

MAC 2311 (Stewart) Chapter 1 (1.5 - 1.8) Review For The Test**Multiple Choice**

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

- _____ 1. Use the graph of the function to state the value of $\lim_{x \rightarrow 0} f(x)$, 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. ∞

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

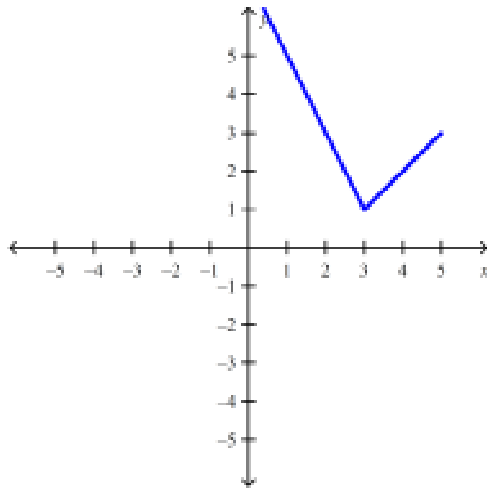
$$f(x) = \frac{x^2 + x}{2\sqrt{x^3 + x^2}}$$

- a. $\frac{1}{2}$
- b. does not exist
- c. $-\infty$
- d. ∞
- e. $-\frac{1}{2}$

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

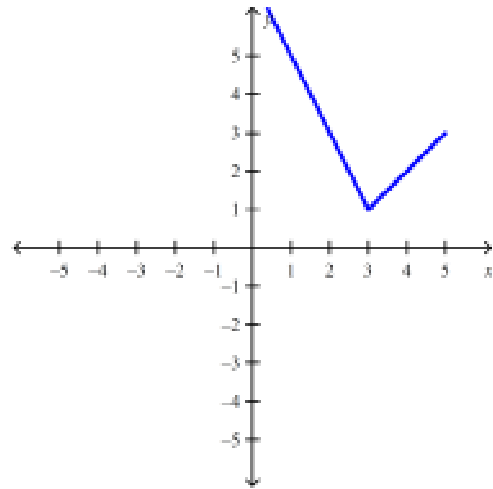
$$f(x) = \begin{cases} x - 2, & \text{if } x \leq 3 \\ -2x + 7, & \text{if } x > 3 \end{cases}$$

a.



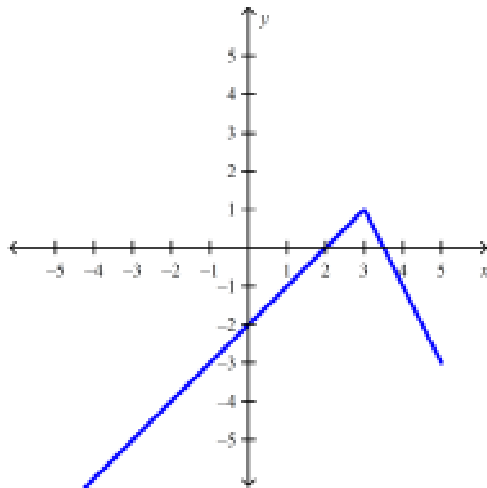
1

c.



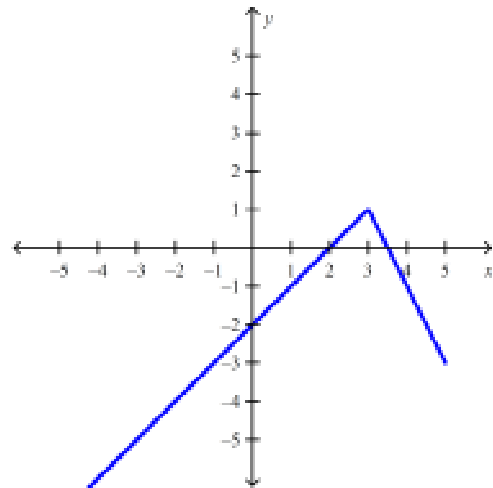
3

b.



