Stewart - Calculus 8e Chapter 1 Form A

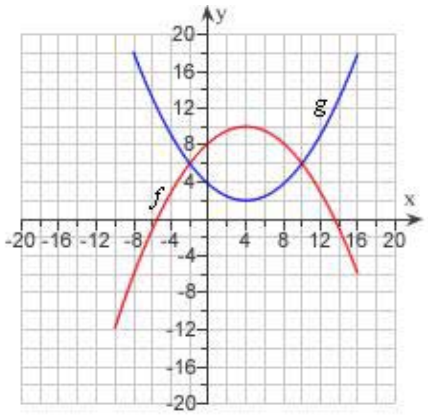
1. Find the domain of the function.

$$f(x) = \frac{5}{4x - 1}$$

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

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

3. 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 $g(4)$.



4. 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 $A = 90\,\mathrm{m}^2$. 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.

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

$v(t) = \sec\left(t^4\right)\tan\left(t^4\right)$

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

t (seconds)	0	1	2	3	4	5
s (feet)	0	16	35	71	112	179

Estimate the instantaneous velocity when $t = 2$ by averaging the velocities for the periods $[1, 2]$ and $[2, 3]$.

7. Consider the following function.

$$f(x) = \begin{cases} 3 - x & x < -1 \\ x & -1 \le x < 3 \\ (x-3)^2 & x \ge 3 \end{cases}$$

Determine the values of *a* for which $\lim_{x \to a} f(x)$ exists.

8. Find the limit.

$$\lim_{x \to 0^+} \tan^{-1}\left(\frac{2}{x}\right)$$

9. Evaluate the limit.

$$\lim_{x \to 0} \frac{(6+x)^{-1} - 6^{-1}}{x}$$

10. Find the limit.

$$\lim_{x \to \frac{10}{x}} \tan^{-1}\left(\frac{5}{x}\right)$$

Stewart - Calculus 8e Chapter 1 Form A

11. Evaluate the limit.

$$\lim_{x \to 3} \left(\frac{x^3 - 5}{x^2 - 6} \right)$$

12. Evaluate the limit.

$$\lim_{x \to 9} \frac{3 - \sqrt{x}}{x - 9}$$

13. Evaluate the limit.

$$\lim_{x \to 0} \frac{3 - \sqrt{3 - x^2}}{x}$$

14. Find a number δ such that if $|x - 2| < \delta$, then $|4x - 8| < \varepsilon$, where $\varepsilon = 0.1$.

15. Find the point at which the given function is discontinuous.

$$f(x) = \begin{cases} \dfrac{1}{x - 7}, & x \neq 7 \\ 7, & x = 7 \end{cases}$$

16. Write an equation that expresses the fact that a function f is continuous at the number 4.

17. Find a function *g* that agrees with f for $x \neq 25$ and is continuous on $\Re$.

$$f(x) = \frac{5 - \sqrt{x}}{25 - x}$$

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

19. Find the limit $\lim_{x \to 0^+} \dfrac{9 + \sqrt{x}}{\sqrt{x + 16}}$.

20. Find the numbers, if any, where the function $f(x) = \dfrac{x - 3}{x^2 - 9}$ is discontinuous.

Stewart - Calculus 8e Chapter 1 Form A

Answer Key

1. $\left\{ x \middle| x \neq \frac{1}{4} \right\}$

2. even

3. a) –2, 10
   b) $f(-2) = 6,\ g(4) = 2$

4. a) 3 species
   b) $702\,\text{m}^2$

5. $f(t) = \sec(t)\tan(t)$
   $g(t) = t^4$

6. 27.5 ft/s

7. $(-\infty,\ -1) \cup (-1,\ 3) \cup (3,\ \infty)$

8. $\frac{\pi}{2}$

9. $-\frac{1}{36}$

10. 0

11. $\frac{22}{3}$

12. $-1/6$

13. ∞

14. $\delta = 0.025$

15. 7

16. $\lim_{x \to 4} f(x) = f(4)$

17. $g(x) = \dfrac{1}{5 + \sqrt{x}}$

18. –6

19. $\dfrac{9}{4}$

20. ± 3

Stewart - Calculus 8e Chapter 1 Form B

1. Find the domain of the function.

   $f(x) = \sqrt{49 - x^2}$

2. 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.

3. 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 $A = 90\,\mathrm{m}^2$.
   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.

4. A spherical balloon with radius r inches has volume $4\frac{\pi r^3}{3}$.
   Find a function that represents the amount of air required to inflate the balloon from a radius of r inches to a radius of $r+3$ inches.

5. A stone is dropped into a lake, creating a circular ripple that travels outward at a speed of 45 cm/s. Express the radius *r* of this circle as a function of the time *t* (in seconds) and find $A \circ r$, if *A* is the area of this circle as a function of the radius.

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

t (seconds)	0	1	2	3	4	5
s (feet)	0	16	35	71	112	179

   Estimate the instantaneous velocity when $t = 2$ by averaging the velocities for the periods $[1, 2]$ and $[2, 3]$.

7. Evaluate the function

$$f(x) = 7\left(\frac{\sqrt{x} - \sqrt{2}}{x - 2}\right)$$

at the given numbers (correct to six decimal places). Use the results to guess the value of the limit $\lim_{x \to 2} f(x)$.

x	$f(x)$
1.6	
1.8	
1.9	
1.99	
1.999	
2.4	
2.2	
2.1	
2.01	
2.001	
Limit	

8. By graphing the function

$$f(x) = \frac{(\cos x - \cos 5x)}{x^2}$$

and zooming in toward the point where the graph crosses the *y*-axis, estimate the value of $\lim_{x \to 0} f(x)$.

Stewart - Calculus 8e Chapter 1 Form B

9. Consider the following function.

$$f(x)=\begin{cases} 3-x & x<-1 \\ x & -1\le x<3 \\ (x-3)^2 & x\ge 3 \end{cases}$$

Determine the values of *a* for which $\lim_{x\to a} f(x)$ exists.

10. How close to 2 do we have to take *x* so that $5x+3$ is within a distance of 0.01 from 13?

11. Find the limit.

$$\lim_{x\to 0^+} \tan^{-1}\left(\frac{2}{x}\right)$$

12. Evaluate the limit.

$$\lim_{x\to\infty} \frac{10x^2-3x+1}{7x^2+3x-3}$$

13. Find the limit.

$$\lim_{x\to \frac{10}{x}} \tan^{-1}\left(\frac{5}{x}\right)$$

14. Evaluate the limit.

$$\lim_{x\to 9} \frac{3-\sqrt{x}}{x-9}$$

15. Find the limit if $g(x)=x^4$.

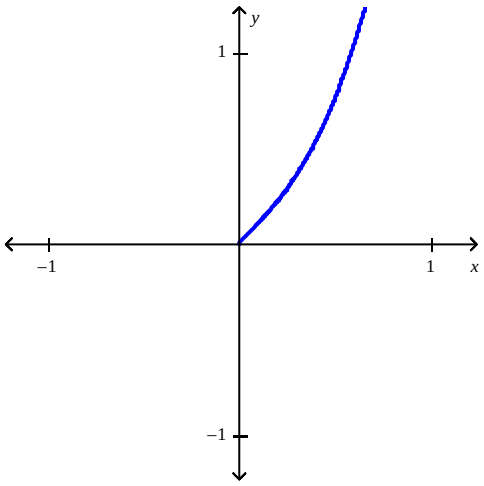
$$\lim_{x\to 2} \frac{g(x)-g(2)}{x-2}$$

16. Use a graph to find a number δ such that $\left|\sqrt{4x+1}-3\right|<0.1$ whenever $|x-2|<\delta$.

Stewart - Calculus 8e Chapter 1 Form B

17. If f and g are continuous functions with $f(7) = 10$ and $\lim_{x \to 7} [\, 2f(x) - g(x) \,] = 7$, find $g(7)$.

18. 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.



