Student: _____
Date: _____

Instructor: Robert Brown
Course: Calculus I Spring 2019 Math 1540 Dr. Bob Brown CRN 20506

Assignment: Calculus I Test 1 Practice

1. Find the limit.

$\lim_{x \to 4} \sqrt{x^2 + 4x + 4}$

- **A.** -6
- **B.** 6
- **C.** 36
- **D.** The limit does not exist.

ID: 2.2-13

2. Find the average rate of change of the function over the given interval.

$y = -3x^2 - x, [5, 6]$

- **A.** -34
- **B.** $\frac{1}{2}$
- **C.** -2
- **D.** $-\frac{1}{6}$

ID: 2.1-5

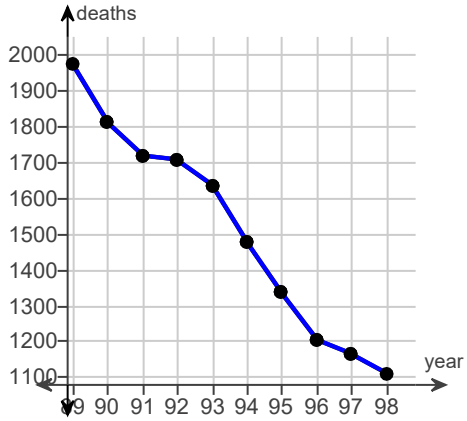
3. Find the limit, if it exists.

$\lim_{x \to 2} \frac{x^2 - 4}{x^2 - 6x + 8}$

- **A.** -1
- **B.** 0
- **C.** -2
- **D.** The limit does not exist.

ID: 2.2-34

4. The graph below shows the number of deaths in a country from a certain disease from 1989 to 1998. Estimate the average rate of change in deaths from this disease from 1991 to 1996.



- **A.** About − 60 deaths per year
- **B.** About − 0.9 deaths per year
- **C.** About − 500 deaths per year
- **D.** About − 100 deaths per year

ID: 2.1-16

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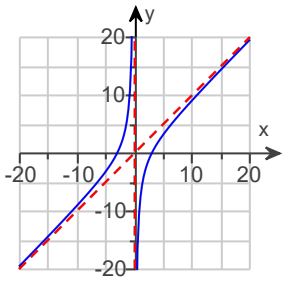
5. Graph the rational function. Include the graphs of the asymptotes.

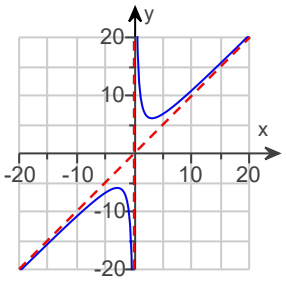
$$y = \frac{x^2 + 9}{x}$$

Choose the correct graph of the rational function below.

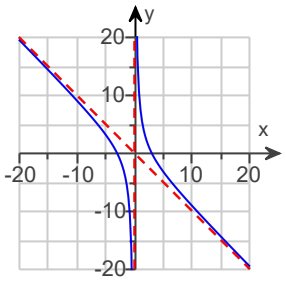
- **A.**



- **B.**



- **C.**



ID: 2.6.103

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6. Find the limit.

$$\lim_{x \to 4^-} \frac{3}{x^2 - 16}$$

- **A.** $-\infty$
- **B.** 0
- **C.** ∞
- **D.** 1

ID: 2.6-24

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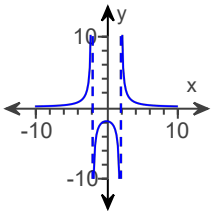
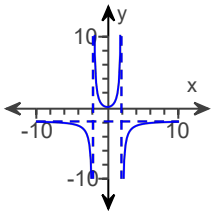
7. Graph the rational function. Include the graphs and equations of the asymptotes.

