Single Variable Calculus Early Transcendentals 8th edition Stewart Test Bank

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Stewart - Calculus 8e ET Chapter 2 Form A

1. Find the limit.

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

2. Evaluate the limit.

$$\lim_{x \to -9} |x+9|$$

3. Find the limit.

$$\lim_{x \to \frac{6}{\pi}} \tan^{-1}\left(\frac{3}{x}\right)$$

4. How close to -9 do we have to take x so that $\dfrac{1}{(x+9)^4} > 10000$?

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

6. If f and g are continuous functions with $f(13)=4$ and $\lim_{x \to 13}\left[2f(x)-g(x)\right]=13$, find $g(13)$.

7. Find the limit.

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

8. Find the limit.

$$\lim_{y \to -\infty}\left(y+\sqrt{y^2+5y}\right)$$

9. Find an equation of the tangent line to the curve.

$$y=\frac{\sqrt{x}}{x+6} \text{ at } (4,\ 0.6)$$

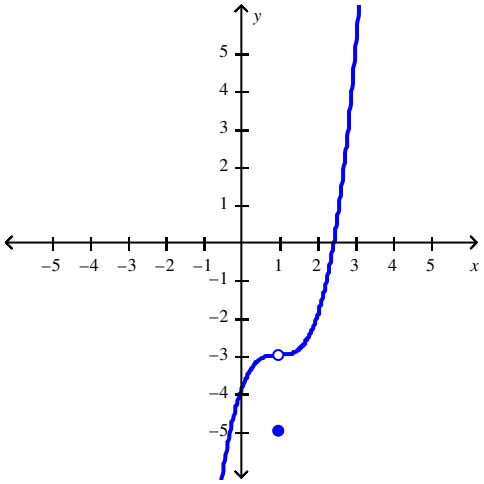
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10. Find the limit if $g(x) = x^3$.

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

11. Use the graph of the function to find each limit.



$$\lim_{x \to 1^-} f(x), \quad \lim_{x \to 1^+} f(x), \quad \lim_{x \to 1} f(x)$$

12. Complete the table by computing $f(x)$ at the given values of x, accurate to five decimal places. Use the results to guess at the indicated limit, if it exists, to three decimal places.

$$\lim_{x \to 4} \frac{\sqrt{x+12} - 4}{x - 4}$$

x	3.9	3.99	3.999	4.001	4.01	4.1
$f(x)$						

13. Use the precise definition of a limit to prove that $\lim_{x \to 1} 8 = 8$.

14. Find the limit $\lim_{x \to 0^+} \frac{3 + \sqrt{x}}{\sqrt{x+64}}$.

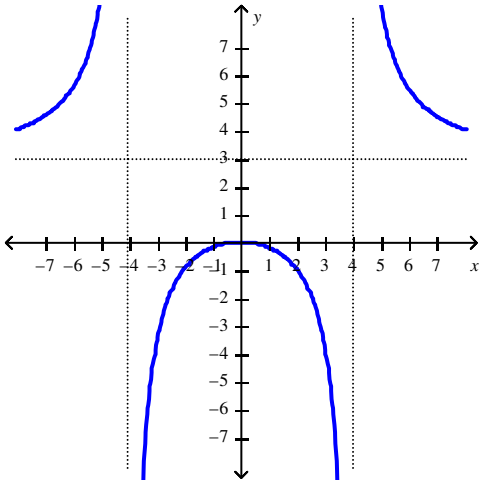
15. Find the numbers, if any, where the function $f(x) = \frac{x - 1}{x^2 - 1}$ is discontinuous.

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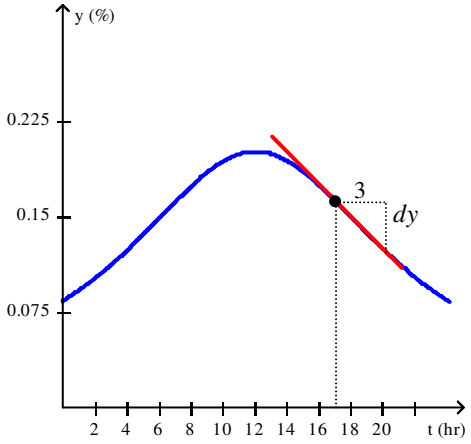
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16. Find the interval(s) where $f(x) = \dfrac{1}{x} + \dfrac{8\sqrt{x}}{(x-9)^2}$ is continuous.

17. You are given the graph of f. Find the horizontal and vertical asymptotes of the graph of f.



18. The graph shows the percentage of households in a certain city watching television during a 24-hr period on a weekday ($t = 0$ corresponds to 6 a.m.). By computing the slope of the respective tangent line, estimate the rate of change of the percentage of households watching television at a-12 p.m.
Note that $dy = 0.039$



19. Find the derivative of the function and evaluate $f'(x)$ at the given value of x.

$$f(x) = \left(\sqrt{x} + 2x\right)\left(x^{3/2} - x\right); \qquad x = 9$$

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20. Let $f(x) = x|x|$.

a. Sketch the graph of f.
b. For what values of x is f differentiable?
c. Find a formula for $f'(x)$.

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Stewart - Calculus 8e ET Chapter 2 Form A

Answer Key

1. $\frac{\pi}{2}$
2. 0
3. 0
4. $|x+9|<0.1$
5. $|x-2|<0.002$
6. -5
7. $-3/7$
8. -2.5
9. $y=\frac{1}{200}(x-4)+0.6$
10. 12
11. $\lim_{x\to 1^-} f(x)=-3,\quad \lim_{x\to 1^+} f(x)=-3,\quad \lim_{x\to 1} f(x)=-3$
12.

x	3.9	3.99	3.999	4.001	4.01	4.1
$f(x)$	0.1252	0.12502	0.125	0.125	0.12498	0.12481

0.125

13. The function is $f(x)=8$ and $L=8$.

    Let $\varepsilon>0$ be given. Choose δ to be any real number greater than 0.

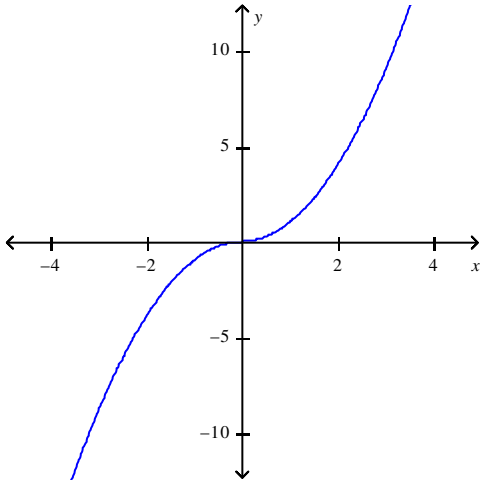
    We see that for any x such that $|x-1|<\delta$ (actually for any x whatsoever), we have $|f(x)-8|=|8-8|=0<\varepsilon$.

    This proves the assertion.
14. $\frac{3}{8}$
15. ± 1
16. $(0, 9)$ and $(9, \infty)$
17. HA $y=3$, VA $x=-4, 4$
18. Falling at $1.3\%/\text{hr}$
19. $\frac{225}{2}$

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20. **a.**



b. $x \in (-\infty, \infty)$

c. $f'(x) = \begin{cases} -2x & \text{if } x < 0 \\ 2x & \text{if } x \geq 0 \end{cases}$

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Single Variable Calculus Early Transcendentals 8th edition Stewart Test Bank

Stewart - Calculus 8e ET Chapter 2 Form B

1. 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 $[2, 3]$.

2. Find the limit.

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

3. Evaluate the limit.

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

4. Evaluate the limit.

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

5. Find the limit.

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

6. Consider the following function.

$$f(x) = \begin{cases} 5 - x & x < -1 \\ x & -1 \le x < 5 \\ (x-5)^2 & x \ge 5 \end{cases}$$

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

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7. How close to -8 do we have to take x so that $\dfrac{1}{(x+8)^2} > 100$?

8. Use a graph to find a number δ such that $\left|\sin x - \dfrac{1}{2}\right| < 0.1$ whenever $\left|x - \dfrac{\pi}{6}\right| < \delta$.

