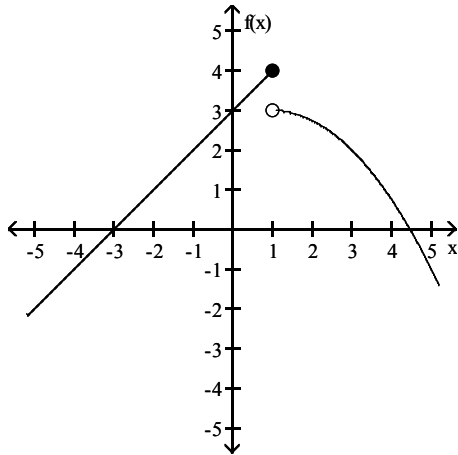


MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Decide whether the limit exists. If it exists, find its value.

1) $\lim_{x \rightarrow 1^+} f(x)$

1) _____



A) Does not exist

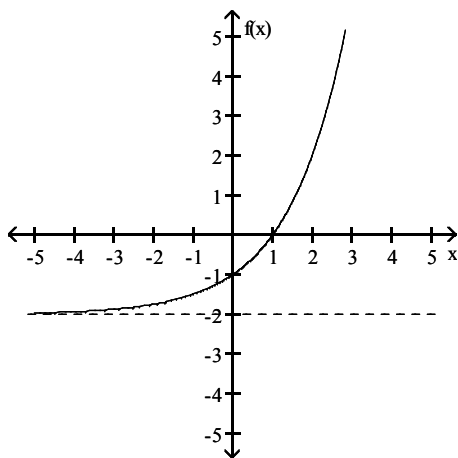
B) 4

C) $3\frac{1}{2}$

D) 3

2) $\lim_{x \rightarrow \infty} f(x)$

2) _____



A) Does not exist

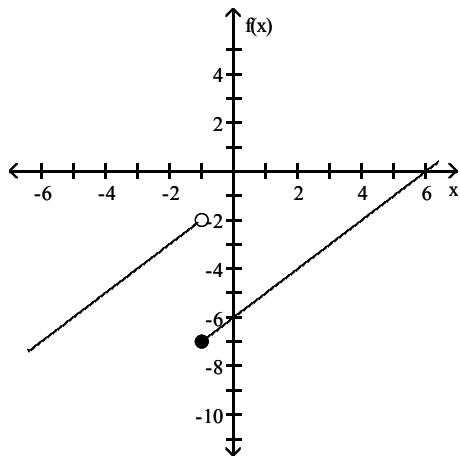
B) 0

C) ∞

D) -2

3) $\lim_{x \rightarrow (-1)^-} f(x)$ and $\lim_{x \rightarrow (-1)^+} f(x)$

3) _____



A) -7, -5

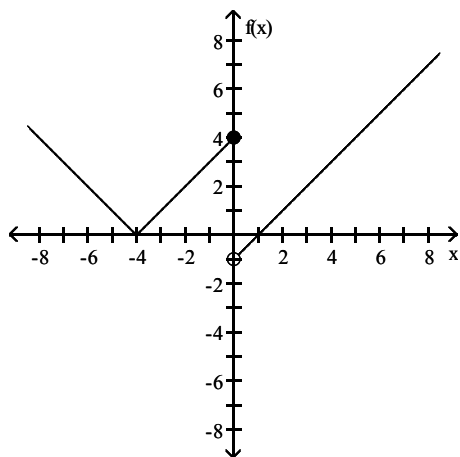
B) -2, -7

C) -7, -2

D) -5, -2

4) $\lim_{x \rightarrow 0^-} f(x)$ and $\lim_{x \rightarrow 0^+} f(x)$

4) _____



A) -1, 4

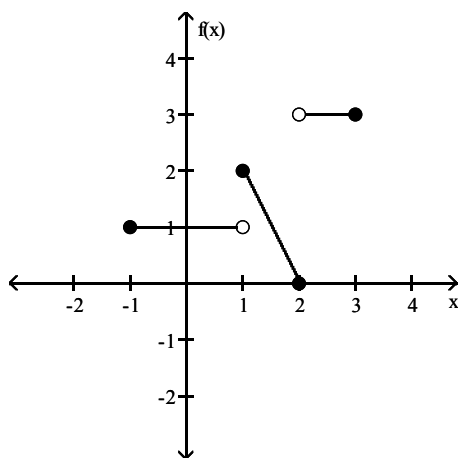
B) -4, -1

C) 4, 1

D) 4, -1