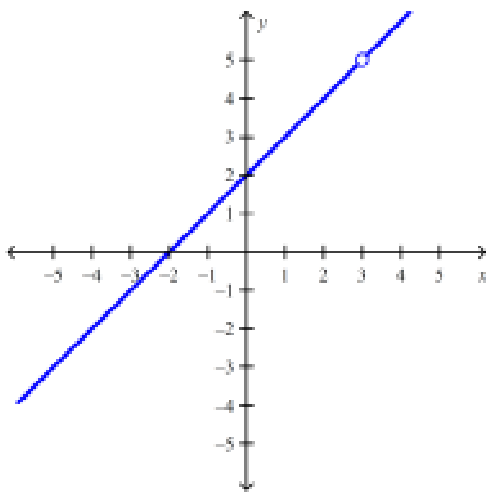
3

d.



1

- _____ 4. Use the graph of $f(x) = \frac{x^2 - x - 6}{x - 3}$ to guess at the limit $\lim_{x \rightarrow 3} \frac{x^2 - x - 6}{x - 3}$, if it exists.



- a. 5
 b. 3
 c. 2
 d. Does not exist
- _____ 5. Find the value of $\lim_{x \rightarrow 0^+} f(x)$.

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

- a. 0
 b. -0.7
 c. -0.7
 d. -0.6
 e. 0.16
- _____ 6. Find the value of $\lim_{x \rightarrow 0} \left(x^4 - \frac{6^x}{8,000} \right)$.

- a. -0.000375
 b. 0.0005
 c. 0.000125
 d. -0.000125
 e. -0.00125
 f. -0.00075

_____ 7. Find the vertical asymptotes of the function.

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

a. $x = \frac{1}{9}$

b. $x = 8$

c. $x = -\frac{2}{9}$

d. $x = 0, x = \frac{1}{8}$

e. none of these

_____ 8. Find the value of the limit.

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

a. 16

b. 4

c. 256

d. 1024

e. 64

Name: _____

ID: A

_____ 9. Find the limit.

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

- a. -5
- b. 5
- c. 6
- d. $\frac{1}{2}$
- e. does not exist

_____ 10. Find the limit $\lim_{x \rightarrow 5} \frac{x + 1}{x^2 - 4x + 2}$.

- a. 6
- b. -6
- c. $\frac{1}{2}$
- d. $\frac{6}{7}$

_____ 11. Find the limit $\lim_{x \rightarrow 0} \frac{\sqrt{x+6} - \sqrt{6}}{x}$, if it exists.

a. Does not exist

b. $\frac{\sqrt{6}}{12}$

c. $\frac{\sqrt{6}}{2}$

d. $\frac{\sqrt{6}}{6}$

_____ 12. Evaluate $\lim_{h \rightarrow 0} \frac{\cot\left(\frac{\pi}{4} + h\right) - 1}{h}$.

a. 0

b. -2

c. 2

d. Undefined

_____ 13. If $6x - 1 \leq f(x) \leq x^2 - 1$, find $\lim_{x \rightarrow 6} f(x)$.

a. 1

b. 35

c. 0

d. -6

e. -35

Name: _____

ID: A

_____ 14. Find the limit.

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

- a. ∞
- b. -3
- c. 0
- d. 3
- e. 7

_____ 15. Find the limit.

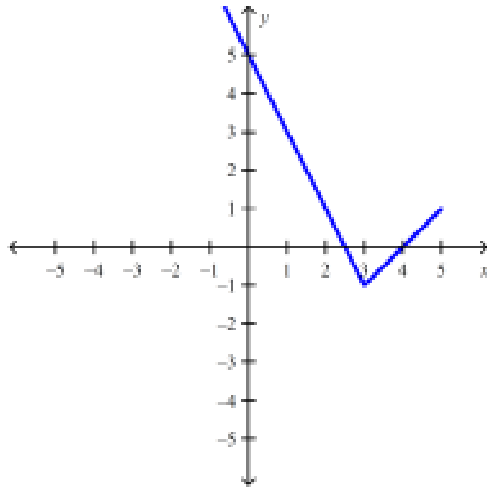
$$\lim_{x \rightarrow 2} \frac{x^2 + 2x - 12}{x - 2}$$

