 + \cos x$$

17. If $f(x) = x + 5$ and $h(x) = 4x - 10$, find a function g such that $g \circ f = h$.

____ 18. The graph of the function f follows. Choose the graph of $y = |f(x)|$.

a.

c.

b.

d.
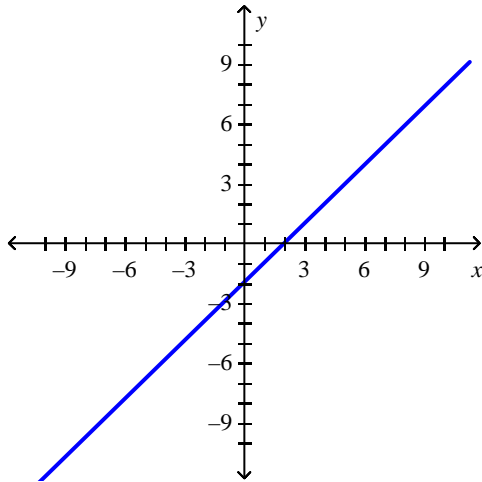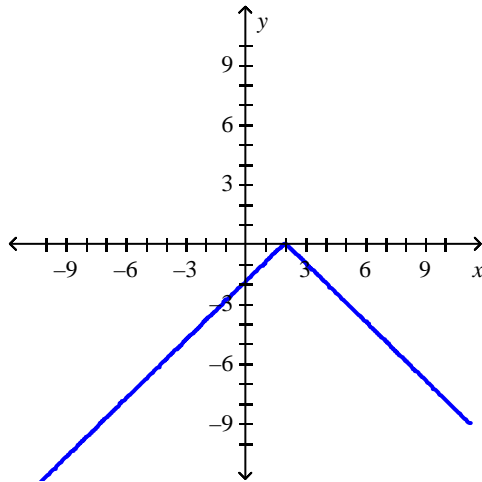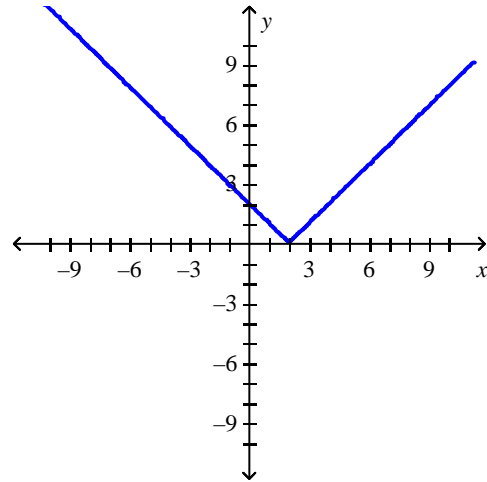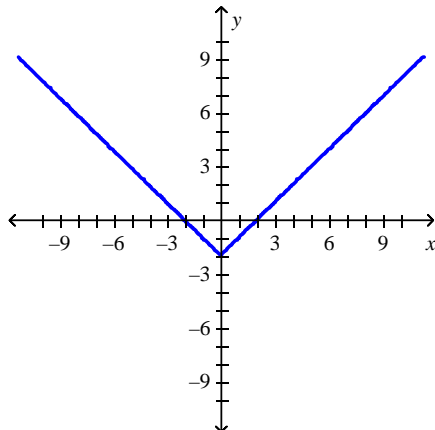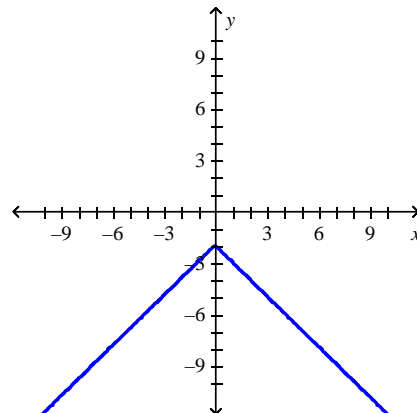
_____ 19. Suppose that the graph of is given f is given. Describe how the graph of the function $y = f(x-3)-3$ can be obtained from the graph of f. Select the correct answer.