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 limit $\lim_{x \to 3} \dfrac{x^2 + x - 12}{x^2 - 9}$, if it exists.

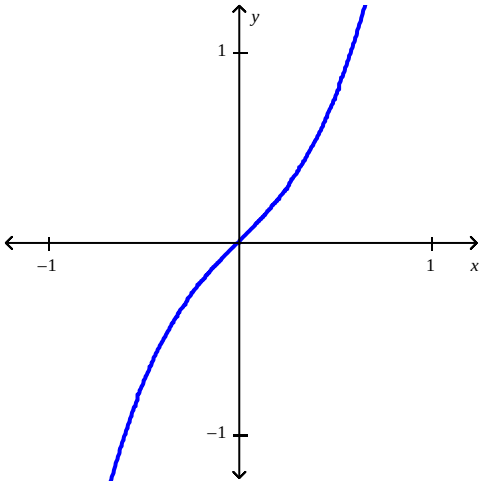
Stewart - Calculus 8e Chapter 1 Form B

Answer Key

1. $[-7, 7]$
2. $\frac{4}{3}\pi\left(3r^2+3r+1\right)$
3. a) 3 species
   b) $702\,\mathrm{m}^2$
4. $12\pi\left(r^2+3r+3\right)$
5. $r(t)=45t,\ 2025\pi t^2$
6. 27.5 ft/s
7. 2.612794, 2.540047, 2.506608, 2.477975, 2.475183, 2.362146, 2.415915, 2.444688, 2.471788, 2.474564, *Limit*: 2.474874
8. 12
9. $(-\infty, -1)\cup(-1, 3)\cup(3, \infty)$
10. $|x-2|<0.002$
11. $\frac{\pi}{2}$
12. $\frac{10}{7}$
13. 0
14. $-1/6$
15. 32
16. $\delta \le 0.15$
17. 13

Stewart - Calculus 8e Chapter 1 Form B

18.



19. –6

20. $\frac{7}{6}$

Stewart - Calculus 8e Chapter 1 Form C

Select the correct answer for each question.

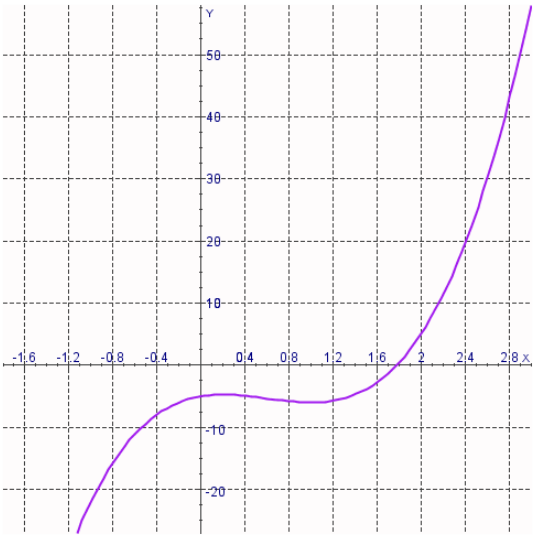
____ 1. If $f(x) = x^2 - x + 6$, evaluate the difference quotient $\dfrac{f(a+h) - f(a)}{h}$.

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

____ 2. Find the domain of the function $f(x) = \dfrac{x}{-2\sin x - 3}$.

a. $(-\infty, \infty)$
b. $\left[-\dfrac{3}{2}, \infty\right)$
c. $[-3, -2]$
d. $[2, 3]$

____ 3. The graph of the function f is given. State the value of $f(-0.4)$.



a. $f(-0.4) = 8$
b. $f(-0.4) = -10$
c. $f(-0.4) = -8$
d. $f(-0.4) = 0$
e. $f(-0.4) = 10$

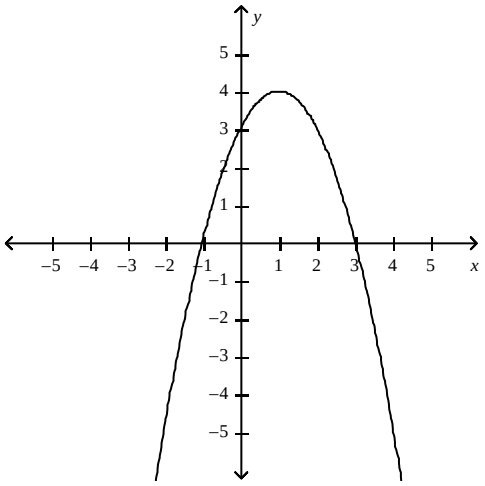
____ 4. Scientists have discovered that a linear relationship exists between the amount of flobberworm mucus secretions and the air temperature. When the temperature is 65°F, the flobberworms each secrete 16 grams of mucus a day; when the temperature is 95°F, they each secrete 22 grams of mucus a day. Find a function $M(t)$ that gives the amount of mucus secreted on a given day, where t is the temperature of that day in degrees Fahrenheit.

a. $M(t) = 0.2t + 16$
b. $M(t) = 5t + 16$
c. $M(t) = 5t + 3$
d. $M(t) = 0.2t + 3$

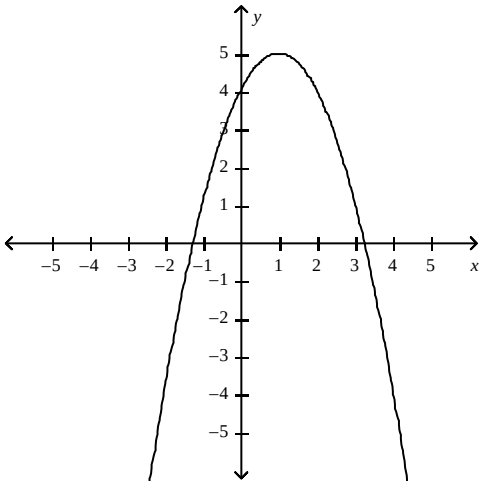
____ 5. Graph the function by hand, not by plotting points, but by starting with the graph of one of the standard functions and then applying the appropriate transformations.

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

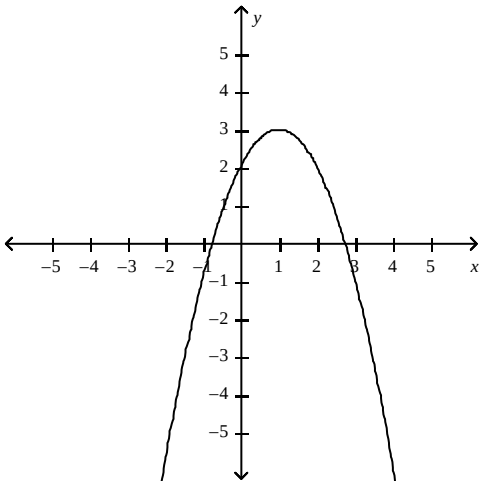
a.



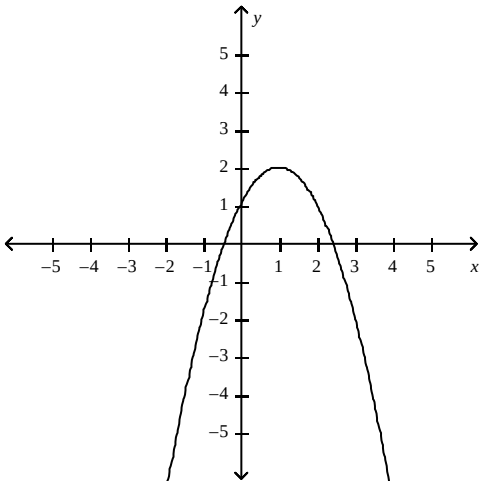
c.



b.