5) $\lim_{x \rightarrow 1} f(x)$

5) _____



A) 0

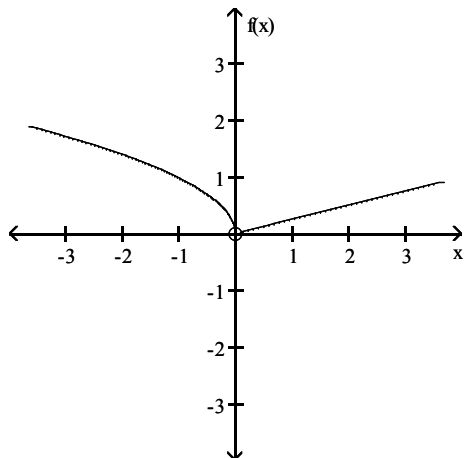
B) Does not exist

C) 2

D) 1

6) $\lim_{x \rightarrow 0} f(x)$

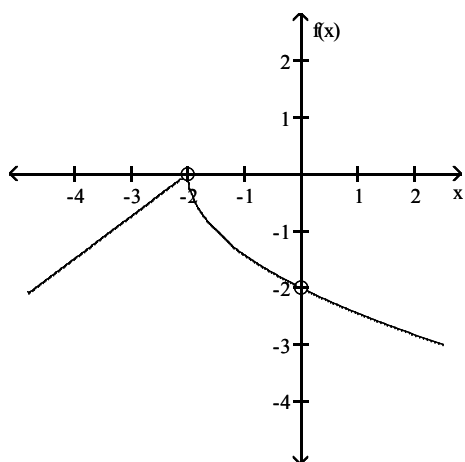
6) _____



- A) 1 B) Does not exist C) 0 D) -1

7) $\lim_{x \rightarrow 0} f(x)$

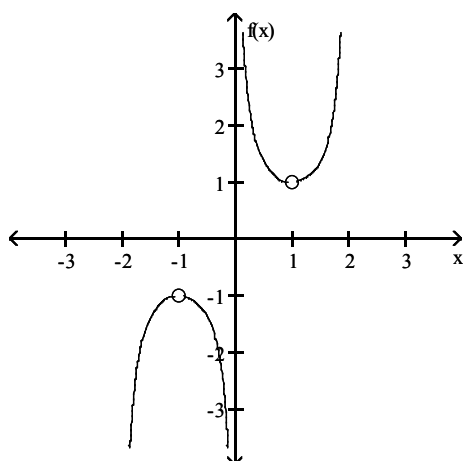
7) _____



- A) Does not exist B) -1 C) 0 D) -2

8) $\lim_{x \rightarrow 1} f(x)$

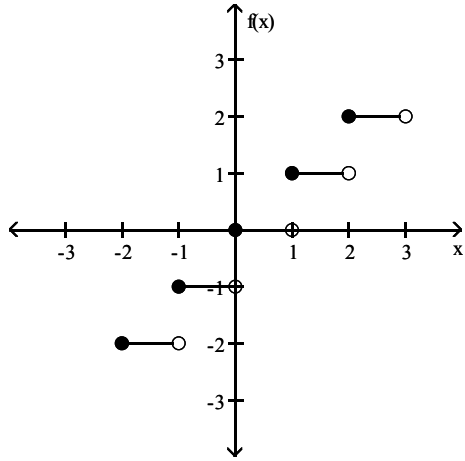
8) _____



- A) -1 B) Does not exist C) 1 D) 0

9) $\lim_{x \rightarrow -1} f(x)$

9) _____



A) -1

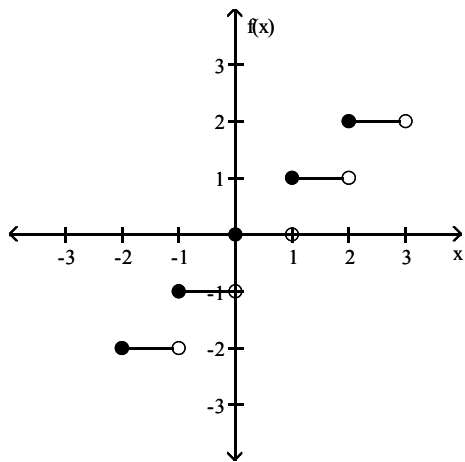
B) -2

C) 0

D) Does not exist

10) $\lim_{x \rightarrow -1/2} f(x)$

10) _____



A) Does not exist

B) -2

C) 0

D) -1

Complete the table and use the result to find the indicated limit.