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

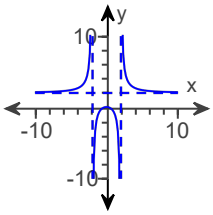
A.
asymptotes:
$x = -2, x = 2, y = 0$



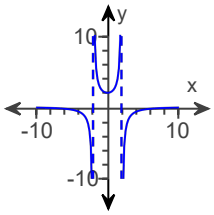
B.
asymptotes:
$x = -2, x = 2, y = -2$



C.
asymptotes:
$x = -2, x = 2, y = 2$



D.
asymptotes:
$x = -2, x = 2, y = 0$



ID: 2.6-37

8. Find the limit.

$$\lim_{x \to \infty} \frac{3}{4 - \left(1 / x^2\right)}$$

A. 1

B. 3

C. $-\infty$

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

ID: 2.6-8

9. Find the limit.

$$\lim_{x \to \infty} \frac{2x + 1}{9x - 7}$$

A. $\frac{2}{9}$

B. 0

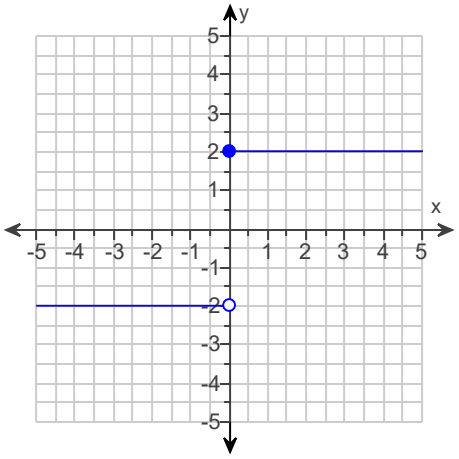
C. $-\frac{1}{7}$

D. ∞

ID: 2.6-11

10. Use the graph to evaluate the limit.

$\lim_{x \to 0} f(x)$



- **A.** 1
- **B.** -1
- **C.** ∞
- **D.** The limit does not exist.

ID: 2.2-5

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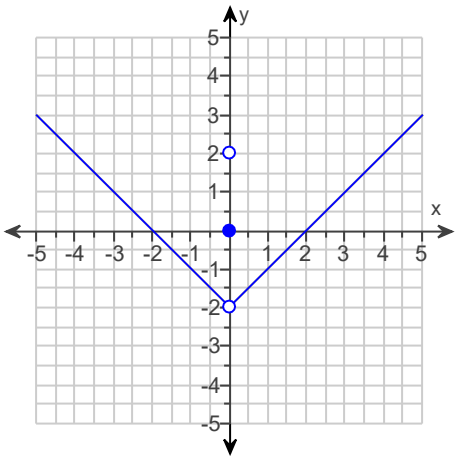
11. Use the graph to evaluate the limit.

$\lim_{x \to 0} f(x)$



- **A.** 0
- **B.** 2
- **C.** -2
- **D.** The limit does not exist.

ID: 2.2-6

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12. Explain why the limit does not exist.

$$\lim_{x\to 0} \frac{x}{|x|}$$

Fill in the blanks in the following statement, and then answer the multiple choice below.

As x approaches 0 from the left, $\frac{x}{|x|}$ approaches (1) _____. As x approaches 0 from the right, $\frac{x}{|x|}$ approaches (2) _____.

- **A.** Since the function is not defined at $x = 0$, there is no way of knowing the limit as $x \to 0$.
- **B.** There is no single number L that the function values all get arbitrarily close to as $x \to 0$.

(1)
- -1
- 1
- 0

(2)
- -1
- 1
- 0

ID: 2.2.5

13. Suppose that a function f(x) is defined for all real values of x in $[-1,1]$. Can anything be said about the existence of $\lim_{x\to 0} f(x)$? Give reasons for your answer.

- **A.** At $x = 0$, $\lim_{x\to 0} f(x)$ must exist because the function is defined at every point in the interval $[-1,1]$.
- **B.** Nothing can be said about the existence of the limit. Even though the function is defined at every point in the interval $[-1,1]$, there may be a jump or an oscillation at $x = 0$.
- **C.** At $x = 0$, $\lim_{x\to 0} f(x)$ does not exist because it is likely that the function oscillates or jumps at that point.

ID: 2.2.8

14. Evaluate the following limit.

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

$\lim_{x\to 1} \left(2x^3 - 2x^2 + 4x + 2\right)$ = _____ (Simplify your answer.)

ID: 2.2.14

15. Use the table of values of $f(\theta) = \dfrac{\cos(4\theta)}{\theta}$ to estimate $\lim\limits_{\theta \to 0} f(x)$, if it exists.