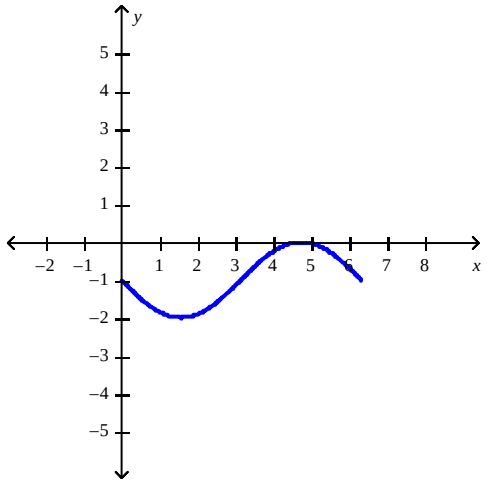


d.

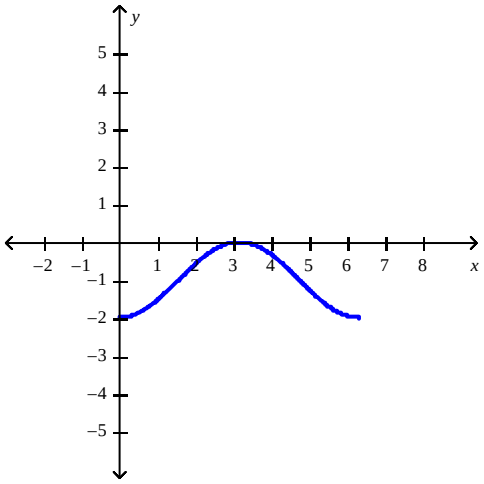


____ 6. Sketch the graph of $y = -1 - \cos x$ over one period.

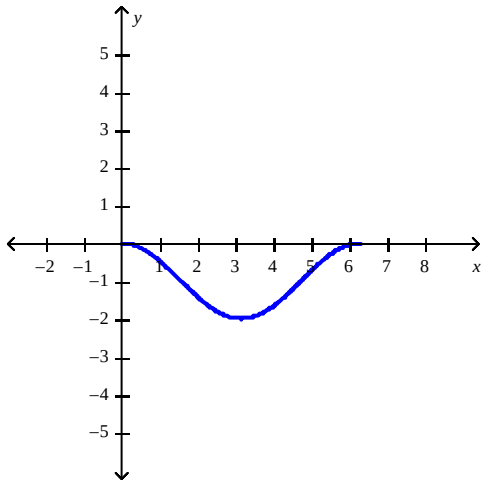
a.



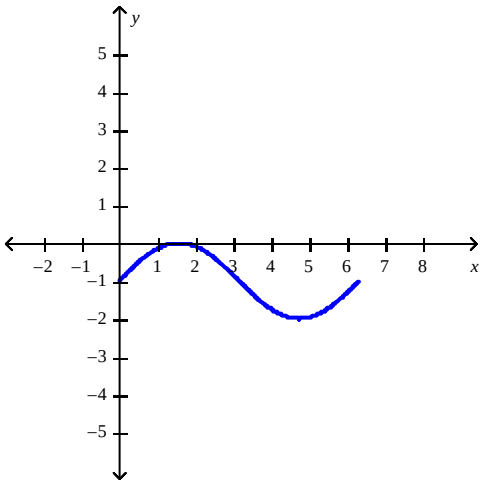
c.



b.



d.



____ 7. 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.

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

____ 8. A cardiac monitor is used to measure the heart rate of a patient after surgery. It compiles the number of heartbeats after *t* minutes. When the data in the table are graphed, the slope of the tangent line represents the heart rate in beats per minute. The monitor estimates this value by calculating the slope of a secant line. Use the data to estimate the patient's heart rate after 42 minutes using the secant line between the points with $t = 38$ and $t = 42$.

t (mins)	36	38	40	42	44
Heartbeats	2570	2720	2840	3020	3070

a. 74
b. 80
c. 85
d. 70
e. 76
f. 75

____ 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 $t = 9$.

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.

a. 46.1 ft/s
b. 31.9 ft/s
c. 33.5 ft/s
d. 33.8 ft/s
e. 33.2 ft/s

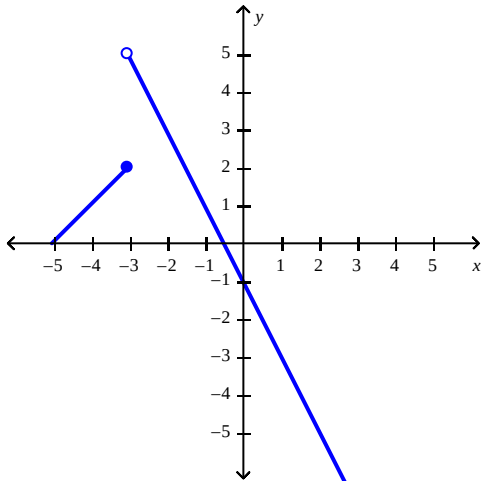
____ 11. Suppose the distance *s* (in feet) covered by a car moving along a straight road after *t* sec is given by the function $s = f(t) = 3t^2 + 13t$. Calculate the (instantaneous) velocity of the car when $t = 35$.

a. 223 ft/sec
b. 16 ft/sec
c. 560 ft/sec
d. 4130 ft/sec

____ 12. Sketch the graph of the function f and evaluate $\lim_{x \to -3^+} f(x)$.

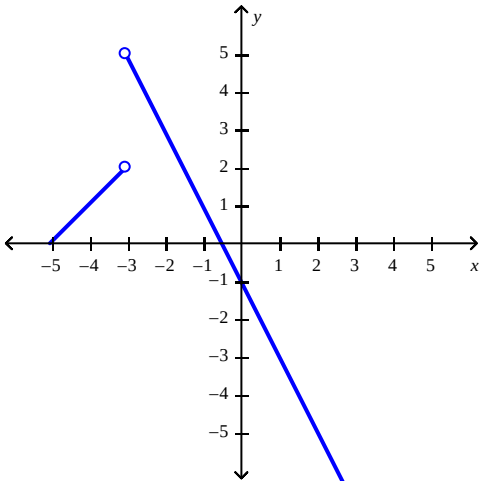
$$f(x) = \begin{cases} x + 5, & \text{if } x \le -3 \\ -2x - 1, & \text{if } x > -3 \end{cases}$$

a.



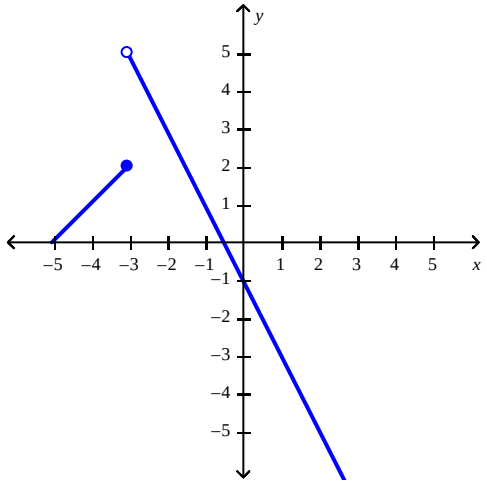
Does not exist

c.



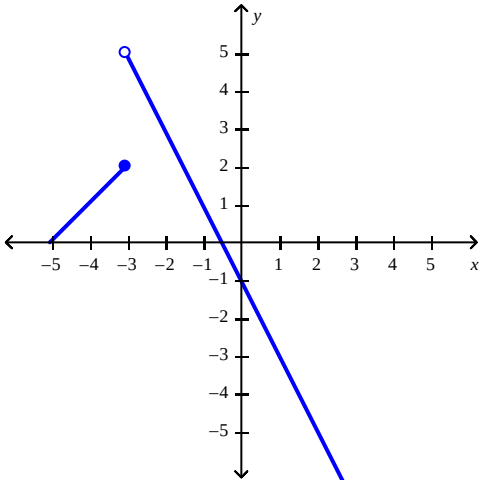
Does not exist

b.