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

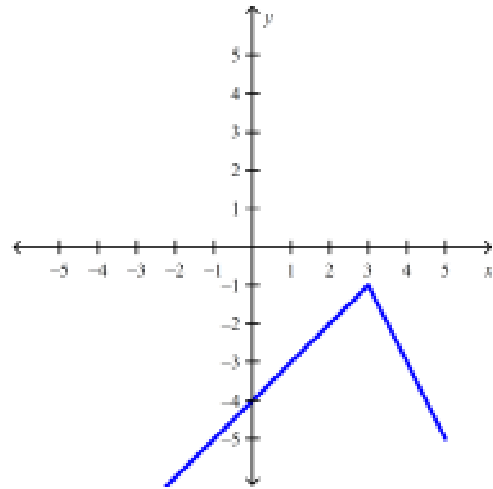
_____ 16. Sketch the graph of the function f and evaluate $\lim_{x \rightarrow 3} f(x)$.

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

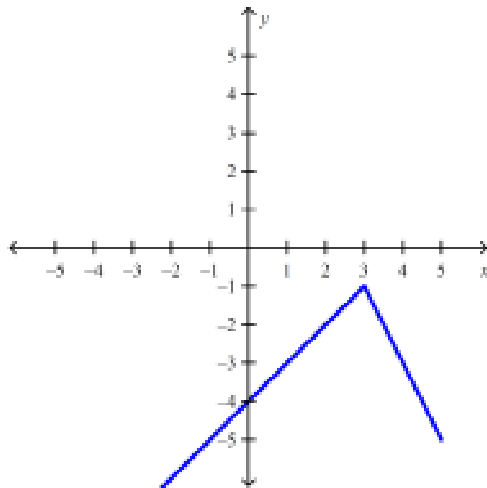
a.



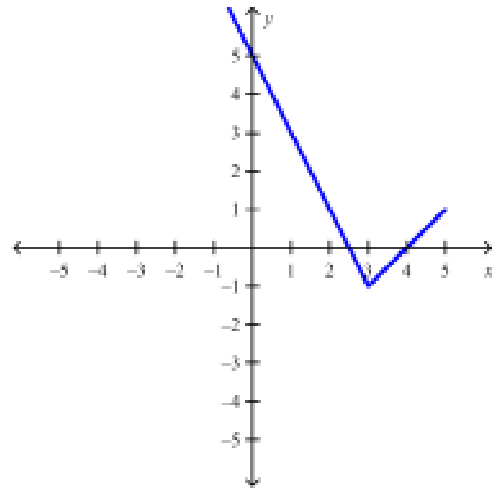
c.



3
b.



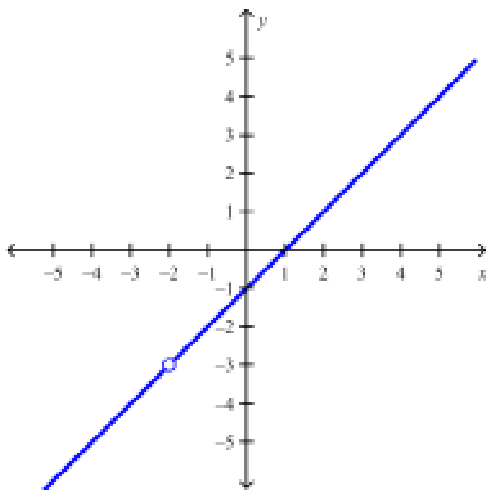
3
d.



-1

-1

_____ 17. Use the graph of $f(x) = \frac{x^2 + x - 2}{x + 2}$ to guess at the limit $\lim_{x \rightarrow -2} \frac{x^2 + x - 2}{x + 2}$, if it exists.