11) If $f(x) = x^2 + 8x - 2$, find $\lim_{x \rightarrow 2} f(x)$.

11) _____

x	1.9	1.99	1.999	2.001	2.01	2.1
f(x)						

A)

x	1.9	1.99	1.999	2.001	2.01	2.1
f(x)	16.692	17.592	17.689	17.710	17.808	18.789

; limit = 17.70

B)

x	1.9	1.99	1.999	2.001	2.01	2.1
f(x)	5.043	5.364	5.396	5.404	5.436	5.763

; limit = 5.40

C)

x	1.9	1.99	1.999	2.001	2.01	2.1
f(x)	5.043	5.364	5.396	5.404	5.436	5.763

; limit = ∞

D)

x	1.9	1.99	1.999	2.001	2.01	2.1
f(x)	16.810	17.880	17.988	18.012	18.120	19.210

; limit = 18.0

12) If $f(x) = \frac{x^4 - 1}{x - 1}$, find $\lim_{x \rightarrow 1} f(x)$.

12) _____

x	0.9	0.99	0.999	1.001	1.01	1.1
f(x)						

A)

x	0.9	0.99	0.999	1.001	1.01	1.1
f(x)	1.032	1.182	1.198	1.201	1.218	1.392

; limit = 1.210

B)

x	0.9	0.99	0.999	1.001	1.01	1.1
f(x)	4.595	5.046	5.095	5.105	5.154	5.677

; limit = 5.10

C)

x	0.9	0.99	0.999	1.001	1.01	1.1
f(x)	1.032	1.182	1.198	1.201	1.218	1.392

; limit = ∞

D)

x	0.9	0.99	0.999	1.001	1.01	1.1
f(x)	3.439	3.940	3.994	4.006	4.060	4.641

; limit = 4.0

13) If $f(x) = \frac{x^3 - 6x + 8}{x - 2}$, find $\lim_{x \rightarrow 0} f(x)$.

13) _____

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

A)

x	-0.1	-0.01	-0.001	0.001	0.01	0.1
f(x)	-4.09476	-4.00995	-4.00100	-3.99900	-3.98995	-3.89526

; limit = -4.0

B)

x	-0.1	-0.01	-0.001	0.001	0.01	0.1
f(x)	-1.22843	-1.20298	-1.20030	-1.19970	-1.19699	-1.16858

; limit = -1.20

C)

x	-0.1	-0.01	-0.001	0.001	0.01	0.1
f(x)	-1.22843	-1.20298	-1.20030	-1.19970	-1.19699	-1.16858

; limit = ∞

D)

x	-0.1	-0.01	-0.001	0.001	0.01	0.1
f(x)	-2.18529	-2.10895	-2.10090	-2.99910	-2.09096	-2.00574

; limit = -2.10

Use the properties of limits to help decide whether the limit exists. If the limit exists, find its value.

14) $\lim_{x \rightarrow 2} \frac{x^2 - 4}{x - 2}$

14) _____

A) 4

B) 2

C) Does not exist

D) 1

15) $\lim_{x \rightarrow 3} \frac{x^2 + 4x - 21}{x - 3}$

15) _____

A) 4

B) Does not exist

C) 10

D) 0

16) $\lim_{x \rightarrow 4} \frac{x^2 - 16}{x^2 - 7x + 12}$

16) _____

A) Does not exist

B) 8

C) 0

D) 4

17) $\lim_{x \rightarrow -8} \frac{x^2 - 64}{x + 8}$

17) _____

A) -16

B) 0

C) Does not exist

D) -8

18) $\lim_{x \rightarrow 4} \frac{\sqrt{x} - 2}{x - 4}$

18) _____

A) 2

B) 0

C) $\frac{1}{2}$

D) $\frac{1}{4}$

19) $\lim_{x \rightarrow \infty} \frac{-5x^2 + 7x - 4}{3x^2 + 6}$

19) _____

A) 0

B) $-\frac{5}{3}$

C) $-\frac{3}{2}$

D) ∞

20) $\lim_{x \rightarrow -\infty} \frac{x}{4x - 13}$ 20) _____

- A) $\frac{1}{4}$ B) 0 C) ∞ D) $-\frac{1}{4}$

21) $\lim_{x \rightarrow \infty} \frac{5x + 1}{16x^2 - 7}$ 21) _____

- A) $-\frac{1}{7}$ B) 0 C) $\frac{5}{16}$ D) ∞

22) $\lim_{x \rightarrow \infty} \frac{4x^2 + 2x - 7x^4}{6x^2 - 4x + 5}$ 22) _____