2

d.



5

____ 13. Evaluate the limit.

$$\lim_{x \to 1} (x+5)^3 \left(x^2 - 6\right)$$

a. -448
b. -1070
c. -1090
d. -1080
e. 320

____ 14. If $6x - 1 \le f(x) \le x^2 - 1$, find $\lim_{x \to 6} f(x)$.

a. 1
b. 35
c. 0
d. -6
e. -35

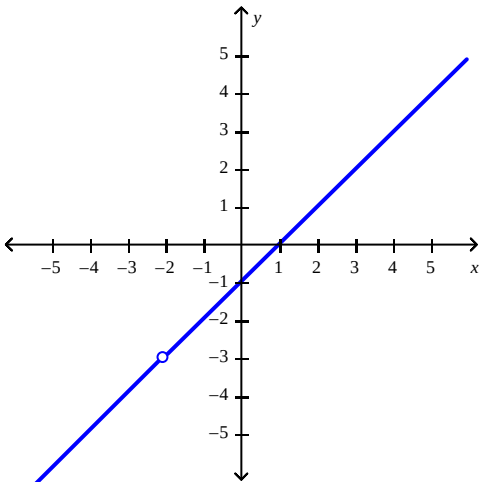
____ 15. Find the limit.

$$\lim_{x \to 2} \frac{x^2 + 2x - 12}{x - 2}$$

a. 6
b. 6
c. 10
d. 12
e. 1

Stewart - Calculus 8e Chapter 1 Form C

____ 16. Use the graph of $f(x) = \dfrac{x^2 + x - 2}{x + 2}$ to guess at the limit $\lim\limits_{x \to -2} \dfrac{x^2 + x - 2}{x + 2}$, if it exists.



a. –2
b. –1
c. Does not exist
d. –3

____ 17. Let $F(x) = \dfrac{x - 5}{|x - 5|}$. Find the following limits.

$\lim\limits_{x \to 5^+} F(x), \lim\limits_{x \to 5^-} F(x)$

a. both 1
b. 2 and 1
c. 2 and -1
d. 1 and -1
e. both -1

____ 18. Which of the given functions is discontinuous?

a. $f(x) = \begin{cases} \dfrac{1}{x-11}, & x \neq 11 \\ 9, & x = 11 \end{cases}$

b. $f(x) = \begin{cases} \dfrac{1}{x-2}, & x \geq 11 \\ \dfrac{1}{9}, & x < 11 \end{cases}$

____ 19. Find the numbers, if any, where the function $f(x) = \begin{cases} 3x-2 & \text{if } x \leq 1 \\ 0 & \text{if } x > 1 \end{cases}$ is discontinuous.

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

____ 20. Find the interval(s) where $f(x) = \sqrt{x^2 - 2x + 3}$ is continuous.

a. $[0, \infty)$
b. $[-3, 3]$
c. $(-\infty, \infty)$
d. $[-2, 3]$

Stewart - Calculus 8e Chapter 1 Form C

Answer Key

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

Stewart - Calculus 8e Chapter 1 Form C

Select the correct answer for each question.

____ 1. 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. $f(x) = x^3 - 9x$

____ 2. Find the domain of the function.

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

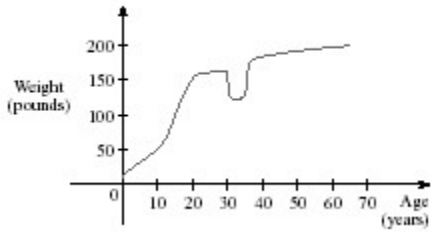
a. $(-\infty, 0)$

b. $\left(-\infty, -\dfrac{1}{7}\right) \cup \left(-\dfrac{1}{7}, \infty\right)$

c. $\left(-\infty, \dfrac{1}{7}\right) \cup \left(\dfrac{1}{7}, \infty\right)$

d. $(-\infty, 0) \cup (0, \infty)$

____ 3. 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.



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

____ 4. 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 $0°C$

____ 5. 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

a. 5
b. 2
c. 3
d. 4
e. 6

____ 6. Find the function $f \cdot g$ and its domain if $f(x) = \sqrt{x+7}$ and $g(x) = \sqrt{x-7}$.

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

$D = [7, \infty)$

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

$D = [-7, \infty)$

c. $\sqrt{x^2 + 49}$

$D = [-7, \infty)$

d. $\sqrt{x^2 + 49}$

$D = [7, \infty)$

____ 7. The displacement (in feet) of a certain particle moving in a straight line is given by

$s = \frac{t^3}{8}$

where *t* is measured in seconds. Find the average velocity over the interval $[1, 1.19]$.

Round your answer to three decimal places.

a. 0.251
b. 0.390
c. 0.351
d. 0.241
e. 0.551
f. 0.451

____ 8. If a rock is thrown upward on the planet Mars with a velocity of 12 m/s, its height in meters t seconds later is given by

$y = 12t - 1.92t^2$.

Find the average velocity over the time interval $[2, 3]$.

a. -0.6 m/s
b. 4.4 m/s
c. 2.4 m/s
d. 3.4 m/s
e. 1.4 m/s

____ 9. The point $P(16, 4)$ lies on the curve $y = \sqrt{x}$. If is the point $Q\left(x, \sqrt{x}\right)$, use your calculator to find the slope of the secant line PQ (correct to six decimal places) for the value $x = 3.89$.

a. $m_{PQ} = -0.044439$
b. $m_{PQ} = -0.167439$
c. $m_{PQ} = -0.307439$
d. $m_{PQ} = 0.377439$
e. $m_{PQ} = 0.167439$

____ 10. Find the value of $\lim_{x \to 0^+} f(x)$.

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

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

____ 11. If $1 \le f(x) \le x^2 + 6x + 6$, for all x, find $\lim_{x \to -1} f(x)$.

a. $-\frac{1}{8}$

b. 1

c. $-\frac{1}{16}$

d. 8

e. does not exist

____ 12. Find the limit.

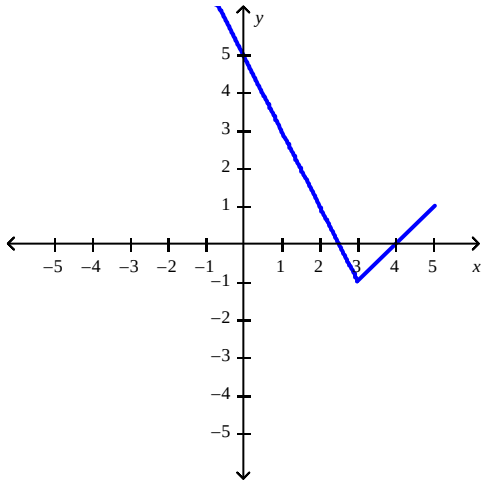
$$\lim_{t \to \infty} \frac{t^2 + 3}{t^3 + t^2 - 7}$$

a. ∞
b. -3
c. 0
d. 3
e. 7

____ 13. Sketch the graph of the function f and evaluate $\lim_{x \to 3} f(x)$.

$$f(x) = \begin{cases} x - 4, & \text{if } x \le 3 \\ -2x + 5, & \text{if } x > 3 \end{cases}$$

a.



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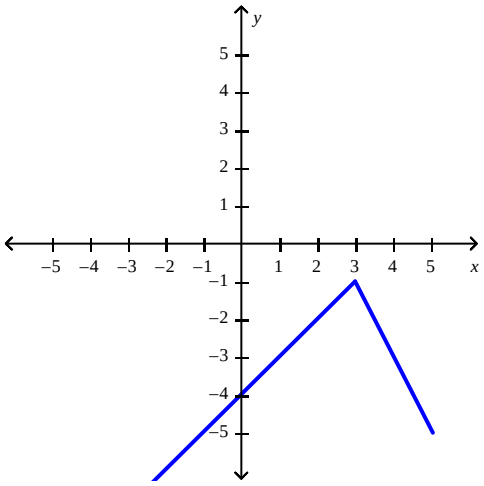
c.