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

_____ 18. Let $F(x) = \frac{x - 5}{|x - 5|}$. Find the following limits.

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

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

- _____ 19. Estimate the value of the limit by graphing the function $f(x) = \frac{6 \sin x}{\sin \pi x}$. State your answer correct to two decimal places.

$$\lim_{x \rightarrow 0} \frac{6 \sin x}{\sin \pi x}$$

- a. 9.42
- b. 3.82
- c. 11.46
- d. 4.71
- e. 1.91

- _____ 20. Find the limit.

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

- a. 0
- b. $-\frac{4}{3}$
- c. $\frac{\sqrt{17}}{2}$
- d. $\frac{4}{3}$
- e. does not exist

- _____ 21. Choose an equation from the following that expresses the fact that a function f is continuous at the number 9.

- a. $\lim_{x \rightarrow 6} f(x) = -\infty$
- b. $\lim_{x \rightarrow 9} f(x) = f(9)$
- c. $\lim_{x \rightarrow 6} f(x) = \infty$
- d. $\lim_{x \rightarrow 0} f(x) = f(6)$
- e. $\lim_{x \rightarrow 0} f(x) = 6$

_____ 22. Determine where f is discontinuous.

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

- a. 0 and 5
- b. 0 and -5
- c. 0 only
- d. -5 only
- e. 5 only

_____ 23. Use continuity to evaluate the limit.

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

- a. 3π
- b. 1
- c. -1
- d. 0
- e. ∞

_____ 24. If f and g are continuous functions with $f(9) = 6$ and $\lim_{x \rightarrow 9} [2f(x) - g(x)] = 9$, find $g(9)$.

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

_____ 25. Which of the given functions is discontinuous?

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

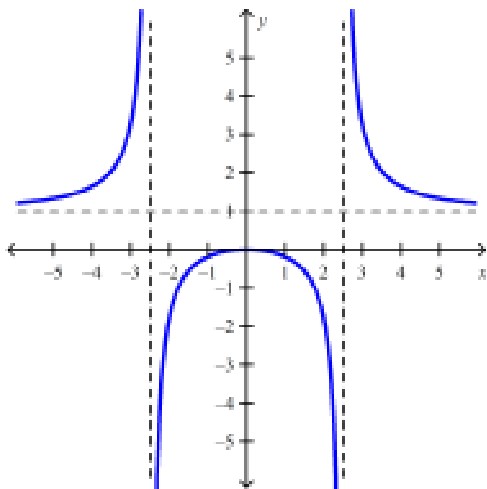
b. $f(x) = \begin{cases} \frac{1}{x-2}, & x \geq 11 \\ \frac{1}{9}, & x < 11 \end{cases}$

_____ 26. 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

_____ 27. 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

_____ 28. 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

_____ 29. Let

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

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

- a. 5
- b. 46
- c. -4
- d. 3

_____ 30. Find the interval(s) where $f(x) = \sqrt{x^2 - 2x + 3}$ is continuous.

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

_____ 31. Define the function $f(x) = \frac{6x^3 + x}{4x}$ at 0 so as to make it continuous at 0.

- a. $f(0) = \frac{3}{2}$
- b. $f(0) = \frac{7}{4}$
- c. $f(0) = 0$
- d. $f(0) = \frac{1}{4}$

Numeric Response

1. Consider the following function.

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

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

2. Find the limit.

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

3. Evaluate the limit.

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

4. Evaluate the limit.

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

5. Evaluate the limit.

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

6. Find the limit.

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

7. Evaluate the limit.

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

8. Consider the following function.

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

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

9. Evaluate the limit.

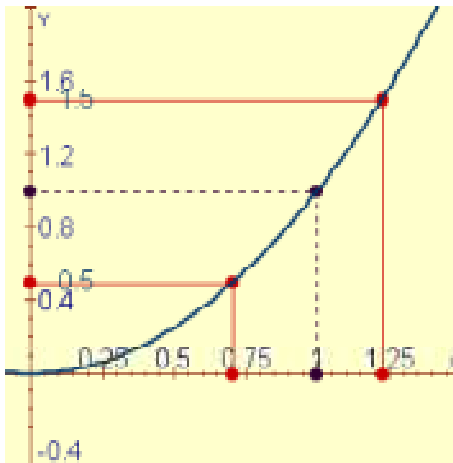
$$\lim_{x \rightarrow 9} \frac{3 - \sqrt{x}}{x - 9}$$