   Round your answer to the nearest thousandth.

9. Use the definition of the limit to find values of δ that corresponds to $\varepsilon = 0.75$.

   $\lim\limits_{x \to 1} \left(4 + x - 3x^3\right) = 2$

   Round your answer to the nearest thousandth.

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

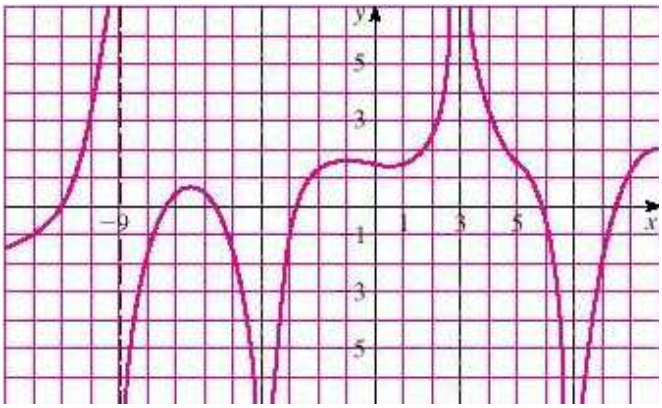
11. How close to 2 do we have to take x so that $5x+3$ is within a distance of 0.01 from 13?

12. Use continuity to evaluate the limit.

    $\lim\limits_{x \to 9} \dfrac{18 + \sqrt{x}}{\sqrt{16+x}}$

13. For the function f whose graph is shown, state the following.

    $\lim\limits_{x \to -4} f(x)$



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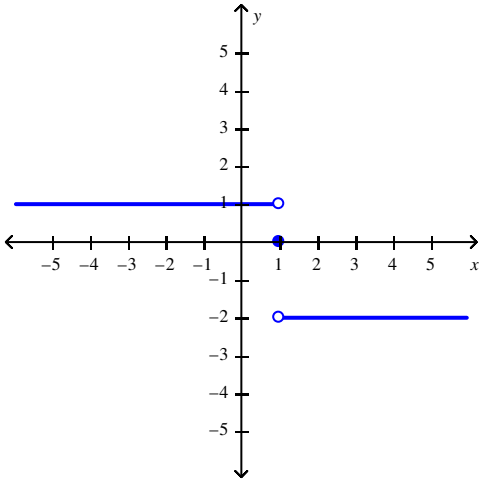
14. If a cylindrical tank holds 10000 gallons of water, which can be drained from the bottom of the tank in an hour, then Torricelli's Law gives the volume of water remaining in the tank after t minutes as

$$V(t) = 10000\left(1 - \frac{1}{60}t\right)^2, 0 \le t \le 60$$

Find the rate at which the water is flowing out of the tank (the instantaneous rate of change of V with respect to t) as a function of t.

15. Find an equation of the tangent line to the curve $8x^2 + 7y^2 = 3$ at the point (1, 1).

16. Use the graph of the function to find each limit.



$\lim_{x \to 1^-} f(x)$, $\lim_{x \to 1^+} f(x)$, $\lim_{x \to 1} f(x)$

17. Use the precise definition of a limit to prove that $\lim_{x \to 6} 5 = 5$.

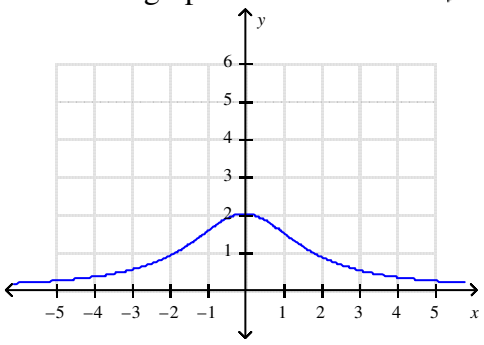
18. Find the limit.

$$\lim_{x \to \infty} \frac{\sin(7x)}{7x}$$

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19. Sketch the graph of the derivative f' of the function f whose graph is given.



20. Let $f(x) = x\left|x^3\right|$.

a. Sketch the graph of f.
b. For what values of x is f differentiable?
c. Find a formula for $f'(x)$.

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Stewart - Calculus 8e ET Chapter 2 Form B

Answer Key

1. 27.5 ft/s
2. $\frac{\pi}{2}$
3. $\frac{10}{7}$
4. $-\frac{1}{36}$
5. 0
6. $(-\infty, -1) \cup (-1, 5) \cup (5, \infty)$
7. $|x + 8| < 0.1$
8. $\delta \leq 0.114$
9. $\delta \leq 0.085$
10. $\delta \leq 0.15$
11. $|x - 2| < 0.002$
12. $\frac{21}{5}$
13. $-\infty$
14. $V'(t) = \frac{-1000}{3} + \frac{50t}{9}$
15. $y = -\frac{8}{7}x + \frac{15}{7}$
16. $\lim_{x \to 1^-} f(x) = 1$, $\lim_{x \to 1^+} f(x) = -2$, $\lim_{x \to 1} f(x)$ Does not exist
17. The function is $f(x) = 5$ and $L = 5$.

    Let $\varepsilon > 0$ be given. Choose δ to be any real number greater than 0.

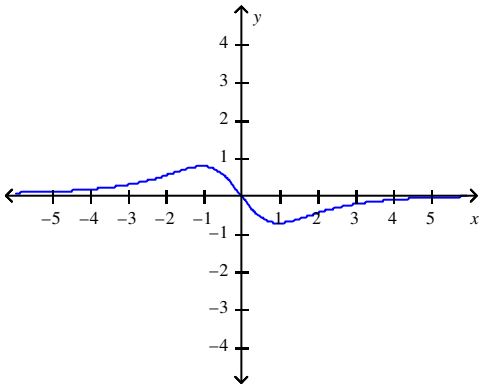
    We see that for any x such that $|x - 6| < \delta$ (actually for any x whatsoever), we have $|f(x) - 5| = |5 - 5| = 0 < \varepsilon$.

    This proves the assertion.
18. 0

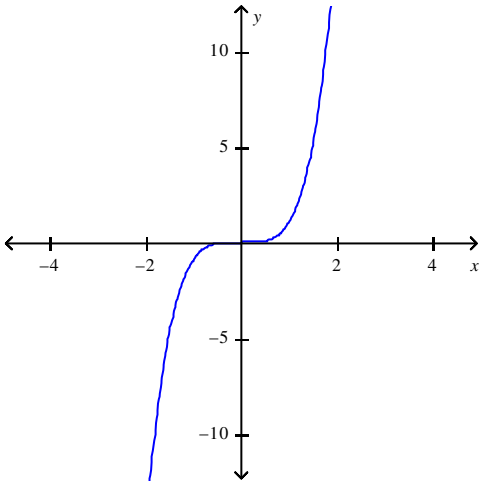
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19.



20. **a.**



b. $x \in (-\infty, \infty)$

c. $f'(x) = \begin{cases} -4x^3 & \text{if } x < 0 \\ 4x^3 & \text{if } x \geq 0 \end{cases}$

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Stewart - Calculus 8e ET Chapter 2 Form C

Select the correct answer for each question.

____ 1. 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

____ 2. 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

____ 3. 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. $m_{PQ} = 0.167439$

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____ 4. Use the graph of the function to state the value of $\lim_{x \to 0} f(x)$, if it exists.

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

a. $\frac{1}{3}$

b. $\frac{1}{2}$

c. does not exist

d. 1

e. ∞

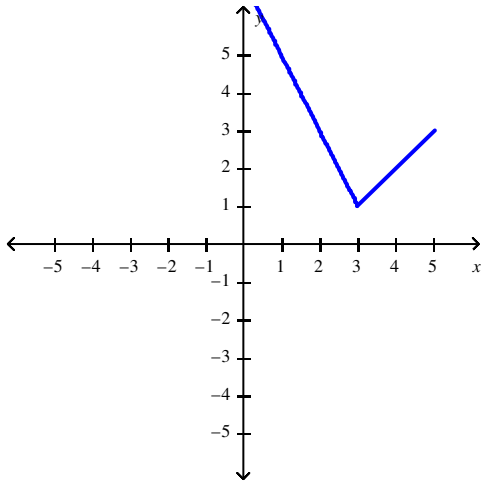
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____ 5. Sketch the graph of the function f and evaluate $\lim_{x \to 3} f(x)$.