    a. Shift the graph 3 units to the right and 3 units down.
    b. Shift the graph 3 units to the right and 3 units up.
    c. Shift the graph 3 units to the left and 3 units up.
    d. Shift the graph 3 units to the left and 3 units down.
    e. None of these

20. Which of the following graphs is the graph of the function?
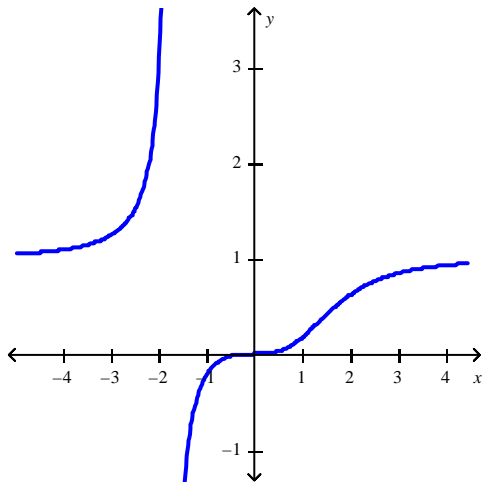
$f(x) = \sin|2x|$
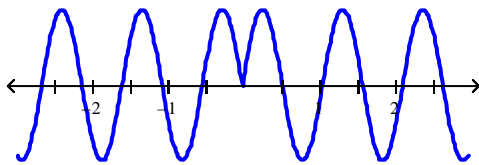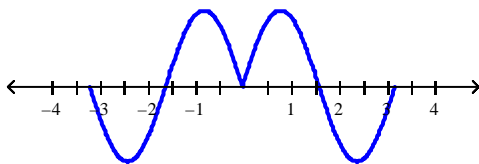
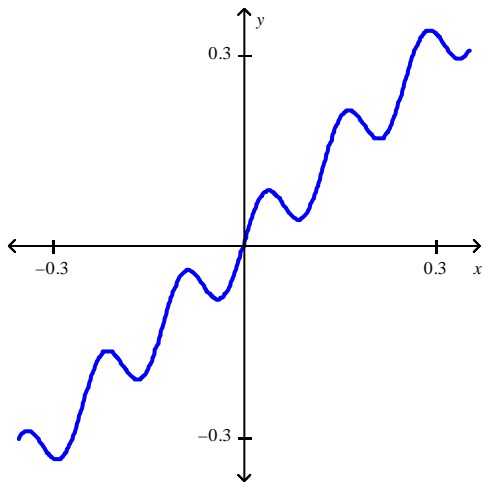Graph 1
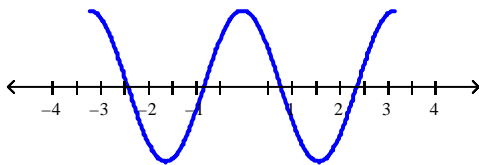
Graph 2

Graph 3

Answer Key

1.

2.

3. D

4. x^{8x+4}

5. B

6. B

7. $\dfrac{\pi}{6}$

8. $\dfrac{1}{2} \ln(x+4) - \dfrac{1}{2} \ln(x-5)$

9. A

10. none of these

11. C

12. $(-\infty, \infty)$

13. D

14. $S(x) = x^2 + \dfrac{24}{x}$

15. B

16. $[3, 5]$

17. $g(x) = 4x - 30$

18. C

19. A

20. Graph 2

Stewart - Calculus 8e ET Chapter 1 Form H

1. Plot the graph of the function f in an appropriate viewing window.

$$f(x) = \frac{x^4}{x^4 + 2}$$

____ 2. Find the points of intersection of the graphs of the functions. Express your answers accurate to five decimal places. Select the correct answer.