10. Evaluate the limit.

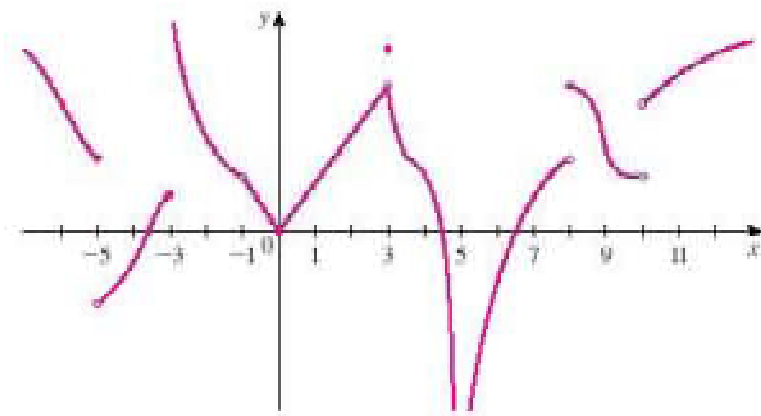
$$\lim_{x \rightarrow 0} \frac{3 - \sqrt{3 - x^2}}{x}$$

11. Use the given graph of
- $f(x) = x^2$
- to find a number
- δ
- such that
- $|x^2 - 3| < \frac{1}{2}$
- whenever
- $|x - 1| < \delta$
- .

Round your answer to two decimal places.



12. How close to -8 do we have to take x so that $\frac{1}{(x+8)^2} > 100$?
13. Find a number δ such that if $|x - 2| < \delta$, then $|4x - 8| < \varepsilon$, where $\varepsilon = 0.1$.
14. For $x = 5$ determine whether f is continuous from the right, from the left, or neither.

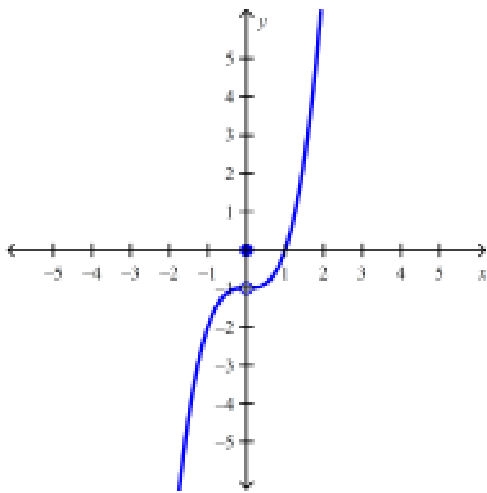


15. If f and g are continuous functions with $f(7) = 10$ and $\lim_{x \rightarrow 7} [2f(x) - g(x)] = 7$, find $g(7)$.
16. Use continuity to evaluate the limit.

$$\lim_{x \rightarrow 9} \frac{18 + \sqrt{x}}{\sqrt{16 + x}}$$

Short Answer

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



$$\lim_{x \rightarrow 0^-} f(x), \quad \lim_{x \rightarrow 0^+} f(x), \quad \lim_{x \rightarrow 0} f(x)$$

2. 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.