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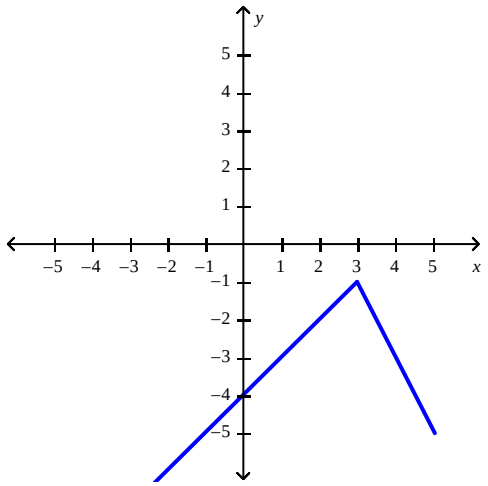
b.



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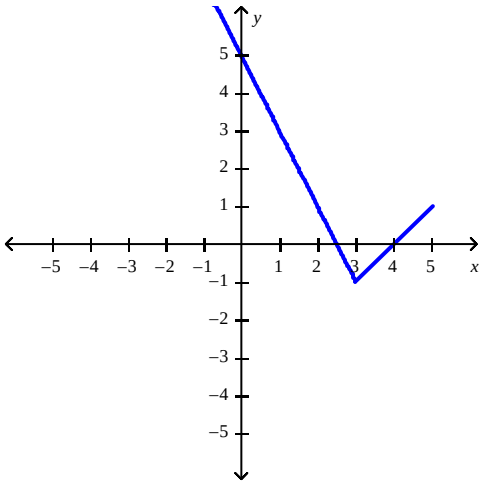
d.



–1

____ 14. Find the limit.

$$\lim_{x \to 2} \sqrt{\frac{4x^2 + 1}{3x - 2}}$$

a. 0

b. $-\frac{4}{3}$

c. $\frac{\sqrt{17}}{2}$

d. $\frac{4}{3}$

e. does not exist

____ 15. If *f* and *g* are continuous functions with $f(9) = 6$ and $\lim_{x \to 9} \left[2f(x) - g(x) \right] = 9$, find $g(9)$.

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

____ 16. Let

$$f(x) = \begin{cases} x - 4 & \text{if } x \le 5 \\ kx^2 - 24x + 46 & \text{if } x > 5 \end{cases}$$

Find the value of *k* that will make *f* continuous on $(-\infty, \infty)$.

a. 5
b. 46
c. –4
d. 3

____ 17. Suppose that the graph of is given f is given. Describe how the graph of the function $y = f(x-5) - 5$ can be obtained from the graph of f.

a. Shift the graph 5 units to the left and 5 units down.
b. Shift the graph 5 units to the left and 5 units up.
c. Shift the graph 5 units to the right and 5 units up.
d. Shift the graph 5 units to the right and 5 units down.
e. None of these

____ 18. 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.

a. 46.1 ft/s
b. 31.9 ft/s
c. 33.5 ft/s
d. 33.8 ft/s
e. 33.2 ft/s

____ 19. Let $F(x) = \dfrac{x-5}{|x-5|}$. Find the following limits.

$$\lim_{x \to 5^+} F(x), \quad \lim_{x \to 5^-} F(x)$$

a. both 1
b. 2 and 1
c. 2 and -1
d. 1 and -1
e. both -1

____ 20. Define the function $f(x) = \dfrac{6x^3 + x}{4x}$ at 0 so as to make it continuous at 0.

a. $f(0) = \dfrac{3}{2}$

b. $f(0) = \dfrac{7}{4}$

c. $f(0) = 0$

d. $f(0) = \dfrac{1}{4}$

Stewart - Calculus 8e Chapter 1 Form C

Answer Key

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

Stewart - Calculus 8e Chapter 1 Test Form E

1. An open rectangular box with volume $2\ \text{m}^3$ 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.

____ 2. Find *a*, such that the function $f(x) = 4x + \sqrt{a - x^2}$ has the domain $(-4, 4)$.

Select the correct answer.

a. $a = -16$
b. $a = \sqrt{4}$
c. $a = -\sqrt{4}$
d. $a = 16$
e. $a = 4$

3. Find the domain.

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

____ 4. Find the range of the function.

$y = 2 + \cos x$

Select the correct answer.

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

5. 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?

6. 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.

7. Suppose that the graph of is given f is given. Describe how the graph of the function $y = f(x-5) - 5$ can be obtained from the graph of *f*.

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

____ 9. A cardiac monitor is used to measure the heart rate of a patient after surgery. It compiles the number of heartbeats after *t* minutes. When the data in the table are graphed, the slope of the tangent line represents the heart rate in beats per minute. The monitor estimates this value by calculating the slope of a secant line. Use the data to estimate the patient's heart rate after 42 minutes using the secant line between the points with $t = 38$ and $t = 42$.

t (mins)	36	38	40	42	44
Heartbeats	2570	2720	2840	3020	3070

Select the correct answer.

a. 74
b. 80
c. 85
d. 70
e. 76
f. 75

10. Estimate the value of the following limit by graphing the function $f(x) = \dfrac{(5\sin x)}{(\sin \pi x)}$.

$\lim\limits_{x \to 0} \dfrac{5\sin x}{\sin \pi x}$

Round your answer correct to two decimal places.

11. Evaluate the limit.

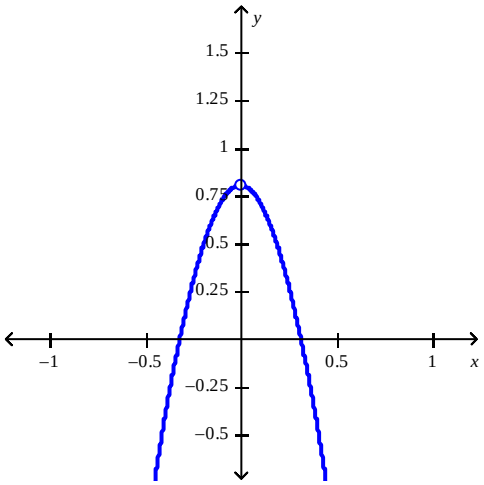
$\lim\limits_{x \to 1} (x+5)^3 \left(x^2 - 6\right)$

12. Find the limit $\lim\limits_{x \to 0} \dfrac{\sqrt{x+6} - \sqrt{6}}{x}$, if it exists.

Stewart - Calculus 8e Chapter 1 Test Form E

13. Is there a number *a* such that $\lim_{x \to -3} \dfrac{3x^2 + ax + a + 3}{x^2 + x - 6}$ exists? If so, find the value of *a* and the value of the limit.

14. Use the graph of $f(x) = \dfrac{\sin 4x}{\tan 5x}$ to guess at the limit $\lim_{x \to 0} \dfrac{\sin 4x}{\tan 5x}$, if it exists.



15. Let $F(x) = \dfrac{x - 5}{|x - 5|}$. Find the following limits.

$\lim_{x \to 5^+} F(x), \quad \lim_{x \to 5^-} F(x)$

16. You are given $\lim_{x \to a} f(x) = L$ and a tolerance ε. Find a number δ such that $|f(x) - L| < \varepsilon$ whenever $0 < |x - a| < \delta$.