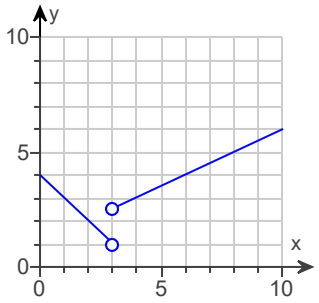
f()θ	− 0.1	− 0.01	− 0.001	⋯	0.001	0.01	0.1
f(θ)	− 9.2106	− 99.9200	− 999.9920	⋯	999.9920	99.9200	9.2106

- **A.** 0
- **B.** 4
- **C.** 9.2106
- **D.** The limit does not exist.

ID: 2.2-52

16. Use the following function and its graph to answer (a) through (d) below.

Let $f(x) = \begin{cases} 4 - x, & x < 3 \\ \frac{x}{2} + 1, & x > 3. \end{cases}$



a. Find $\lim_{x \to 3^+} f(x)$ and $\lim_{x \to 3^-} f(x)$. Select the correct choice below and fill in any answer boxes in your choice.

- **A.** $\lim_{x \to 3^+} f(x) =$ _____, $\lim_{x \to 3^-} f(x) =$ _____ (Simplify your answer.)
- **B.** The limit does not exist.

b. Does $\lim_{x \to 3} f(x)$ exist? If so, what is it? If not, why not?

- **A.** No, $\lim_{x \to 3} f(x)$ does not exist because $\lim_{x \to 3^+} f(x) \neq \lim_{x \to 3^-} f(x)$.
- **B.** Yes, $\lim_{x \to 3} f(x)$ exists and equals 2.5.
- **C.** Yes, $\lim_{x \to 3} f(x)$ exists and equals 1.
- **D.** No, $\lim_{x \to 3} f(x)$ does not exist because $f(3)$ is undefined.

c. Find $\lim_{x \to 4^+} f(x)$ and $\lim_{x \to 4^-} f(x)$. Select the correct choice below and fill in any answer boxes in your choice.

- **A.** $\lim_{x \to 4^+} f(x) =$ _____, $\lim_{x \to 4^-} f(x) =$ _____ (Simplify your answer.)
- **B.** The limit does not exist.

d. Does $\lim_{x \to 4} f(x)$ exist? If so, what is it? If not, why not?

- **A.** No, $\lim_{x \to 4} f(x)$ does not exist because $f(4)$ is undefined.
- **B.** Yes, $\lim_{x \to 4} f(x)$ exists and equals 0.
- **C.** No, $\lim_{x \to 4} f(x)$ does not exist because $\lim_{x \to 4^+} f(x) \neq \lim_{x \to 4^-} f(x)$.
- **D.** Yes, $\lim_{x \to 4} f(x)$ exists and equals 3.

ID: 2.4.3

17. Find $\lim_{x \to 9} \frac{x-9}{\sqrt{x+7}-4}$.

$\lim_{x \to 9} \frac{x-9}{\sqrt{x+7}-4} =$ _____

(Type an integer or a simplified fraction.)

ID: 2.2.37

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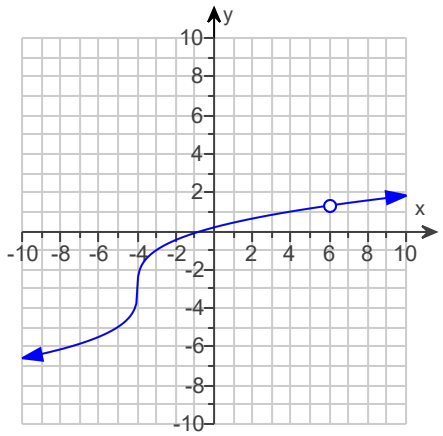
18. Find all points where the function is discontinuous.



- **A.** $x = -4$
- **B.** $x = 6$
- **C.** $x = -4$ and $x = 6$
- **D.** There are no points where the function is discontinuous.