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

x	-0.9	-0.99	-0.999	-1.001	-1.01	-1.1
$f(x)$						

3. 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.

$$\lim_{x \rightarrow 0} \frac{x}{\sin 4x}$$

x	-0.1	-0.01	-0.001	0.001	0.01	0.1
$f(x)$						

4. Find the limit $\lim_{x \rightarrow 3} \frac{x^2 + x - 12}{x^2 - 9}$, if it exists.
5. Use the precise definition of a limit to prove that $\lim_{x \rightarrow 8} 5x = 40$.
6. Find the limit $\lim_{x \rightarrow 0^+} \frac{3 + \sqrt{x}}{\sqrt{x + 49}}$.
7. Find the limit $\lim_{x \rightarrow \pi} \sqrt{8 + \cos 6x}$.
8. Find the numbers, if any, where the function $f(x) = 2x^3 - 3x^2 - 7$ is discontinuous.
9. Find the numbers, if any, where the function $f(x) = \frac{x - 3}{x^2 - 9}$ is discontinuous.
10. Find the interval(s) where $f(x) = \frac{-5}{x\sqrt{1 - x^2}}$ is continuous.
11. Find the interval(s) where $f(x) = \frac{1}{x} + \frac{8\sqrt{x}}{(x - 2)^2}$ is continuous.

MAC 2311 (Stewart) Chapter 1 (1.5 - 1.8) Review For The Test Answer Section

MULTIPLE CHOICE

- | | | | | |
|-----|-------------------|------------------------|------------------------------------|--------------|
| 1. | ANS: C
KEY: 7e | PTS: 1
MSC: Bimodal | DIF: Medium
NOT: Section 1.5 | REF: 1.5.13c |
| 2. | ANS: B
KEY: 7e | PTS: 1
MSC: Bimodal | DIF: Medium
NOT: Section 1.5 | REF: 1.5.14c |
| 3. | ANS: D
KEY: 7e | PTS: 1
MSC: Bimodal | DIF: Medium
NOT: Section 1.5 | REF: 1.5.11 |
| 4. | ANS: A
KEY: 7e | PTS: 1
MSC: Bimodal | DIF: Medium
NOT: Section 1.5 | REF: 1.5.14c |
| 5. | ANS: A
KEY: 7e | PTS: 1
MSC: Bimodal | DIF: Medium
NOT: Section 1.5 | REF: 1.5.13b |
| 6. | ANS: D
KEY: 7e | PTS: 1
MSC: Bimodal | DIF: Medium
NOT: Section 1.5 | REF: 1.5.41a |
| 7. | ANS: E
KEY: 7e | PTS: 1
MSC: Bimodal | DIF: Medium
NOT: Section 1.5 | REF: 1.5.38a |
| 8. | ANS: E
KEY: 7e | PTS: 1
MSC: Bimodal | DIF: Medium
NOT: Section 1.5 | REF: 1.5.21 |
| 9. | ANS: D
KEY: 7e | PTS: 1
MSC: Bimodal | DIF: Medium
NOT: Section 1.6 | REF: 1.6.30 |
| 10. | ANS: D
KEY: 7e | PTS: 1
MSC: Bimodal | DIF: Easy
NOT: Section 1.6 | REF: 1.6.5 |
| 11. | ANS: B
KEY: 7e | PTS: 1
MSC: Bimodal | DIF: Medium
NOT: Section 1.6 | REF: 1.6.25 |
| 12. | ANS: C
KEY: 7e | PTS: 1
MSC: Bimodal | DIF: Difficult
NOT: Section 1.6 | REF: 1.6.31 |
| 13. | ANS: B
KEY: 7e | PTS: 1
MSC: Bimodal | DIF: Medium
NOT: Section 1.6 | REF: 1.6.37 |
| 14. | ANS: C
KEY: 7e | PTS: 1
MSC: Bimodal | DIF: Medium
NOT: Section 1.6 | REF: 1.6.15 |
| 15. | ANS: A
KEY: 7e | PTS: 1
MSC: Bimodal | DIF: Medium
NOT: Section 1.6 | REF: 1.6.11 |
| 16. | ANS: B
KEY: 7e | PTS: 1
MSC: Bimodal | DIF: Medium
NOT: Section 1.6 | REF: 1.6.48b |
| 17. | ANS: C
KEY: 7e | PTS: 1
MSC: Bimodal | DIF: Medium
NOT: Section 1.6 | REF: 1.6.33a |
| 18. | ANS: D
KEY: 7e | PTS: 1
MSC: Bimodal | DIF: Medium
NOT: Section 1.6 | REF: 1.6.49a |
| 19. | ANS: E
KEY: 7e | PTS: 1
MSC: Bimodal | DIF: Medium
NOT: Section 1.6 | REF: 1.6.33a |