$\lim_{x \to 3} 4x = 12; \quad \varepsilon = 0.01$

17. If *f* and *g* are continuous functions with $f(9) = 6$ and $\lim_{x \to 9} [2f(x) - g(x)] = 9$, find $g(9)$.

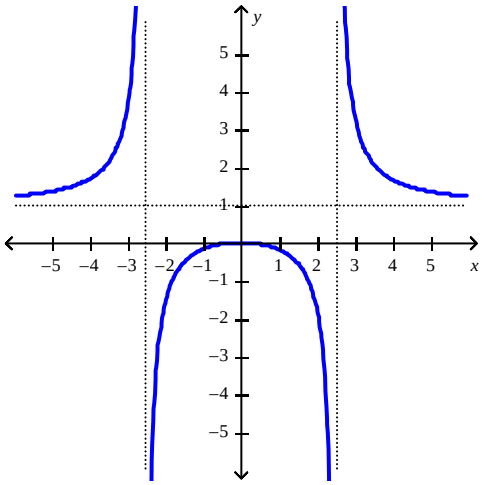
____ 18. For what value of the constant c is the function f continuous on $(-\infty, \infty)$?

$$f(x) = \begin{cases} cx + 5 & \text{for } x \le 2 \\ cx^2 - 5 & \text{for } x > 2 \end{cases}$$

Select the correct answer.

a. $c = 1$
b. $c = 5$
c. $c = -2$
d. $c = -5$
e. $c = 2$

19. Use the graph to determine where the function is discontinuous.



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

Stewart - Calculus 8e Chapter 1 Test Form E

Answer Key

1. $S(x) = x^2 + \frac{8}{x}$
2. D
3. $[0, 3]$
4. E
5. 32, Fahrenheit temperature corresponding to $0°C$
6. $C = 0.5d + 50$
7. Shift the graph 5 units to the right and 5 units down.
8. $\sqrt{x^2 - 49}$

   $D = [7, \infty)$

9. F
10. 1.59
11. -1080
12. $\frac{\sqrt{6}}{12}$
13. $a = 15$, limit equals 0.6
14. 0.8
15. 1 and -1
16. 0.0025
17. $g(9) = 3$
18. B
19. At ± 2.5
20. $y = 6 - \sqrt{-x}$

Stewart - Calculus 8e Chapter 1 Form F

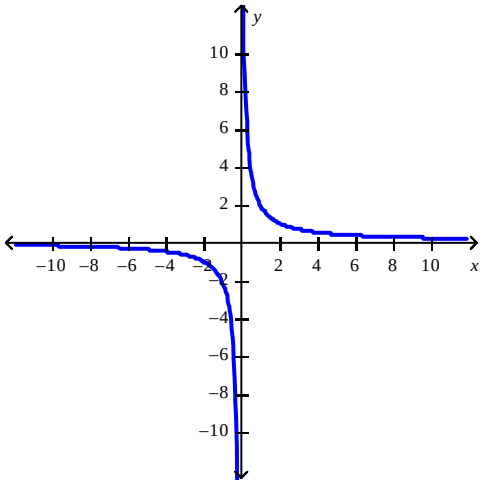
____ 1. If the point $(7,3)$ is on the graph of an even function, what other point must also be on the graph?

Select the correct answer.

a. $(-7,-3)$
b. $(7,-3)$
c. $(0,0)$
d. $(-7,3)$
e. None of these

2. Find an expression for the function $y=f(x)$ whose graph is the bottom half of the parabola $x+\left(6-y\right)^2=0$.

3. Determine whether the function whose graph is given is even, odd, or neither.



____ 4. Find the domain of the function $f(x)=\dfrac{x}{-2\sin x-3}$.

a. $(-\infty,\infty)$
b. $\left[-\dfrac{3}{2},\infty\right)$
c. $[-3,-2]$
d. $[2,3]$

____ 5. Find *a*, such that the function $f(x) = 4x + \sqrt{a - x^2}$ has the domain $(-4, 4)$.

a. $a = -16$
b. $a = \sqrt{4}$
c. $a = -\sqrt{4}$
d. $a = 16$
e. $a = 4$

____ 6. Determine whether f is even, odd, or neither.

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

a. neither
b. odd
c. even

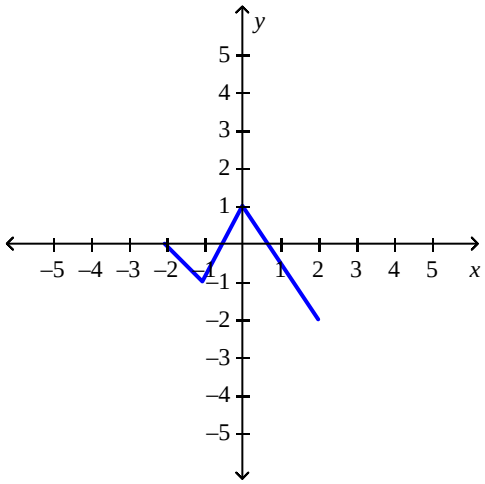
7. Find the range of the function.

$y = 2 + \cos x$

8. 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.

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

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



____ 10. If a rock is thrown upward on the planet Mars with a velocity of 12 m/s, its height in meters t seconds later is given by

$y = 12t - 1.92t^2$.

Find the average velocity over the time interval $[2, 3]$.

a. -0.6 m/s
b. 4.4 m/s
c. 2.4 m/s
d. 3.4 m/s
e. 1.4 m/s

11. Use the graph of the function to state the value of $\lim_{x \to 0} f(x)$, if it exists.

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

12. Find the limit.

$$\lim_{x \to -\infty} \frac{\sqrt{x^2 - 25}}{2x - 6}$$

13. Find the limit $\lim_{x \to 5} \frac{x+1}{x^2 - 4x + 2}$.

14. Evaluate $\lim_{h \to 0} \frac{\cot\left(\frac{\pi}{4} + h\right) - 1}{h}$.

15. Find the limit.

$$\lim_{x \to 2} \frac{x^2 + 2x - 12}{x - 2}$$

16. Which of the given functions is discontinuous?

____ 17. How would you define $f(7)$ in order to make f continuous at 7?

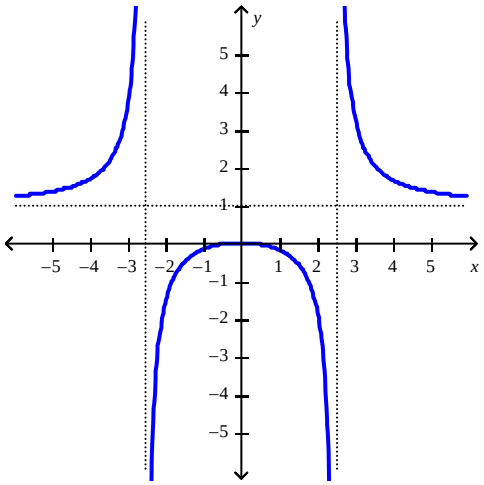
$$f(x) = \frac{x^2 - 2x - 3}{x - 7}$$

a. $f(3) = -8$
b. $f(7) = 12$
c. $f(7) = 0$
d. $f(7) = -12$
e. None of these

18. For what value of the constant c is the function f continuous on $(-\infty, \infty)$?

$$f(x) = \begin{cases} cx + 5 & \text{for } x \le 2 \\ cx^2 - 5 & \text{for } x > 2 \end{cases}$$

19. Use the graph to determine where the function is discontinuous.

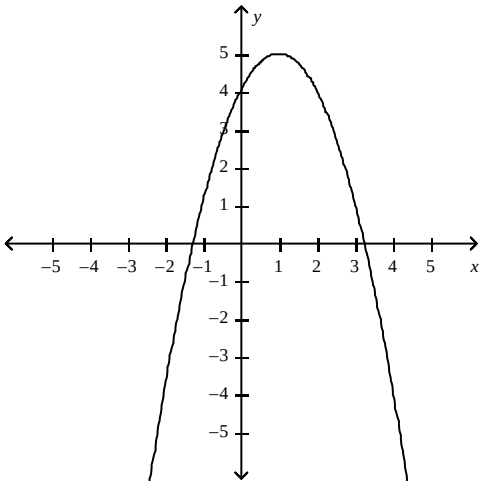


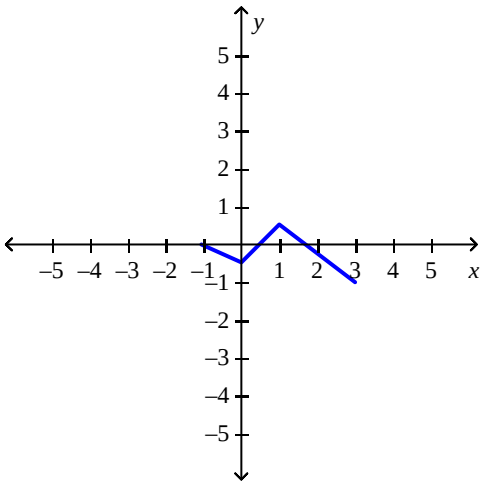
____ 20. Find the numbers, if any, where the function $f(x) = \begin{cases} 3x - 2 & \text{if } x \le 1 \\ 0 & \text{if } x > 1 \end{cases}$ is discontinuous.