ID: 2.5-3

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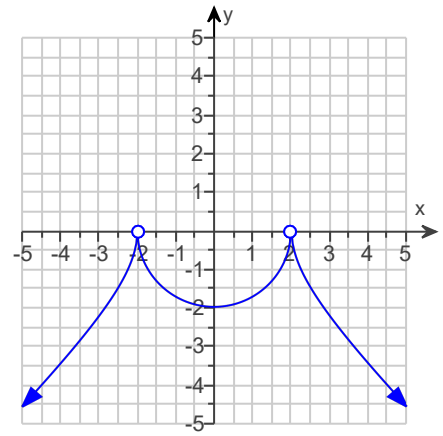
19. Find all points where the function is discontinuous.



- **A.** $x = -2$ and $x = 2$
- **B.** $x = 2$
- **C.** $x = -2$
- **D.** There are no points where the function is discontinuous.

ID: 2.5-6

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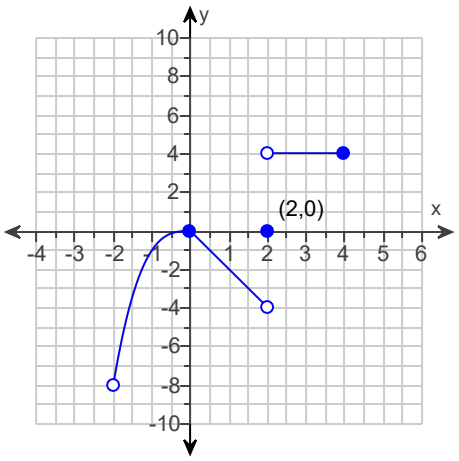
20. Let f(x) be defined as shown on the right. The graph of y = f(x) is shown below. Does $\lim_{x \to 0} f(x)$ exist?



$$f(x) = \begin{cases} x^3, & -2 < x < 0 \\ -2x, & 0 \le x < 2 \\ 0, & x = 2 \\ 4, & 2 < x \le 4 \end{cases}$$

- No
- Yes

ID: 2.5-9

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21. To what new value should f(2) be changed to remove the discontinuity?

$$f(x) = \begin{cases} 2x - 4, & x < 2 \\ 2 & x = 2 \\ x - 2, & x > 2 \end{cases}$$

- **A.** 0
- **B.** −1
- **C.** −7
- **D.** −8

ID: 2.5-12

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22. Find the slope of the curve at the given point P and an equation of the tangent line at P.

$y = x^2 + 5x$, P(4,36)

- **A.** The slope of the curve is $-\frac{4}{25}$ at P. The line $y = -\frac{4x}{25} + \frac{8}{5}$ is tangent at P.
- **B.** The slope of the curve is $\frac{1}{20}$ at P. The line $y = \frac{x}{20} + \frac{1}{5}$ is tangent at P.
- **C.** The slope of the curve is −39 at P. The line y = −39x − 80 is tangent at P.
- **D.** The slope of the curve is 13 at P. The line y = 13x − 16 is tangent at P.

ID: 2.1-7

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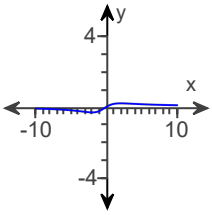
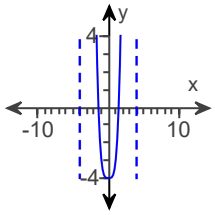
23. Graph the rational function. Include the graphs and equations of the asymptotes.