20.	ANS: C KEY: 7e	PTS: 1 MSC: Bimodal	DIF: Medium NOT: Section 1.6	REF: 1.6.9
21.	ANS: B KEY: 7e	PTS: 1 MSC: Multiple Choice	DIF: Medium	REF: 1.8.1 NOT: Section 1.8
22.	ANS: A KEY: 7e	PTS: 1 MSC: Bimodal	DIF: Medium NOT: Section 1.8	REF: 1.8.43
23.	ANS: D KEY: 7e	PTS: 1 MSC: Bimodal	DIF: Medium NOT: Section 1.8	REF: 1.8.36
24.	ANS: E KEY: 7e	PTS: 1 MSC: Bimodal	DIF: Medium NOT: Section 1.8	REF: 1.8.11
25.	ANS: A KEY: 7e	PTS: 1 MSC: Bimodal	DIF: Medium NOT: Section 1.8	REF: 1.8.42
26.	ANS: B KEY: 7e	PTS: 1 MSC: Bimodal	DIF: Medium NOT: Section 1.8	REF: 1.8.23
27.	ANS: C KEY: 7e	PTS: 1 MSC: Bimodal	DIF: Easy NOT: Section 1.8	REF: 1.8.3b
28.	ANS: C KEY: 7e	PTS: 1 MSC: Bimodal	DIF: Medium NOT: Section 1.8	REF: 1.8.18
29.	ANS: D KEY: 7e	PTS: 1 MSC: Bimodal	DIF: Medium NOT: Section 1.8	REF: 1.8.45
30.	ANS: C KEY: 7e	PTS: 1 MSC: Bimodal	DIF: Medium NOT: Section 1.8	REF: 1.8.16
31.	ANS: D KEY: 7e	PTS: 1 MSC: Bimodal	DIF: Medium NOT: Section 1.8	REF: 1.8.24

NUMERIC RESPONSE

- ANS: $(-\infty, -1) \cup (-1, 3) \cup (3, \infty)$
 PTS: 1 DIF: Medium REF: 1.5.11 KEY: 7e
 MSC: Numerical Response NOT: Section 1.5
- ANS: $\frac{\pi}{2}$
 PTS: 1 DIF: Medium REF: 1.5.34 KEY: 7e
 MSC: Numerical Response NOT: Section 1.5
- ANS: $\frac{10}{7}$
 PTS: 1 DIF: Medium REF: 1.6.16 KEY: 7e
 MSC: Numerical Response NOT: Section 1.6