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

Stewart - Calculus 8e Chapter 1 Form F

Answer Key

1. D
2. $y = 6 - \sqrt{-x}$
3. Odd
4. A
5. D
6. C
7. $[1, 3]$
8. 

9. 

10. C
11. does not exist
12. $\frac{1}{2}$
13. $\frac{6}{7}$

14. 2
15. 6
16. $f(x) = \begin{cases} \dfrac{1}{x-11}, & x \neq 11 \\ 9, & x = 11 \end{cases}$
17. B
18. $c = 5$
19. At ± 2.5
20. C

Stewart - Calculus 8e Chapter 1 Form G

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

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

3. Find the domain of the function $f(x) = \dfrac{x}{-2\sin x - 3}$.

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

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

____ 5. 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.

Select the correct answer.

a. $C = -50d + 0.5$
b. $C = 50d - 0.5$
c. $C = 0.5d + 50$
d. $C = 2d + 50$
e. $C = 0.5d - 50$

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

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

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

____ 9. Suppose the distance *s* (in feet) covered by a car moving along a straight road after *t* sec is given by the function $s = f(t) = 3t^2 + 13t$. Calculate the (instantaneous) velocity of the car when $t = 35$.

Select the correct answer.

a. 223 ft/sec
b. 16 ft/sec
c. 560 ft/sec
d. 4130 ft/sec

____ 10. If $\lim_{x \to 2^+} f(x) = 7.9$, then if $\lim_{x \to 2} f(x)$ exists, to what value does it converge?

Select the correct answer.

a. 6.9
b. 8.9
c. 9.9
d. 7.9
e. 5.9

11. Find the value of the limit.

$$\lim_{x \to 0} 3\frac{\tan 4x - 4x}{x^3}$$

12. Find the limit.

$$\lim_{x \to -\infty} \frac{\sqrt{x^2 - 25}}{2x - 6}$$

13. If $1 \le f(x) \le x^2 + 6x + 6$, for all *x*, find $\lim_{x \to -1} f(x)$.

14. Find the limit $\lim_{x \to 0} \frac{\sqrt{x+6} - \sqrt{6}}{x}$, if it exists.

____ 15. Is there a number *a* such that $\lim_{x \to -3} \frac{3x^2 + ax + a + 3}{x^2 + x - 6}$ exists? If so, find the value of *a* and the value of the limit.

Select the correct answer.

a. $a = 15$, limit equals -0.6
b. $a = 15$, limit equals 0.6
c. $a = -15$, limit equals 0.6
d. $a = -15$, limit equals -0.6
e. $a = 15$, limit equals 18

16. Find the limit.

$$\lim_{x \to 2} \sqrt{\frac{4x^2 + 1}{3x - 2}}$$

17. Use continuity to evaluate the limit.

$$\lim_{x \to 3\pi} \sin(x + 4 \sin x)$$

18. Which of the given functions is discontinuous?

19. For what value of the constant *c* is the function f continuous on $(-\infty, \infty)$?

$$f(x) = \begin{cases} cx + 5 & \text{for } x \le 2 \\ cx^2 - 5 & \text{for } x > 2 \end{cases}$$

20. Find the interval(s) where $f(x) = \sqrt{x^2 - 2x + 3}$ is continuous.

Stewart - Calculus 8e Chapter 1 Form G

Answer Key

1. none of these
2. $8+4h$
3. $(-\infty, \infty)$
4. even
5. C
6. *f(x)*
7. $\sqrt{x^2-49}$

   $D=[7,\infty)$
8. $-\dfrac{3}{x}$,

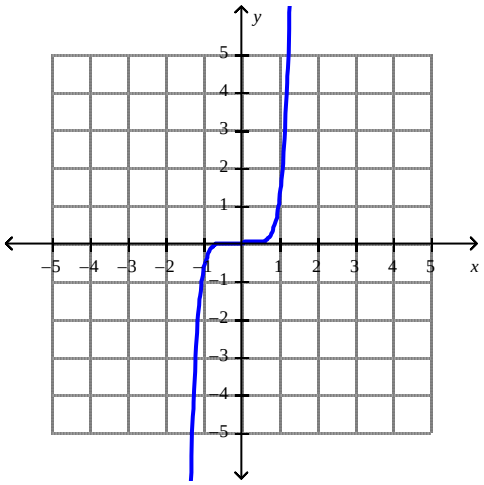
   $D=(-\infty,-3)\cup(-3,0)\cup(0,\infty)$
9. A
10. D
11. 64
12. $\dfrac{1}{2}$
13. 1
14. $\dfrac{\sqrt{6}}{12}$
15. B
16. $\dfrac{\sqrt{17}}{2}$
17. 0
18. $f(x)=\begin{cases}\dfrac{1}{x-11}, & x\neq 11\\ 9, & x=11\end{cases}$
19. $c=5$
20. $(-\infty, \infty)$

Stewart - Calculus 8e Chapter 1 Test Form H

1. Find the domain of the function.

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

2. What is the equation of this graph?



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

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

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

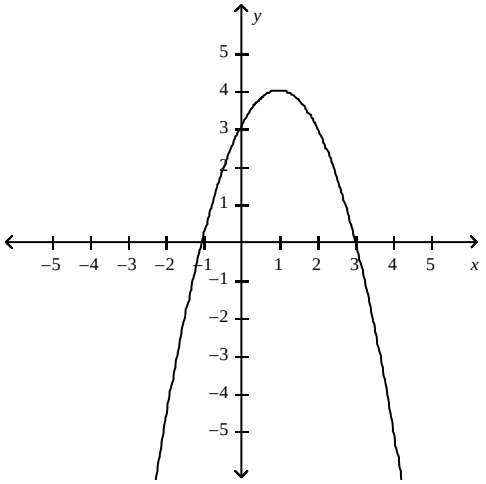
$$f(x) = -8x^{-7} - x^{-5} - 7$$

____ 5. 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.

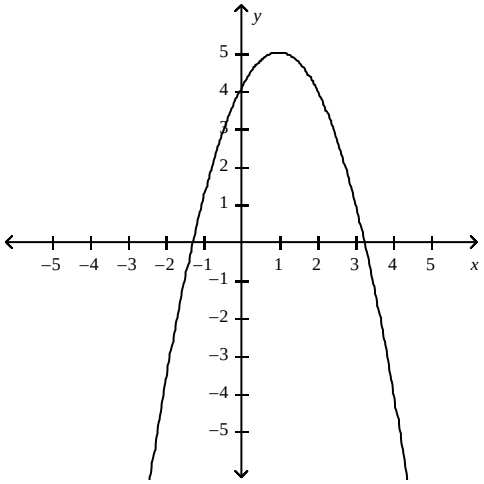
$y = 4 + 2x - x^2$

Select the correct answer.