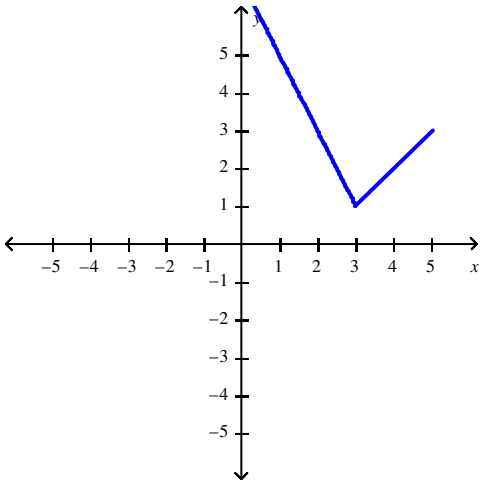
$$f(x) = \begin{cases} x - 2, & \text{if } x \le 3 \\ -2x + 7, & \text{if } x > 3 \end{cases}$$

a.



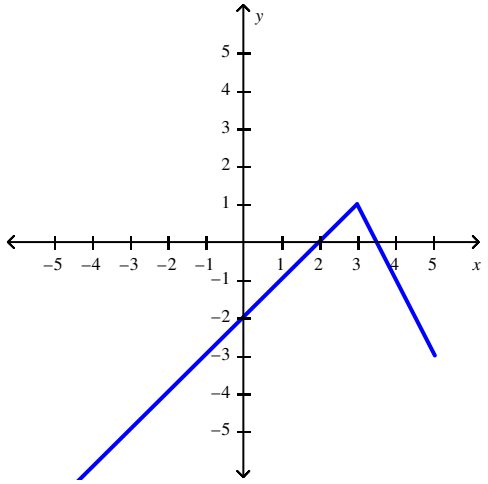
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c.



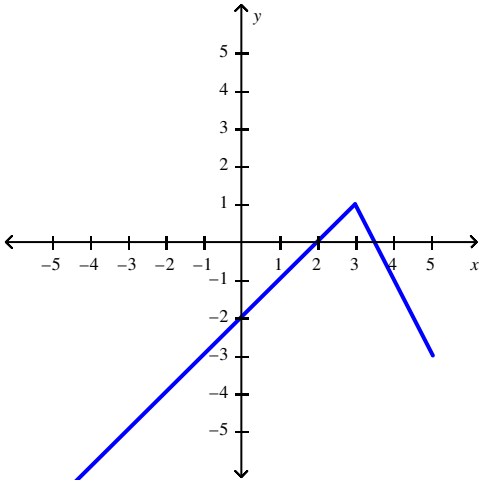
3

b.



3

d.



1

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____ 6. 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

____ 7. Find the limit $\lim_{x \to 1} \dfrac{x^2 + x - 2}{x - 1}$, if it exists.

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

____ 8. Find the limit by evaluating the derivative of a suitable function at an appropriate value of x. (Hint: Use the definition of the derivative.)

$$\lim_{h \to 0} \frac{2(5+h)^2 + 5(5+h) - 75}{h}$$

a. 25
b. 75
c. 0
d. ∞

____ 9. You are given that $\lim_{x \to a} f(x) = -3$, $\lim_{x \to a} g(x) = -4$, and $\lim_{x \to a} h(x) = 2$. Find the limit $\lim_{x \to a} \left\{ [h(x)]^2 - f(x)g(x) \right\}$.

a. 17
b. –8
c. 0
d. 22

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____ 10. 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

____ 11. 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.

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

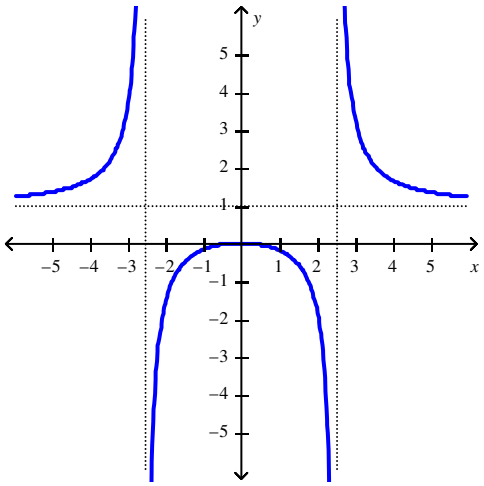
____ 12. If f and g are continuous functions with $f(9) = 6$ and $\lim_{x \to 9} [\,2f(x) - g(x)\,] = 9$, find $g(9)$.

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

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____ 13. Use the graph to determine where the function is discontinuous.



a. At 0
b. On the interval $(0, 1)$
c. At ± 2.5
d. At 1

____ 14. 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

____ 15. 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

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____ 16. Find the limit.

$$\lim_{x \to -\infty} \frac{-5x^2 - 9}{4x^2 + 5}$$

a. $-\frac{9}{5}$
b. 0
c. $\frac{5}{4}$
d. $-\frac{5}{4}$

____ 17. Find the horizontal and vertical asymptotes of the graph of the function

$$f(x) = \frac{9x^3}{\sqrt{4x^6 + 1}}.$$

a. HA $y = \frac{9}{2}$, VA $x = -\frac{1}{2}, \frac{1}{2}$
b. HA $y = -\frac{9}{2}, \frac{9}{2}$, VA none
c. HA $y = \frac{9}{2}$, VA none
d. HA $y = -\frac{9}{2}, \frac{9}{2}$, VA $x = -\frac{1}{2}, \frac{1}{2}$

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____ 18. Find the vertical asymptotes of the function.

$$y = \frac{4x^2 + 1}{3x - 4x^2}$$

a. $x = -\frac{4}{3}$

b. $x = \frac{4}{3}$

c. $x = 3$

d. $x = 0, \frac{4}{3}$

e. None of these

____ 19. If $g(x) = \sqrt{2 - 3x}$, use the definition of derivative to find $g'(x)$.

a. $g'(x) = -\frac{1}{2}(2 - 3x)^{-1/2}$

b. $g'(x) = -(2 - 3x)^{-1/2}$

c. $g'(x) = -\frac{3}{2}(2 - 3x)^{1/2}$

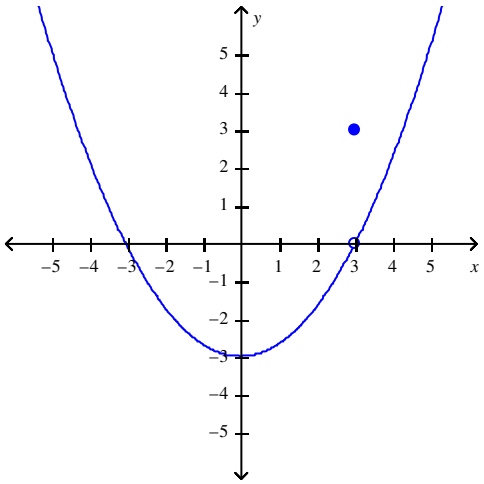
d. $g'(x) = -\frac{3}{2}(2 - 3x)^{-1/2}$

e. None of these

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____ 20. Use the graph of the function f to find the value(s) of x at which f is not differentiable.



a. -3
b. ± 6
c. -6
d. 3

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Stewart - Calculus 8e ET Chapter 2 Form C

Answer Key

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

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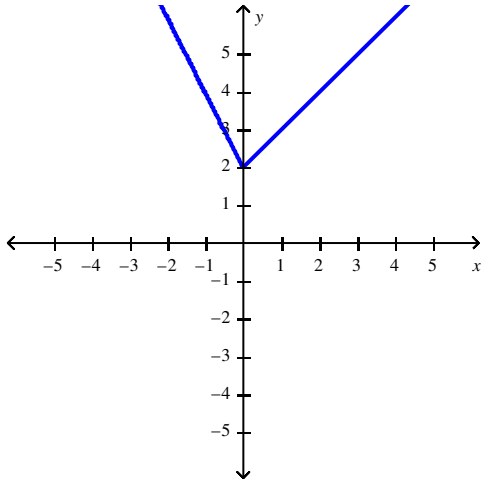
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Select the correct answer for each question.