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

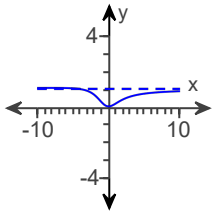
A.
asymptote:
$y = 0$



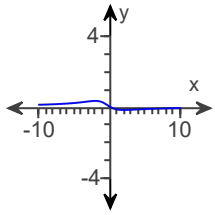
B.
asymptotes:
$x = 4, x = -4$



C.
asymptote:
$y = 1$



D.
asymptote:
$y = 0$



ID: 2.6-33

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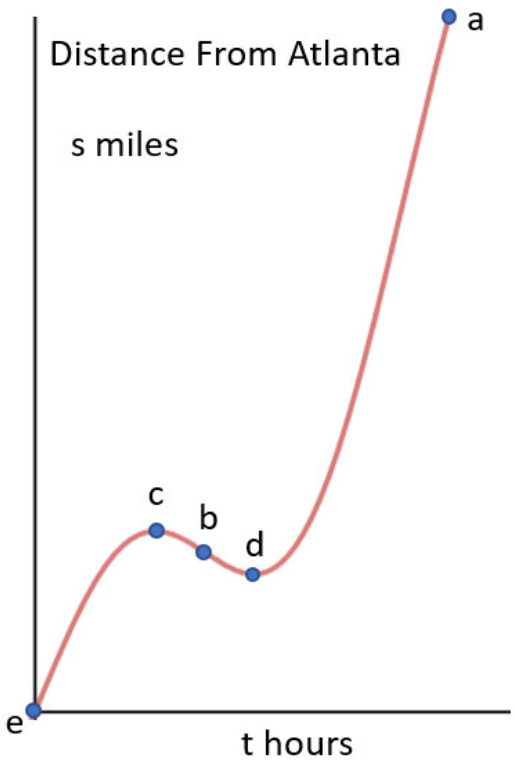
24. Consider the graph of a car's position versus time and answer the following questions:

At which point is the car's velocity the greatest? ____

A which point is he car going backwards at the highest velocity? _____

At which point is the car stopped and also closest to the starting point? _____



ID: Instructor-created question

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25. On the far, far, away gigantic planet Cyclops, the distance an object falls after being dropped is given by:

$s = 80t^2$ where t is time in seconds after the object is dropped and s is the distance in feet.

Find the average rate of change (velocity) of the objects position over the time interval [0, 2]

- **A.** 320 ft/sec
- **B.** 160 ft/sec
- **C.** 120 ft/sec
- **D.** 240 ft/sec

ID: Instructor-created question

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26. Find $\lim_{x \to -11} \dfrac{10 - \sqrt{x^2 - 21}}{x + 11}$.

$\lim_{x \to -11} \dfrac{10 - \sqrt{x^2 - 21}}{x + 11} =$ _____

(Type an integer or a simplified fraction.)

ID: 2.2.41

1. B. 6

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2. A. -34

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3. C. -2

---

4. D. About -100 deaths per year

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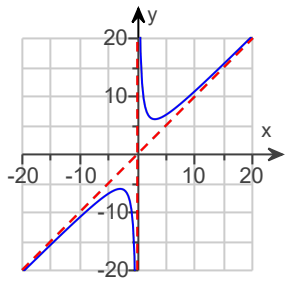
5. 

B.

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6. A. $-\infty$

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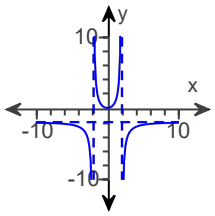
7. 

B. asymptotes: $x = -2$, $x = 2$, $y = -2$

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8. D. $\frac{3}{4}$

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9. A. $\frac{2}{9}$

---

10. D. The limit does not exist.

---

11. C. -2

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12. (1) -1

(2) 1

B. There is no single number L that the function values all get arbitrarily close to as $x \to 0$.

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13. B.
Nothing can be said about the existence of the limit. Even though the function is defined at every point in the interval $[-1,1]$, there may be a jump or an oscillation at $x = 0$.

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14. 6

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15. D. The limit does not exist.

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16. A. $\lim_{x\to 3^+} f(x) =$ **2.5**, $\lim_{x\to 3^-} f(x) =$ **1** (Simplify your answer.)

A. No, $\lim_{x\to 3} f(x)$ does not exist because $\lim_{x\to 3^+} f(x) \neq \lim_{x\to 3^-} f(x)$.

A. $\lim_{x\to 4^+} f(x) =$ **3**, $\lim_{x\to 4^-} f(x) =$ **3** (Simplify your answer.)

D. Yes, $\lim_{x\to 4} f(x)$ exists and equals 3.

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17. 8

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18. B. $x = 6$

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19. A. $x = -2$ and $x = 2$

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20. Yes

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21. A. 0

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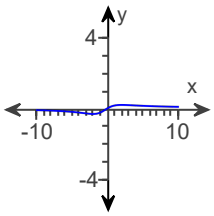
22. D. The slope of the curve is 13 at P. The line $y = 13x - 16$ is tangent at P.

23.



A. asymptote: $y = 0$

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25. B. 160 ft/sec

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26. $\frac{11}{10}$