$$f(x) = 0.5x^3 - 1.8x^2 + 2.2x - 4; \ g(x) = 2.8x - 4.3$$

   a. (–0.55126, –5.84352),
      (3.87001, 6.53604)
   b. (–0.55126, –1.54352)
      (0.28124, 10.83604)
      (3.87001, 0.78748)
   c. (–0.55126, –1.54352)
      (3.87001, 0.78748)
   d. (–0.55126, –5.84352),
      (0.28124, –3.51252)
      (3.87001, 6.53604)

3. The function $f(x) = \sqrt{4 + cx^2}$ is graphed below.
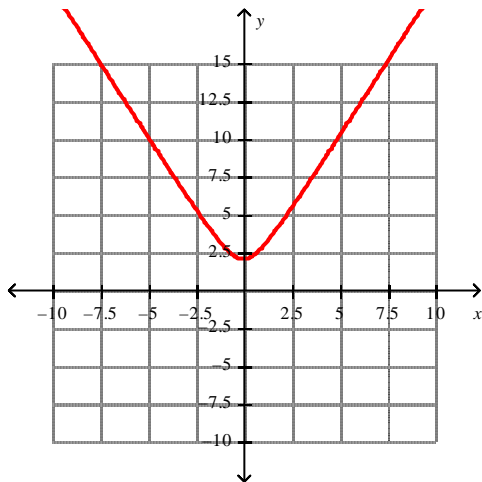
4. Find the inverse function of $f(x) = \dfrac{x+1}{3x+1}$.

_____   5. Determine whether the function is one-to-one.

$$f(x) = \sqrt{4 - x^2}$$

    a. Yes
    b. No

6. Find the exact value of the given expression.

$$\tan^{-1} 1$$

7. Use the laws of logarithms to expand the expression.

$$\ln \left(\frac{x + 5}{x - 6} \right)^{\frac{1}{2}}$$

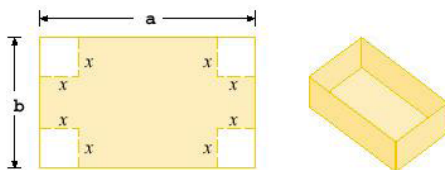_____   8. Simplify the expression. Select the correct answer.

$$e^{3\ln 6}$$

    a. 9
    b. 18
    c. 216
    d. 729

9. Solve the equation.

$$4e^{x+5} = 2$$

10. A box with an open top is to be constructed from a rectangular piece of card board with dimensions $b = 4$ in. by $a = 28$ in. by cutting out equal squares of side x at each corner and then folding up the sides as in the figure.

Express the volume V of the box as a function of x.

_____ 11. Find an expression for the function $y = f(x)$ whose graph is the bottom half of the parabola $x + (6-y)^2 = 0$. Select the correct answer.

    a. $y = 6 - \sqrt{-x}$
    b. $y = 36 - \sqrt{-x}$
    c. $y = 6 + \sqrt{x}$
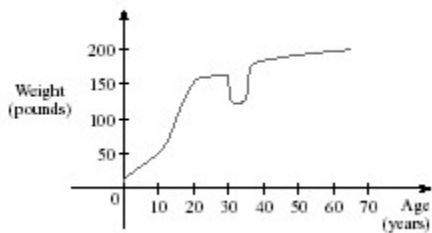   d. $y = 36 - x^2$
    e. $y = 6 - x^2$

12. Find the domain of the function.

$$f(x) = \frac{7x + 1}{x^2}$$

13. Find the domain and sketch the graph of the function. What is its range?

$$f(x) = \begin{cases} -x + 3 & \text{if } x \geq 3 \\ x^2 - 1 & \text{if } x < 3 \end{cases}$$

_____ 14. The graph shown gives the weight of a certain person as a function of age. Find the age at which the person started an exercise program. Select the correct answer.