____ 1. Sketch the graph of the function f and evaluate $\lim_{x \to 0} f(x)$.

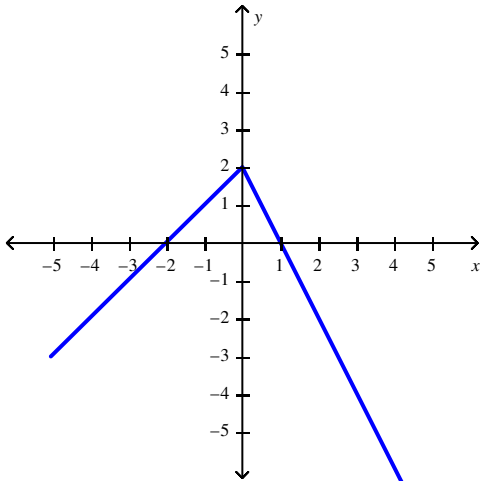
$$f(x) = \begin{cases} x + 2, & \text{if } x \le 0 \\ -2x + 2, & \text{if } x > 0 \end{cases}$$

a.



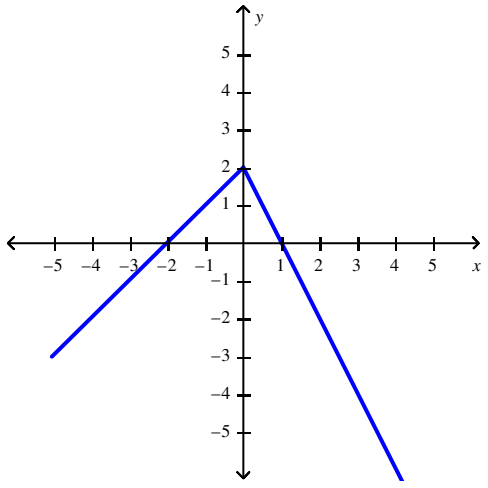
0

c.



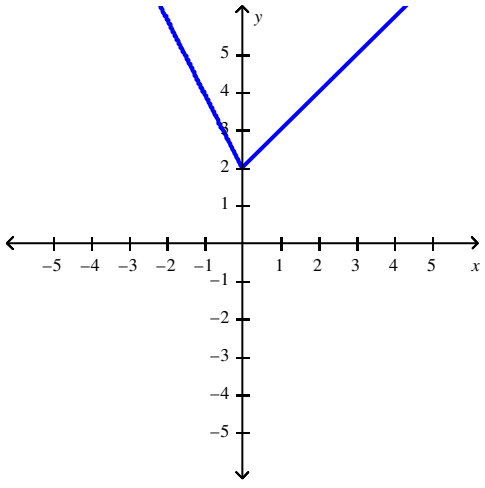
2

b.



0

d.

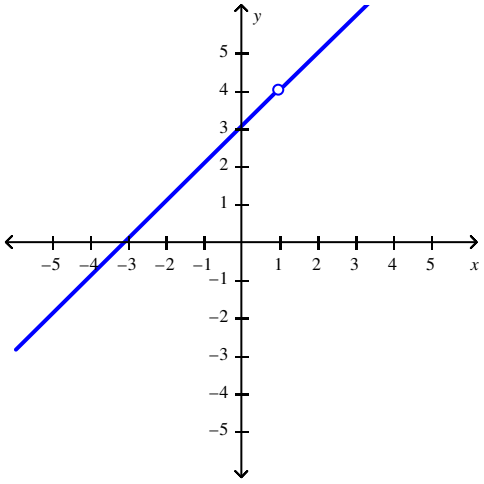


2

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____ 2. Use the graph of $f(x) = \dfrac{x^2 + 2x - 3}{x - 1}$ to guess at the limit $\lim\limits_{x \to 1} \dfrac{x^2 + 2x - 3}{x - 1}$, if it exists.



a. 1
b. 4
c. 3
d. Does not exist

____ 3. Find the vertical asymptotes of the function.

$$y = \frac{4x^2 + 1}{5x - 4x^2}$$

a. $x = 4$

b. $x = \dfrac{1}{5}$

c. $x = 0,\ x = \dfrac{1}{4}$

d. $x = -\dfrac{2}{5}$

e. none of these

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____ 4. Find the limit.

$$\lim_{x \to -\infty} \frac{\sqrt{x^2 - 25}}{6x - 18}$$

a. $\frac{1}{6}$

b. 5

c. -5

d. 18

e. does not exist

____ 5. If $1 \le f(x) \le x^2 + 5x + 5$, for all x, find $\lim_{x \to -1} f(x)$.

a. 1

b. 8

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

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

e. does not exist

____ 6. Find the limit $\lim_{x \to 3} \frac{x^2 - 5x + 6}{x - 3}$, if it exists.

a. –2
b. Does not exist
c. 3
d. 1

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____ 7. Evaluate $\lim_{h \to 0} \dfrac{\cot\left(\dfrac{\pi}{4} + h\right) - 1}{h}$.

a. 0
b. –2
c. 2
d. Undefined

____ 8. Evaluate the limit, if it exists.

$$\lim_{h \to 0} \frac{(x-h)^7 - x^7}{h}$$

a. -7
b. 1
c. $-7x^6$
d. $7x^6$
e. does not exist

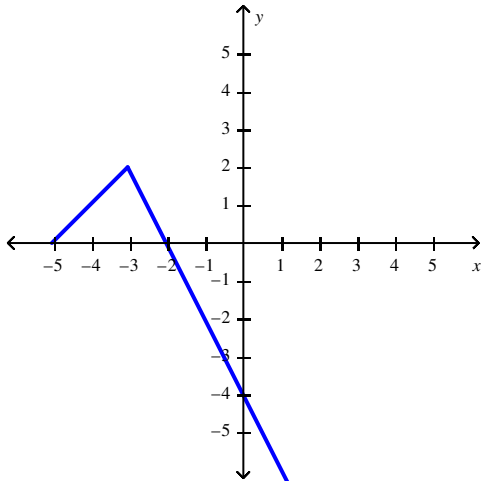
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____ 9. Sketch the graph of the function f and evaluate $\lim_{x \to -3} f(x)$.

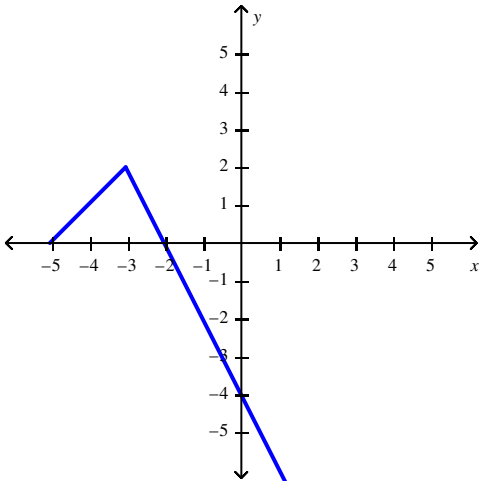
$$f(x) = \begin{cases} x + 5, & \text{if } x \le -3 \\ -2x - 4, & \text{if } x > -3 \end{cases}$$

a.



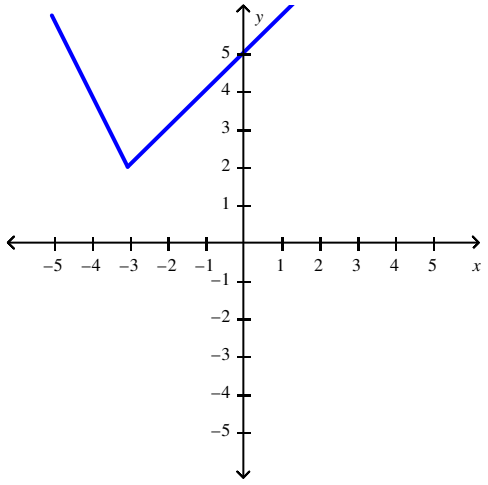
–3

c.