- A) $\frac{2}{3}$ B) $-\infty$ C) ∞ D) Does not exist

Use the properties of limits to help decide whether each limit exists. If a limit exists, find its value.

23) Let $f(x) = \begin{cases} x^2 - 5 & \text{if } x < 0 \\ 2 & \text{if } x \geq 0 \end{cases}$. Find $\lim_{x \rightarrow -2} f(x)$. 23) _____

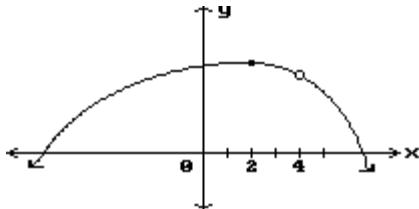
- A) -1 B) Does not exist C) 2 D) -5

24) Let $f(x) = \begin{cases} -3x + 9 & \text{if } x < 1 \\ 1 & \text{if } x = 1 \\ 3x - 10 & \text{if } x > 1 \end{cases}$. Find $\lim_{x \rightarrow 1} f(x)$. 24) _____

- A) -7 B) Does not exist C) 0 D) 6

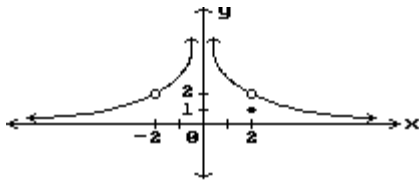
Find all points where the function is discontinuous.

25) 25) _____



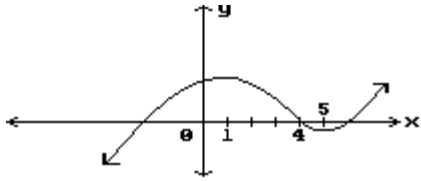
- A) $x = 4$ B) $x = 4, x = 2$ C) $x = 2$ D) None

26) 26) _____



- A) $x = 2$ B) $x = 0, x = 2$
 C) $x = -2, x = 0, x = 2$ D) $x = -2, x = 0$

27)

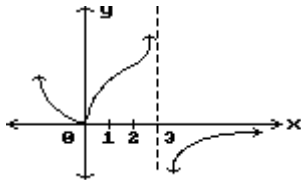


- A) $x = 4$
 C) $x = 1, x = 4, x = 5$

- B) None
 D) $x = 1, x = 5$

27) _____

28)

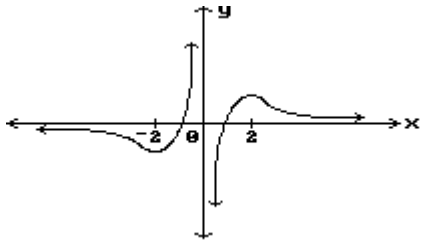


- A) None
 B) $x = 0$

- C) $x = 3$
 D) $x = 0, x = 3$

28) _____

29)



- A) $x = 0$
 C) $x = -2, x = 0, x = 2$

- B) None
 D) $x = -2, x = 2$

29) _____

Find all values $x = a$ where the function is discontinuous.

$$30) f(x) = \frac{-2x}{(7x-7)(2-8x)}$$

A) $a = 1, \frac{1}{4}$

B) $a = 1, -\frac{1}{4}$

C) Nowhere

D) $a = 0, 1, \frac{1}{4}$

30) _____

$$31) f(x) = \frac{x^2 - 49}{x + 7}$$

A) $a = -49$

B) $a = -7$

C) $a = 7$

D) $a = 6$

31) _____

$$32) g(x) = \begin{cases} 0 & \text{if } x < 0 \\ x^2 - 5x & \text{if } 0 \leq x \leq 5 \\ 5 & \text{if } x > 5 \end{cases}$$

A) $a = 0, 5$

B) $a = 0$

C) Nowhere

D) $a = 5$

32) _____

$$33) f(x) = \begin{cases} 6 & \text{if } x < 4 \\ x^2 - 10 & \text{if } 4 \leq x \leq 7 \\ 6 & \text{if } x > 7 \end{cases}$$

A) $a = 4$

B) $a = 10$

C) Nowhere

D) $a = 7$

33) _____

Give an appropriate response.