    a. 20
    b. 54
    c. 38
    d. 30
    e. 35

_____ 15. Find the domain. Select the correct answer.

$$g(u) = \sqrt{u} - \sqrt{3-u}$$
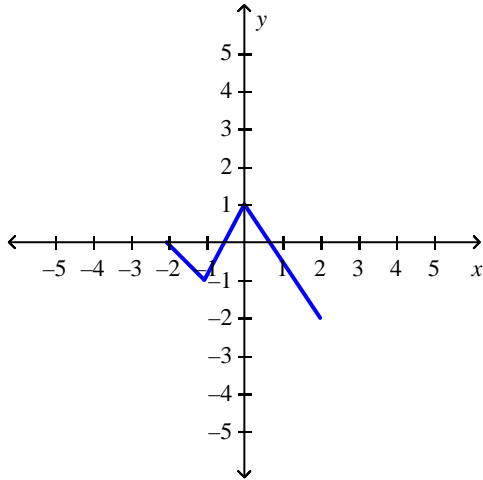
 a. $(0, 3)$

 b. $(-\infty, 0]$

 c. $(-3, \infty]$

 d. $[0, 3]$

 e. $[0, \infty)$

16. Graph the function by hand, not by plotting points, but by starting with the graph of one of the standard functions and then applying the appropriate transformations.
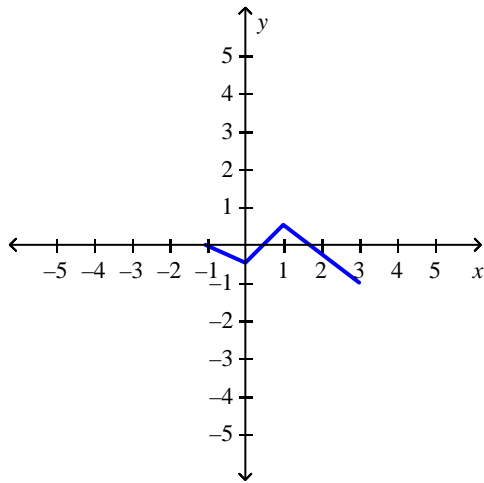
$$y = 4 + 2x - x^2$$

_____ 17. The graph of the function f follows. Choose the graph of $y = \frac{1}{2}f(x-1)$.

a.

c.

b.

d.
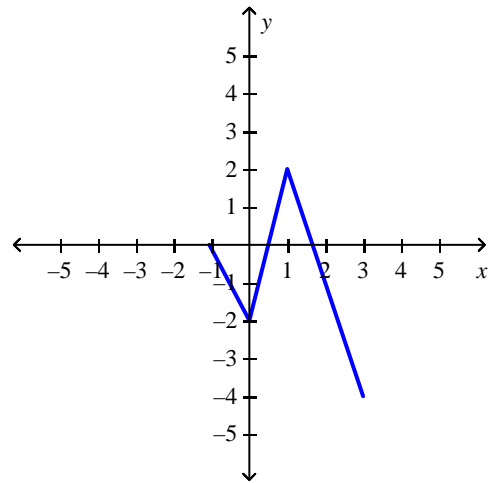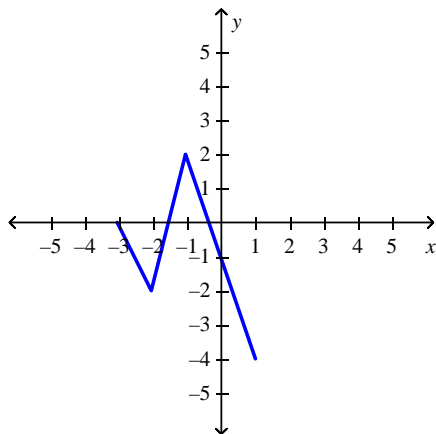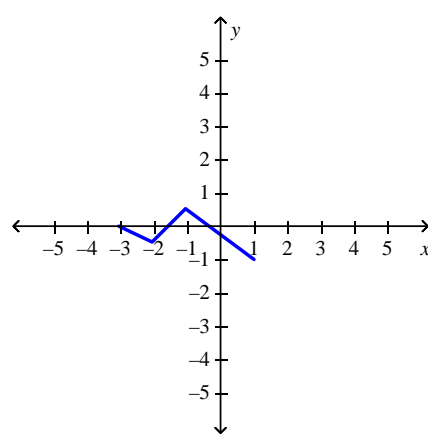
18. Sketch the graph of $y = -1 - \cos x$ over one period.