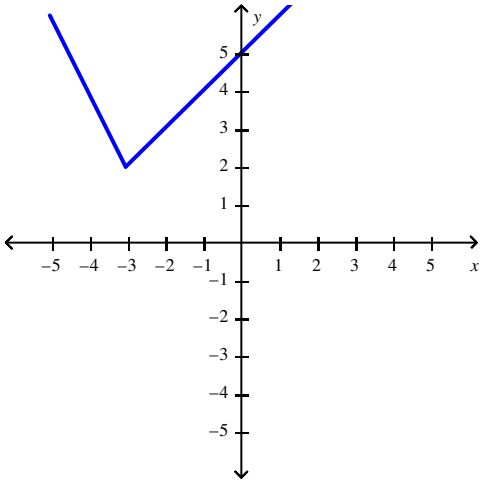
2

b.



2

d.



–3

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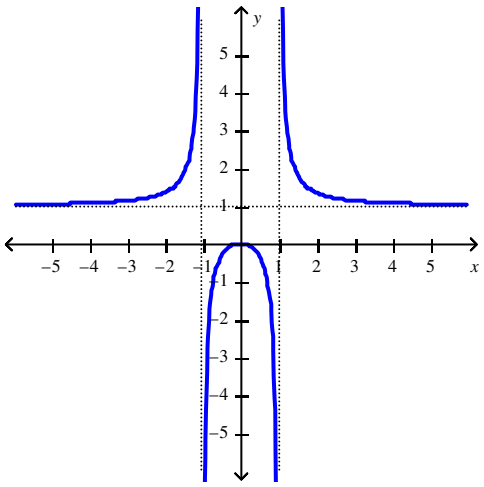
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____ 10. For what value of the constant c is the function f continuous on $(-\infty, \infty)$?

$$f(x) = \begin{cases} cx + 5 & \text{for } x \le 2 \\ cx^2 - 7 & \text{for } x > 2 \end{cases}$$

a. $c = 2$
b. $c = 1$
c. $c = 6$
d. $c = -2$
e. $c = -6$

____ 11. Use the graph to determine where the function is discontinuous.



a. At 1
b. On the interval $(0, 1)$
c. At 0
d. At ± 1

____ 12. Find the limit.

$$\lim_{x \to \infty} \frac{x^7 - 4}{x^6 + 8}$$

a. $-1/4$
b. $-\infty$
c. 0
d. $1/4$
e. ∞

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____ 13. Find the horizontal and vertical asymptotes of the graph of the function

$$f(x) = \frac{7x^3}{\sqrt{9x^6 + 1}}.$$

a. HA $y = \frac{7}{3}$, VA $x = -\frac{1}{3}, \frac{1}{3}$

b. HA $y = -\frac{7}{3}, \frac{7}{3}$, VA none

c. HA $y = \frac{7}{3}$, VA none

d. HA $y = -\frac{7}{3}, \frac{7}{3}$, VA $x = -\frac{1}{3}, \frac{1}{3}$

____ 14. Let $F(x) = \frac{x^2 - 1}{|x - 1|}$. Find the following limits.

$$\lim_{x \to 1^+} F(x), \quad \lim_{x \to 1^-} F(x)$$

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

____ 15. The cost (in dollars) of producing x units of a certain commodity is

$$C(x) = 4,571 + 17x + 0.05x^2.$$

Find the instantaneous rate of change with respect to x when $x = 103$. (This is called the *marginal cost*.)

a. 32.45
b. 10.3
c. 22.15
d. 19.06
e. 27.3

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____ 16. Find an equation of the tangent line to the curve $y = x^3 - 6x$ at the point $(6, 8)$.

a. $y = 8 + 30x$
b. $y = 6 + 30x$
c. $y = 6 - 30x$
d. $y = x - 8$
e. None of these

____ 17. Find the tangent line to the parabola $y = 5x - x^2$ at the point $(2, 4)$.

a. $y = \sqrt{3}x - 4$

b. $y = -\sqrt{6}x - 3$

c. $y = \frac{\sqrt{3}}{3}x - 4$

d. $y = x + 2$

e. None of these

____ 18. The cost (in dollars) of producing x units of a certain commodity is

$C(x) = 4,280 + 13x + 0.03x^2$.

Find the average rate of change with respect to x when the production level is changed from $x = 100$ to $x = 120$.

a. 29.82
b. 16.3
c. 19.6
d. 22.9
e. 14.3

____ 19. At what point is the function $f(x) = |3 - x|$ not differentiable.

a. -3
b. 0
c. 1
d. -1
e. 3

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____ 20. The symbol $\lfloor\ \rfloor$ can be used to denote the greatest integer function, which is defined by $\lfloor x \rfloor =$ the greatest integer n such that $n \leq x$. Use the graph of the function to find the indicated limit, if it exists.

$$\lim_{x \to -0.3} \lfloor x \rfloor$$

a. 0
b. –1
c. –0.3
d. 0.3

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Answer Key

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

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Stewart - Calculus 8e ET Chapter 2 Form E

1. 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.

____ 2. 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

3. Find the value of the limit.

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

4. Find the limit.

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

____ 5. Find the limit $\lim_{x \to 1} \frac{x^2 + x - 2}{x - 1}$, if it exists. Select the correct answer.

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

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____ 6. Evaluate the limit, if it exists. Select the correct answer.

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

a. $6x^5$
b. -6
c. 1
d. $-6x^5$
e. does not exist

7. Sketch the graph of the function f and evaluate $\lim_{x \to -1^+} f(x)$.

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

____ 8. You are given that $\lim_{x \to a} f(x) = -3$, $\lim_{x \to a} g(x) = -4$, and $\lim_{x \to a} h(x) = 2$. Find the limit $\lim_{x \to a} \left\{ [h(x)]^2 - f(x)g(x) \right\}$. Select the correct answer.

a. 17
b. –8
c. 0
d. 22

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

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

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____ 10. Find the limit. Select the correct answer.

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

a. ∞
b. 0
c. $-\infty$
d. -2
e. 2

____ 11. 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

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

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

____ 14. Find the limit.

$$\lim_{x \to -\infty} \frac{-5x^2 - 9}{4x^2 + 5}$$

Select the correct answer.

a. $-\frac{9}{5}$
b. 0
c. $\frac{5}{4}$
d. $-\frac{5}{4}$

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____ 15. Find the horizontal and vertical asymptotes of the graph of the function

$$f(x) = \frac{9x^3}{\sqrt{4x^6 + 1}}.$$

Select the correct answer.

a. HA $y = \frac{9}{2}$, VA $x = -\frac{1}{2}, \frac{1}{2}$

b. HA $y = -\frac{9}{2}, \frac{9}{2}$, VA none

c. HA $y = \frac{9}{2}$, VA none

d. HA $y = -\frac{9}{2}, \frac{9}{2}$, VA $x = -\frac{1}{2}, \frac{1}{2}$

____ 16. Evaluate the limit. Select the correct answer.

$$\lim_{x \to 0} \frac{1 - \cos x}{x^2 + x}$$

a. 1

b. 1

c. ∞

d. π

e. 0

17. The cost (in dollars) of producing x units of a certain commodity is

$$C(x) = 4,571 + 17x + 0.02x^2.$$

Find the instantaneous rate of change with respect to x when $x = 103$. (This is called the *marginal cost*.)

____ 18. Find the instantaneous rate of change of the function $f(x) = x^3 + 8x$ when $x = -2$.
Select the correct answer.

a. –16

b. 20

c. –22

d. 8

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19. The cost (in dollars) of producing x units of a certain commodity is

$C(x) = 4,280 + 13x + 0.03x^2$.

Find the average rate of change with respect to x when the production level is changed from $x = 102$ to $x = 122$.