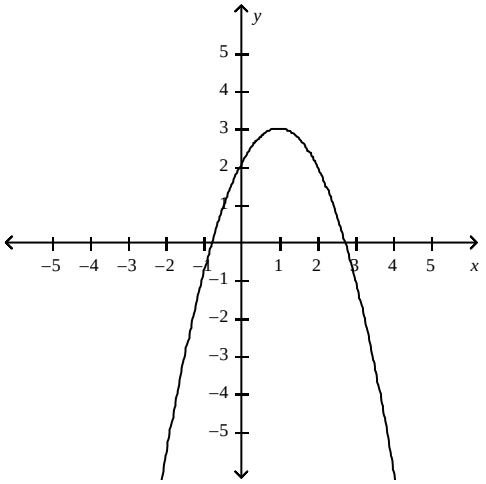
a.



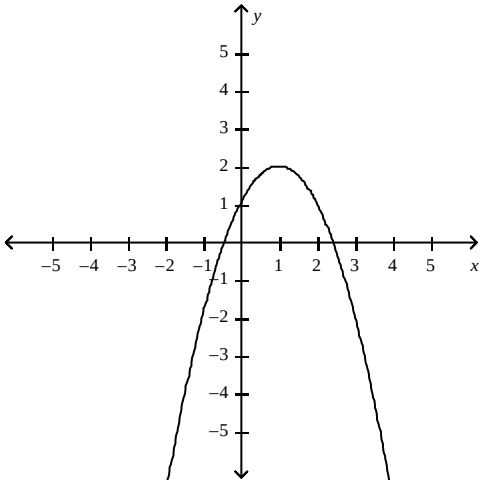
c.



b.



d.



6. Suppose that the graph of is given f is given. Describe how the graph of the function $y = f(x - 5) - 5$ can be obtained from the graph of f.

7. 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 $t = 9$.

8. The point $P(16, 4)$ lies on the curve $y = \sqrt{x}$. If is the point $Q\left(x, \sqrt{x}\right)$, use your calculator to find the slope of the secant line *PQ* (correct to six decimal places) for the value $x = 3.89$.

9. Estimate the value of the following limit by graphing the function $f(x) = \dfrac{(5 \sin x)}{(\sin \pi x)}$.

   $\lim\limits_{x \to 0} \dfrac{5 \sin x}{\sin \pi x}$

   Round your answer correct to two decimal places.

10. Use the graph of the function to state the value of $\lim\limits_{x \to 0} f(x)$, if it exists.

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

11. Sketch the graph of the function *f* and evaluate $\lim\limits_{x \to -3^+} f(x)$.

    $f(x) = \begin{cases} x + 5, & \text{if } x \le -3 \\ -2x - 1, & \text{if } x > -3 \end{cases}$

____ 12. If $\lim\limits_{x \to 2^+} f(x) = 7.9$, then if $\lim\limits_{x \to 2} f(x)$ exists, to what value does it converge?

    Select the correct answer.

    a. 6.9
    b. 8.9
    c. 9.9
    d. 7.9
    e. 5.9

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____ 13. Find the limit $\lim\limits_{x \to 0} \dfrac{\sqrt{x+6} - \sqrt{6}}{x}$, if it exists.

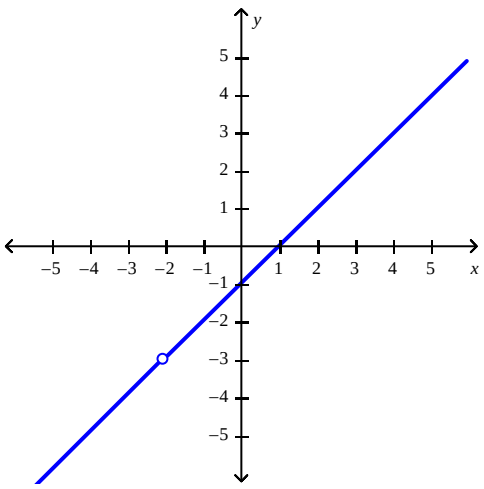
Select the correct answer.

a. Does not exist
b. $\dfrac{\sqrt{6}}{12}$
c. $\dfrac{\sqrt{6}}{2}$
d. $\dfrac{\sqrt{6}}{6}$

14. Evaluate $\lim\limits_{h \to 0} \dfrac{\cot\left(\dfrac{\pi}{4} + h\right) - 1}{h}$.

15. If $6x - 1 \le f(x) \le x^2 - 1$, find $\lim\limits_{x \to 6} f(x)$.

16. Use the graph of $f(x) = \dfrac{x^2 + x - 2}{x + 2}$ to guess at the limit $\lim\limits_{x \to -2} \dfrac{x^2 + x - 2}{x + 2}$, if it exists.



____ 17. A machinist is required to manufacture a circular metal disk with area 1000 cm^2. If the machinist is allowed an error tolerance of $\pm 15\,\text{cm}^2$ in the area of the disk, how close to the ideal radius must the machinist control the radius?

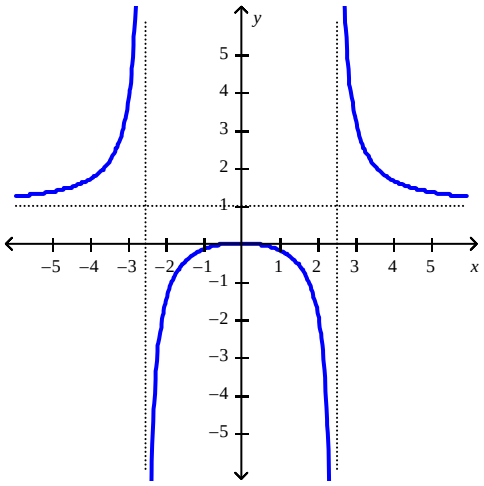
Round your answer to the nearest hundred thousandth. Select the correct answer.

a. $\delta \le 0.13131$ cm
b. $\delta \le 0.13281$ cm
c. $\delta \le 0.13231$ cm
d. $\delta \le 0.13331$ cm
e. $\delta \le 0.13431$ cm

18. For what value of the constant c is the function f continuous on $(-\infty, \infty)$?

$$f(x) = \begin{cases} cx + 5 & \text{for } x \le 2 \\ cx^2 - 5 & \text{for } x > 2 \end{cases}$$

19. Use the graph to determine where the function is discontinuous.



____ 20. Find the numbers, if any, where the function $f(x) = \begin{cases} 3x - 2 & \text{if } x \le 1 \\ 0 & \text{if } x > 1 \end{cases}$ is discontinuous.

Select the correct answer.

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

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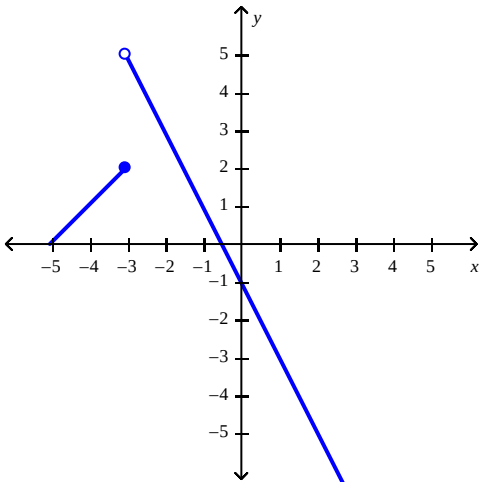
Answer Key

1. $(-\infty, 0) \cup (0, \infty)$
2. $y = x^7$
3. even
4. Rational
5. C
6. Shift the graph 5 units to the right and 5 units down.
7. -104 ft/s
8. $m_{PQ} = 0.167439$
9. 1.59
10. does not exist
11. 

    5
12. D
13. B
14. 2
15. 35
16. Does not exist
17. D
18. $c = 5$
19. At ± 2.5
20. C