4. ANS: 0

PTS: 1 DIF: Medium REF: 1.6.41 KEY: 7e
 MSC: Numerical Response NOT: Section 1.6

5. ANS: $-\frac{1}{36}$

PTS: 1 DIF: Medium REF: 1.6.28 KEY: 7e
 MSC: Numerical Response NOT: Section 1.6

6. ANS: 0

PTS: 1 DIF: Medium REF: 1.6.39 KEY: 7e
 MSC: Numerical Response NOT: Section 1.6

7. ANS: $\frac{22}{3}$

PTS: 1 DIF: Medium REF: 1.6.19 KEY: 7e
 MSC: Numerical Response NOT: Section 1.6

8. ANS: $(-\infty, -1) \cup (-1, 5) \cup (5, \infty)$

PTS: 1 DIF: Medium REF: 1.6.50 KEY: 7e
 MSC: Numerical Response NOT: Section 1.6

9. ANS: $-1/6$

PTS: 1 DIF: Medium REF: 1.6.21 KEY: 7e
 MSC: Numerical Response NOT: Section 1.6

10. ANS: ∞

PTS: 1 DIF: Medium REF: 1.6.18 KEY: 7e
 MSC: Numerical Response NOT: Section 1.6

11. ANS: $\delta \leq 0.58$

PTS: 1 DIF: Medium REF: 1.7.4 KEY: 7e
 MSC: Numerical Response NOT: Section 1.7

12. ANS: $|x + 8| < 0.1$

PTS: 1 DIF: Medium REF: 1.7.41 KEY: 7e
 MSC: Numerical Response NOT: Section 1.7

13. ANS: $\delta = 0.025$

PTS: 1 DIF: Medium REF: 1.7.13 KEY: 7e
 MSC: Numerical Response NOT: Section 1.7

14. ANS: neither

PTS: 1 DIF: Medium REF: 1.8.3b KEY: 7e
 MSC: Numerical Response NOT: Section 1.8

15. ANS: 13

PTS: 1 DIF: Medium REF: 1.8.11 KEY: 7e
 MSC: Numerical Response NOT: Section 1.8

16. ANS: $\frac{21}{5}$

PTS: 1 DIF: Medium REF: 1.8.35 KEY: 7e
 MSC: Numerical Response NOT: Section 1.8

SHORT ANSWER

1. ANS:

$$\lim_{x \rightarrow 0^-} f(x) = -1, \quad \lim_{x \rightarrow 0^+} f(x) = -1, \quad \lim_{x \rightarrow 0} f(x) = -1$$

PTS: 1 DIF: Easy REF: 1.5.5abc KEY: 7e
 MSC: Short Answer NOT: Section 1.5

2. ANS:

x	-0.9	-0.99	-0.999	-1.001	-1.01	-1.1
$f(x)$	-0.20408	-0.2004	-0.20004	-0.19996	-0.1996	-0.19608

-0.2

PTS: 1 DIF: Medium REF: 1.5.20 KEY: 7e
 MSC: Short Answer NOT: Section 1.5

3. ANS:

x	-0.1	-0.01	-0.001	0.001	0.01	0.1
$f(x)$	0.25679	0.25007	0.25	0.25	0.25007	0.25679

0.25

PTS: 1 DIF: Medium REF: 1.5.24 KEY: 7e
 MSC: Short Answer NOT: Section 1.5

4. ANS:

$$\frac{7}{6}$$

PTS: 1 DIF: Medium REF: 1.6.15 KEY: 7e

MSC: Short Answer NOT: Section 1.6

5. ANS:

The function is $f(x) = 5x$ and $L = 40$.Let $\varepsilon > 0$ be given. Choose $\delta = \frac{\varepsilon}{5}$.We see that for any x such that $|x - 8| < \delta$, we have

$$|f(x) - 40| = |5x - 40|$$

$$= 5|x - 8|$$

$$< 5\delta$$

$$= 5 \cdot \frac{\varepsilon}{5}$$

$$= \varepsilon.$$

This proves the assertion.

PTS: 1 DIF: Medium REF: 1.7.5 KEY: 7e

MSC: Short Answer NOT: Section 1.7

6. ANS:

$$\frac{3}{7}$$

PTS: 1 DIF: Easy REF: 1.8.35 KEY: 7e

MSC: Short Answer NOT: Section 1.8

7. ANS:

$$3$$

PTS: 1 DIF: Easy REF: 1.8.36 KEY: 7e

MSC: Short Answer NOT: Section 1.8

8. ANS:

None

PTS: 1 DIF: Easy REF: 1.8.17 KEY: 7e

MSC: Short Answer NOT: Section 1.8

9. ANS:
 ± 3

PTS: 1 DIF: Medium REF: 1.8.24 KEY: 7e
MSC: Short Answer NOT: Section 1.8

10. ANS:
 $(-1, 0)$ and $(0, 1)$

PTS: 1 DIF: Medium REF: 1.8.27 KEY: 7e
MSC: Short Answer NOT: Section 1.8

11. ANS:
 $(0, 2)$ and $(2, \infty)$

PTS: 1 DIF: Medium REF: 1.8.31 KEY: 7e
MSC: Short Answer NOT: Section 1.8