____ 20. If an equation of the tangent line to the curve $y = f(x)$ at the point where $a = 2$ is $y = 7x - 3$, find $f(5)$ and $f'(5)$. Select the correct answer.

a. $f(5) = 7$

$f'(5) = 37$

b. $f(5) = 7$

$f'(5) = 32$

c. $f(5) = 37$

$f'(5) = 7$

d. $f(5) = 32$

$f'(5) = 7$

e. $f(5) = 32$

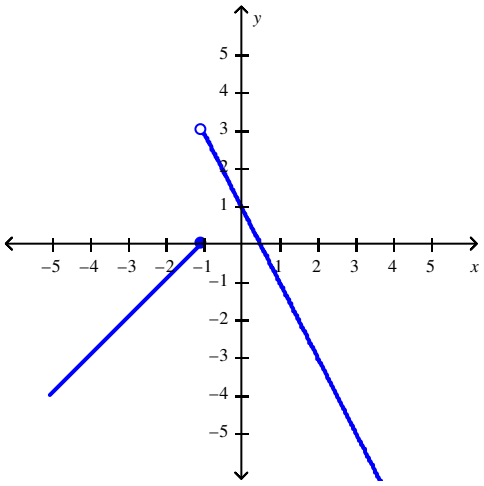
$f'(5) = 32$

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Stewart - Calculus 8e ET Chapter 2 Form E

Answer Key

1. 0.451
2. B
3. 64
4. $\frac{1}{2}$
5. B
6. D
7. 

   3
8. B
9. 1 and -1
10. C
11. C
12. 3
13. $(-\infty, \infty)$
14. D
15. B
16. C
17. 21.12
18. B
19. 19.72
20. D

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Stewart - Calculus 8e ET Chapter 2 Form F

1. If a ball is thrown into the air with a velocity of 59 ft/s, its height (in feet) after t seconds is given by

   $H = 59t - 8t^2$.

   Find the velocity when $t = 8$.

____ 2. Use the graph of the function to state the value of $\lim_{x \to 0} f(x)$, if it exists. Select the correct answer.

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

a. $-\frac{1}{2}$

b. ∞

c. does not exist

d. $\frac{1}{2}$

e. $-\infty$

3. Sketch the graph of the function f and evaluate $\lim_{x \to 1} f(x)$.

$$f(x) = \begin{cases} x + 1, & \text{if } x \le 1 \\ -2x + 4, & \text{if } x > 1 \end{cases}$$

4. Find the limit.

$$\lim_{x \to -\infty} \frac{\sqrt{x^2 - 49}}{5x - 15}$$

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____ 5. If $1 \le f(x) \le x^2 + 4x + 4$, for all x, find $\lim_{x \to -1} f(x)$. Select the correct answer.

a. 1

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

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

d. 8

e. does not exist

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

____ 7. Evaluate the limit, if it exists. Select the correct answer.

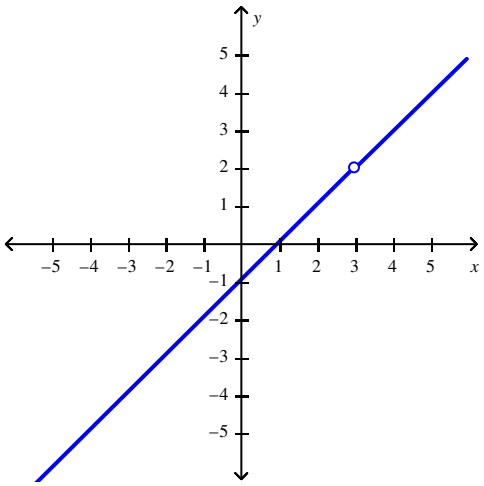
$$\lim_{h \to 0} \frac{(x-h)^3 - x^3}{h}$$

a. 1
b. $3x^2$
c. $-3x^2$
d. -3
e. does not exist

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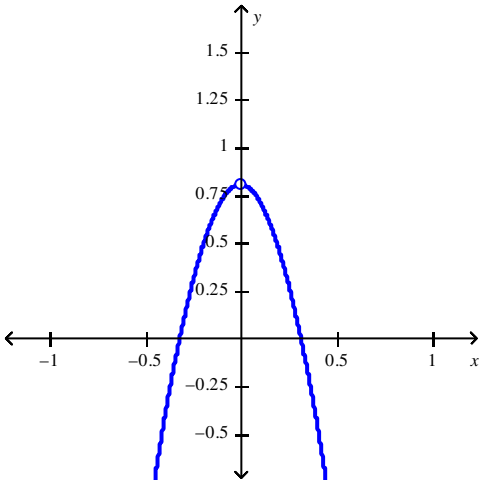
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8. Use the graph of $f(x) = \dfrac{x^2 - 4x + 3}{x - 3}$ to guess at the limit $\lim\limits_{x \to 3} \dfrac{x^2 - 4x + 3}{x - 3}$, if it exists.



____ 9. Use the graph of $f(x) = \dfrac{\sin 4x}{\tan 5x}$ to guess at the limit $\lim\limits_{x \to 0} \dfrac{\sin 4x}{\tan 5x}$, if it exists.

Select the correct answer.



a. Does not exist
b. 0.8
c. 1.3
d. 0.2

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10. Estimate the value of the limit by graphing the function $f(x) = \dfrac{2\sin x}{\sin \pi x}$. State your answer correct to two decimal places.

$$\lim_{x \to 0} \frac{2\sin x}{\sin \pi x}$$

11. Find the limit.

$$\lim_{x \to 2} \sqrt{\frac{4x^2 + 1}{9x - 2}}$$

____ 12. Which of the given functions is discontinuous? Select the correct answer.

a.
$$f(x) = \begin{cases} \dfrac{1}{x-2}, & x \geq 13 \\ \dfrac{1}{11}, & x < 13 \end{cases}$$

b.
$$f(x) = \begin{cases} \dfrac{1}{x-13}, & x \neq 13 \\ 11, & x = 13 \end{cases}$$

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

$$f(x) = \begin{cases} cx + 9 & \text{for } x \leq 2 \\ cx^2 - 5 & \text{for } x > 2 \end{cases}$$

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____ 14. Find the limit. Select the correct answer.

$$\lim_{x \to \infty} \frac{x^7 - 2}{x^6 + 4}$$

a. $-1/2$
b. ∞
c. 0
d. $1/2$
e. $-\infty$

15. Find the limit.

$$\lim_{x \to -\infty} \frac{4x^2 - 5}{7x^2 + 4}$$

16. Find the horizontal and vertical asymptotes of the graph of the function

$$f(x) = \frac{5x^3}{\sqrt{9x^6 + 1}}.$$

____ 17. Use the definition of the derivative to find $f'(4)$, where $f(x) = x^3 - 3x$.

Select the correct answer.

a. 45
b. 32
c. -45
d. 48
e. does not exist

18. Find an equation of the tangent line to the curve $y = x^3 - 6x$ at the point $(6, 4)$.

19. The slope of the tangent line to the graph of the exponential function $y = 8^x$ at the point $(0, 1)$ is $\lim_{x \to 0} \frac{8^x - 1}{x}$. Estimate the slope to three decimal places.

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____ 20. Find the tangent line to the parabola $y = 5x - x^2$ at the point $(2, 4)$. Select the correct answer.

a. $y = x + 2$

b. $y = -\sqrt{6}x - 3$

c. $y = \frac{\sqrt{3}}{3}x - 4$

d. $y = \sqrt{3}x - 4$

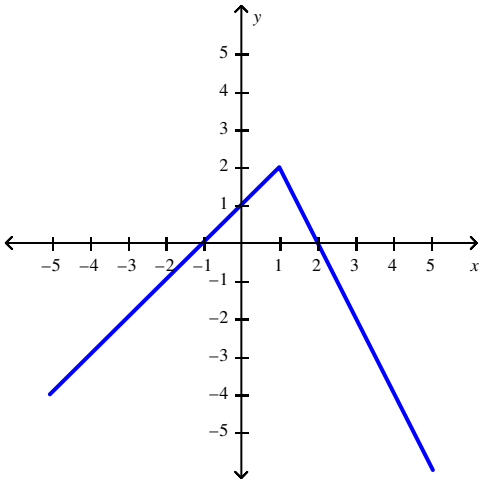
e. None of these

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Stewart - Calculus 8e ET Chapter 2 Form F

Answer Key

1. -69 ft/s
2. C
3. 