19. Find the function $f \circ g$ and its domain if $f(x) = \dfrac{x-1}{x}$ and $g(x) = \dfrac{x}{x+3}$.

_____ 20. The graph of the function $f(x) = x^2 - 11x + 7$ has been stretched horizontally by a factor of 2. Find the function for the transformed graph. Select the correct answer.

    a. $g(x) = \dfrac{x^2 - 11x + 7}{2}$
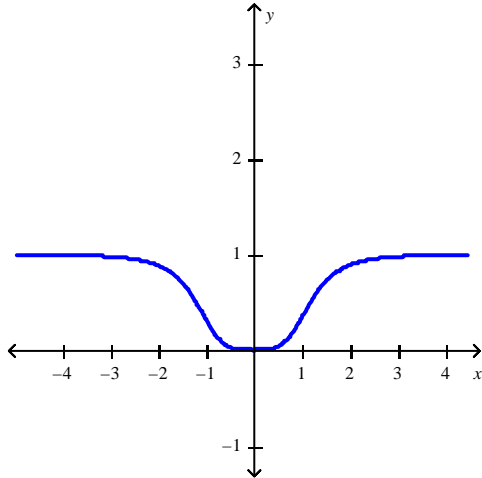
    b. $g(x) = 2x^2 - 22x + 14$

    c. $g(x) = \dfrac{x^2 - 22x + 28}{4}$

    d. $g(x) = 4x^2 - 22x + 7$

Answer Key

1.

2. D
3. $c > 0$
4. $f^{-1}(x) = -\dfrac{x-1}{3x-1}$
5. B
6. $\dfrac{\pi}{4}$
7. $\dfrac{1}{2} \ln (x + 5) - \dfrac{1}{2} \ln (x - 6)$
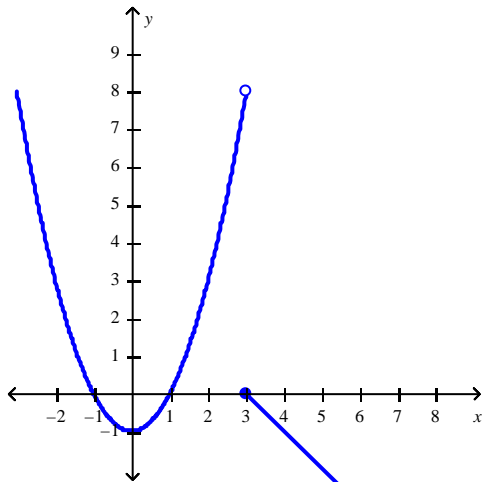8. C
9. $x = \ln \dfrac{1}{2} - 5$
10. $V(x) = 4x^3 - 64x^2 + 112x$
11. A
12. $(-\infty, 0) \cup (0, \infty)$
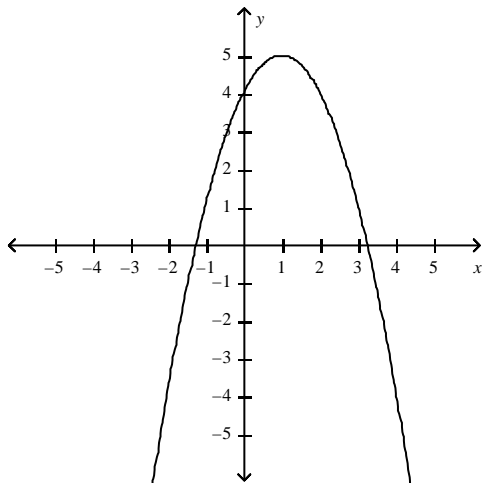13. D: $(-\infty, \infty)$; R: $(-\infty, \infty)$

14. D
15. D

16.

17. A
18.

19. $-\dfrac{3}{x}$,

    $D = (-\infty, -3) \cup (-3, 0) \cup (0, \infty)$

20. C