34) Find the limit of $f(x)$ as x approaches 1 from the right.

34) _____

$$f(x) = \begin{cases} 2 & \text{if } x < 1 \\ x + 3 & \text{if } 1 \leq x \leq 3 \\ 6 & \text{if } x > 3 \end{cases}$$

- A) 4
C) 2

- B) 6
D) The limit does not exist.

35) Find the limit of $f(x)$ as x approaches 2 from the left.

35) _____

$$f(x) = \begin{cases} 1 & \text{if } x < 2 \\ x + 2 & \text{if } 2 \leq x \leq 4 \\ 6 & \text{if } x > 4 \end{cases}$$

- A) 1
C) 4

- B) 6
D) The limit does not exist.

Find the value of the constant k that makes the function continuous.

36) $h(x) = \begin{cases} x^2 & \text{if } x \leq 6 \\ x + k & \text{if } x > 6 \end{cases}$

36) _____

A) $k = 42$

B) $k = 6$

C) $k = -6$

D) $k = 30$

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

37) _____

A) $k = -8$

B) $k = -10$

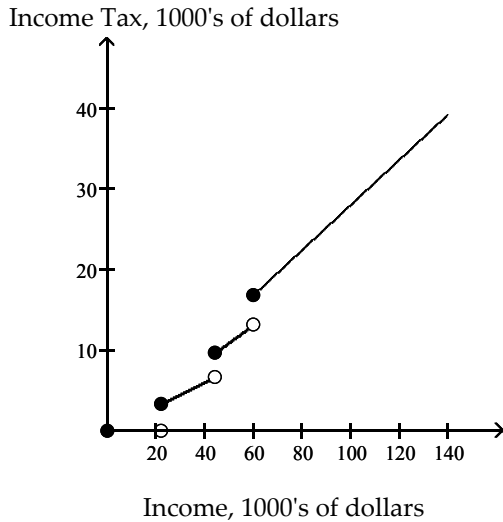
C) $k = 2$

D) $k = -6$

Solve the problem.

- 38) The graph below shows the amount of income tax that a single person must pay on his or her income when claiming the standard deduction. Identify the income levels where discontinuities occur and explain the meaning of the discontinuities.

38) _____



- A) Discontinuities at $x = \$44,000$ and $x = \$60,000$. Discontinuities represent boundaries between tax brackets.
- B) Discontinuities at $x = \$22,000$, $x = \$44,000$, and $x = \$60,000$. Discontinuities represent tax cheating on the part of high-income earners.
- C) Discontinuities at $x = \$44,000$ and $x = \$60,000$. Discontinuities represent tax shelters.
- D) Discontinuities at $x = \$22,000$, $x = \$44,000$, and $x = \$60,000$. Discontinuities represent boundaries between tax brackets.

- 39) Suppose that the cost, p , of shipping a 3-pound parcel depends on the distance shipped, x , according to the function $p(x)$ depicted in the graph. Is p continuous at $x = 50$? at $x = 500$? at $x = 1500$? at $x = 3000$?

39) _____



- A) Yes; yes; yes; no
- B) Yes; no; no; no
- C) No; no; yes; no
- D) Yes; no; yes; no

Answer Key

Testname: CHAPTER 1 LIMITS AND CONTINUITY

- 1) D
- 2) C
- 3) B
- 4) D
- 5) B
- 6) C
- 7) D
- 8) C
- 9) D
- 10) D
- 11) D
- 12) D
- 13) A
- 14) A
- 15) C
- 16) B
- 17) A
- 18) D
- 19) B
- 20) A
- 21) B
- 22) B
- 23) A
- 24) B
- 25) A
- 26) C
- 27) B
- 28) C
- 29) A
- 30) A
- 31) B
- 32) D
- 33) D
- 34) A
- 35) A
- 36) D
- 37) B
- 38) D
- 39) D