2
4. $\frac{1}{5}$
5. A
6. $\frac{\sqrt{6}}{12}$
7. C
8. Does not exist
9. B
10. 0.64
11. $\frac{\sqrt{17}}{4}$
12. B
13. $c = 7$
14. B
15. $\frac{4}{7}$
16. HA $y = -\frac{5}{3}, \frac{5}{3}$, VA none
17. A
18. None of these
19. 2.079
20. A

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Stewart - Calculus 8e ET Chapter 2 Form G

1. 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.

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

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

____ 3. Use the graph of the function to state the value of $\lim\limits_{x \to 0} f(x)$, if it exists. Select the correct answer.

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

   a. $\dfrac{1}{2}$

   b. does not exist
   c. $-\infty$

   d. ∞

   e. $-\dfrac{1}{2}$

____ 4. Find the value of $\lim\limits_{x \to 0^+} f(x)$. Select the correct answer.

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

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

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5. Find the limit by evaluating the derivative of a suitable function at an appropriate value of x. (Hint: Use the definition of the derivative.)

$$\lim_{h \to 0} \frac{2(5+h)^2 + 5(5+h) - 75}{h}$$

6. 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.

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

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

8. Sketch the graph of the function f and evaluate $\lim_{x \to -1^+} f(x)$.

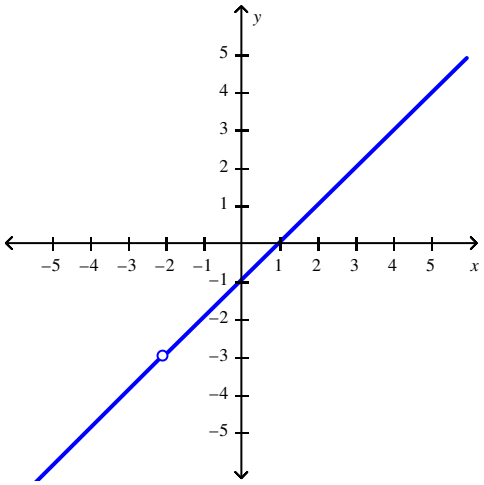
$$f(x) = \begin{cases} x + 1, & \text{if } x \le -1 \\ -2x + 1, & \text{if } x > -1 \end{cases}$$

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____ 9. 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.

Select the correct answer.



a. –2
b. –1
c. Does not exist
d. –3

10. 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 $g(9)$.

11. Let $P(x)$ and $Q(x)$ be polynomials.

Find $\lim\limits_{x \to \infty} \dfrac{P(x)}{Q(x)}$ if the degree of $P(x)$ is 6 and the degree of $Q(x)$ is 8.

12. A skydiver leaps from a helicopter hovering high above the ground. Her velocity t sec later and before deploying her parachute is given by

$$v(t) = 48\left[1 - (0.82)^t \right]$$

where $v(t)$ is measured in meters per second. What is her terminal velocity? Hint: Evaluate $\lim\limits_{t \to \infty} v(t)$.

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____ 13. Evaluate the limit. Select the correct answer.

$$\lim_{x \to 0} \frac{1 - \cos x}{x^2 + x}$$

a. 1
b. 1
c. ∞
d. π
e. 0

14. Let $F(x) = \dfrac{x^3 - 1}{|x - 1|}$. Find the following limits.

$$\lim_{x \to 1^+} F(x), \quad \lim_{x \to 1^-} F(x)$$

15. Use the definition of the derivative to find $f'(3)$, where $f(x) = x^3 - 2x$.

____ 16. Find an equation of the tangent line to the parabola $y = 5x^3$ at the point $(-5, -145)$.

Select the correct answer.

a. $y = 375x - 1730$
b. $y = 395x - 1730$
c. $y = 375x + 1730$
d. $y = 395x + 1730$
e. $y = 395x - 1730$

17. If an equation of the tangent line to the curve $y = f(x)$ at the point where $a = 2$ is $y = 7x - 3$, find $f(5)$ and $f'(5)$.

____ 18. At what point is the function $f(x) = |3 - x|$ not differentiable. Select the correct answer.

a. 0
b. 3
c. 1
d. -1
e. -3

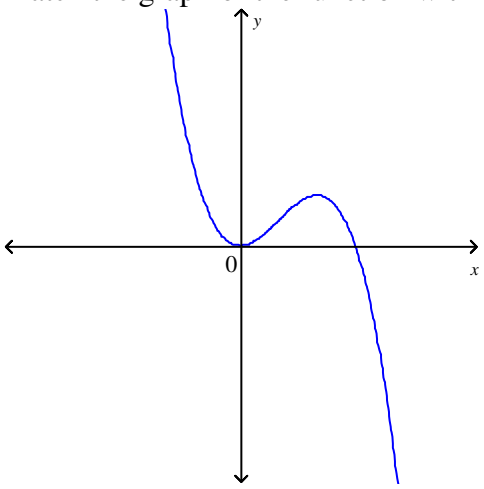
19. If $g(x) = \sqrt{2 - 3x}$, use the definition of derivative to find $g'(x)$.

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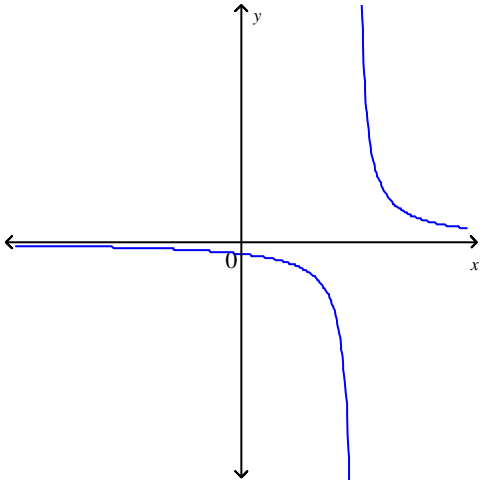
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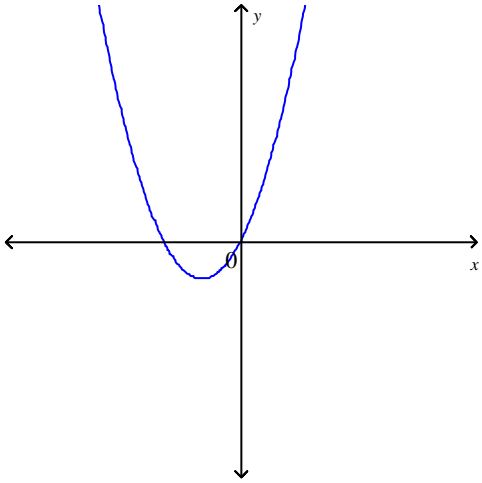
___ 20. Match the graph of the function with the graph of its derivative.



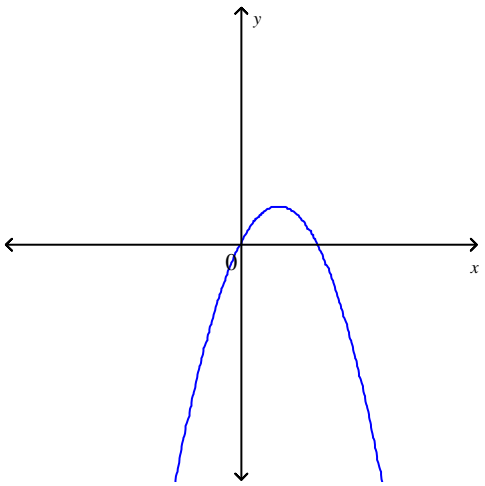
a.



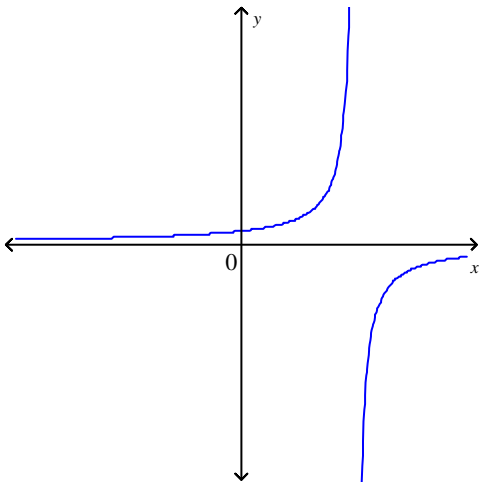
c.



b.



d.

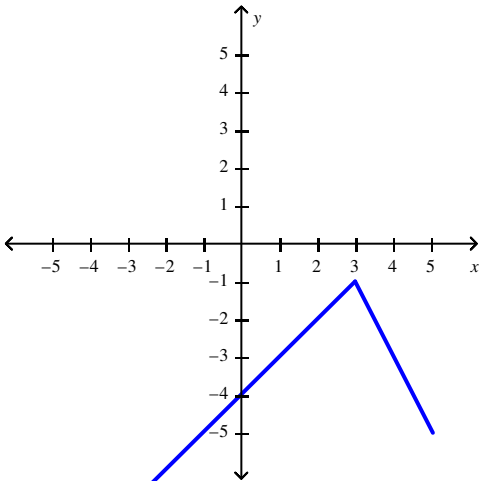


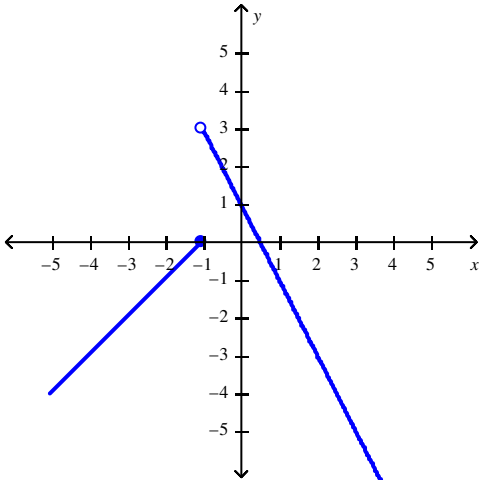
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Stewart - Calculus 8e ET Chapter 2 Form G

Answer Key

1. 1.59
2. does not exist
3. B
4. A
5. 25
6. $a = 15$, limit equals 0.6
7. 

−1
8. 

3
9. C
10. $g(9) = 3$
11. 0
12. 48 m/sec
13. C
14. 3 and −3
15. 25

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16. C
17. $f(5) = 32$

    $f'(5) = 7$
18. B
19. $g'(x) = -\frac{3}{2}(2 - 3x)^{-1/2}$
20. B

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Stewart - Calculus 8e ET Chapter 2 Form H

1. 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 $[2, 3]$.

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

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

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

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

____ 4. Find the limit $\lim_{h \to 3} \left(h^4 - 3h^3 - 4h + 5 \right)$. Select the correct answer.

   a. 7
   b. 3
   c. 5
   d. –7

____ 5. Find the limit by evaluating the derivative of a suitable function at an appropriate value of x. (Hint: Use the definition of the derivative.) Select the correct answer.

   $$\lim_{h \to 0} \frac{2(5+h)^2 + 5(5+h) - 75}{h}$$

   a. 25
   b. 75
   c. 0
   d. ∞

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____ 6. If $\lim_{x \to 3^-} f(x) = 4.5$, then if $\lim_{x \to 3} f(x)$ exists, find the value where it exists. Select the correct answer.

a. 1
b. 3
c. 4.5
d. 6
e. 4.8

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

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

8. Sketch the graph of the function f and evaluate $\lim_{x \to -1^+} f(x)$.

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

____ 9. The symbol $\lfloor \rfloor$ can be used to denote the greatest integer function, which is defined by $\lfloor x \rfloor =$ the greatest integer n such that $n \le x$. Use the graph of the function to find the indicated limit, if it exists. Select the correct answer.

$\lim_{x \to 0.7} \lfloor x \rfloor$

a. 0
b. 1
c. –0.7
d. 0.7

____ 10. You are given that $\lim_{x \to a} f(x) = -3$, $\lim_{x \to a} g(x) = -4$, and $\lim_{x \to a} h(x) = 2$. Find the limit $\lim_{x \to a} \left\{ [h(x)]^2 - f(x)g(x) \right\}$. Select the correct answer.

a. 17
b. –8
c. 0
d. 22

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11. 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 $0 < |x - a| < \delta$.

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

____ 12. How would you define $f(7)$ in order to make f continuous at 7? Select the correct answer.

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

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

____ 13. 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

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

____ 15. Find the limit. Select the correct answer.

$$\lim_{x \to \infty} \frac{x^7 - 6}{x^6 + 12}$$

a. $-\infty$
b. 0
c. ∞
d. $1/6$
e. $-1/6$

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16. Find the horizontal and vertical asymptotes of the graph of the function

$$f(x) = \frac{9x^3}{\sqrt{4x^6 + 1}}.$$

17. Use the definition of the derivative to find $f'(3)$, where $f(x) = x^3 - 2x$.

____ 18. If the tangent line to $y = f(x)$ at $(8, 4)$ passes through the point $(4, -32)$, find $f'(8)$.

Select the correct answer.

a. $f'(8) = 29$
b. $f'(8) = 19$
c. $f'(8) = 9$
d. $f'(8) = 34$
e. $f'(8) = -9$

19. Find the slope of the tangent line to the curve $y = 5x^2$ at the point $(-4, 22)$.

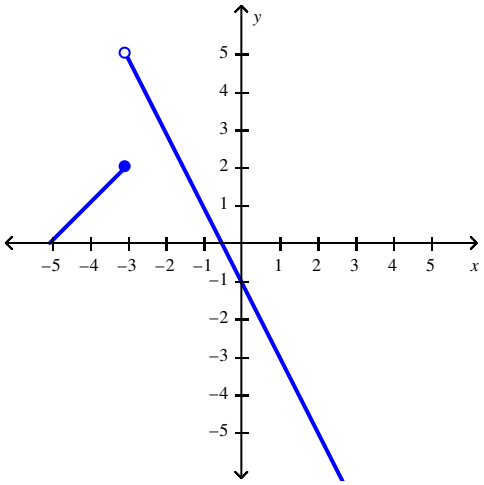
20. Find the instantaneous rate of change of the function $f(x) = x^3 + 8x$ when $x = -2$.

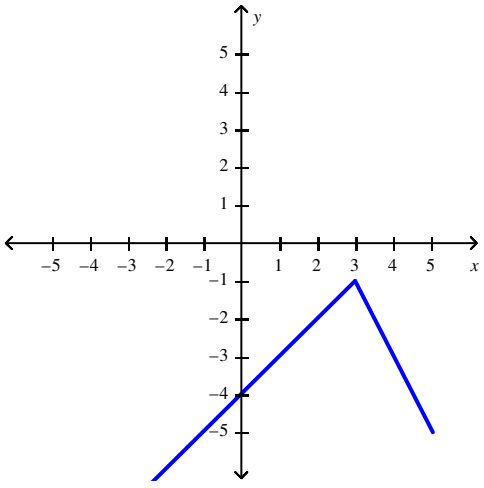
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Stewart - Calculus 8e ET Chapter 2 Form H

Answer Key

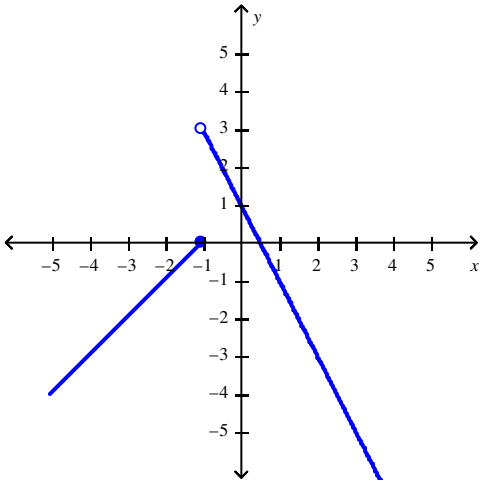
1. 2.4 m/s
2. does not exist
3. 

   5
4. D
5. A
6. C
7. 

   −1

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8. 

3

9. A
10. B
11. 0.0025
12. B
13. C
14. $f(0) = \frac{1}{4}$
15. C
16. HA $y = -\frac{9}{2}, \frac{9}{2}$, VA none
17. 25
18. C
19. −40
20. 20

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