

Calculus Concepts  
Limit Worksheet #1

Name \_\_\_\_\_

Refer to the graph below to find each of the following. If the limit does not exist, explain why.

1.  $\lim_{x \rightarrow +\infty} g(x) =$

2.  $\lim_{x \rightarrow -\infty} g(x) =$

3.  $\lim_{x \rightarrow a^+} g(x) =$

4.  $\lim_{x \rightarrow a^-} g(x) =$

5.  $\lim_{x \rightarrow a} g(x) =$

6.  $\lim_{x \rightarrow 0} g(x) =$

7.  $\lim_{x \rightarrow b^+} g(x) =$

8.  $\lim_{x \rightarrow b^-} g(x) =$

9.  $\lim_{x \rightarrow b} g(x) =$

10.  $\lim_{x \rightarrow c} g(x) =$

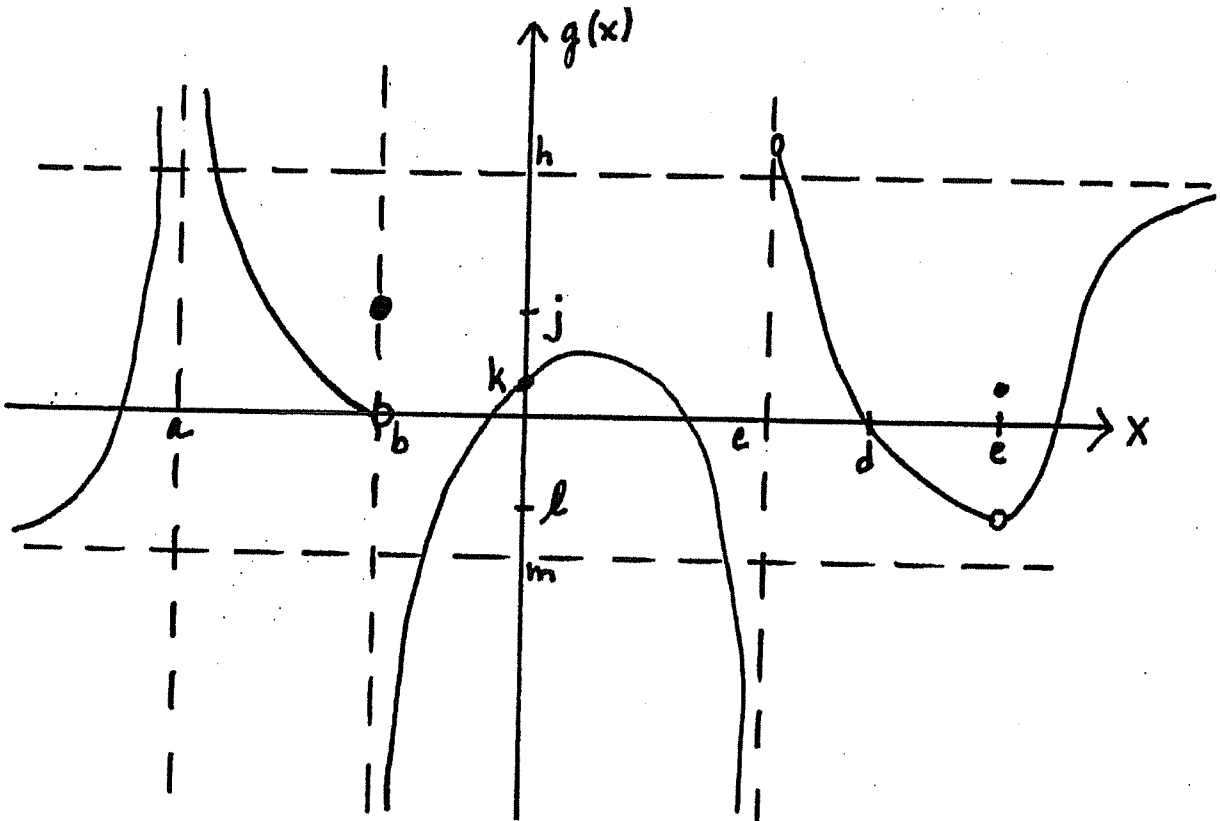
11.  $\lim_{x \rightarrow d} g(x) =$

12.  $\lim_{x \rightarrow e} g(x) =$

13.  $g(e) =$

14.  $g(0) =$

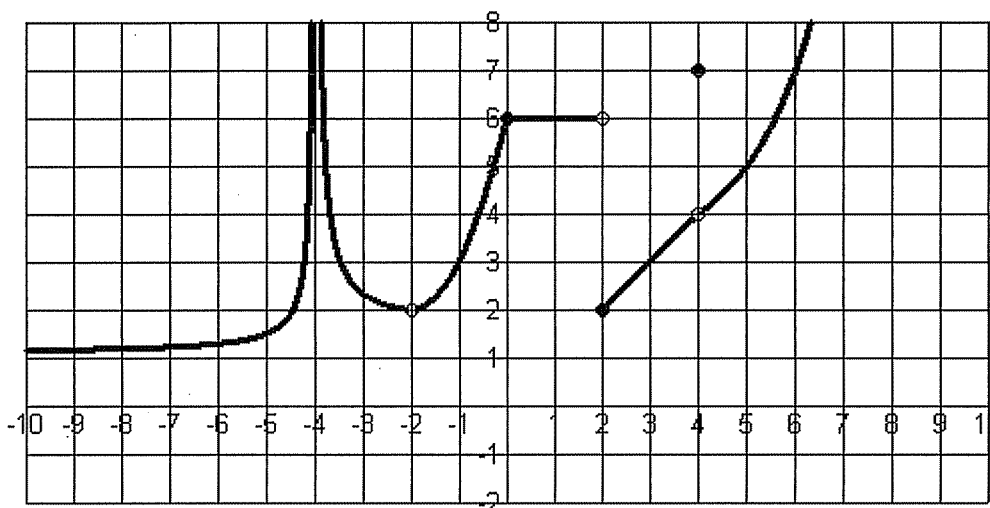
15.  $g(b) =$



Limits and Continuity  
 Calculus Concepts  
 Unit 1

Name \_\_\_\_\_

Date \_\_\_\_\_



Use the graph of  $f(x)$  shown above to answer questions 1-27.

1.  $\lim_{x \rightarrow -\infty} f(x) = \underline{\hspace{2cm}}$

4.  $\lim_{x \rightarrow -4^+} f(x) = \underline{\hspace{2cm}}$

2.  $\lim_{x \rightarrow \infty} f(x) = \underline{\hspace{2cm}}$

5.  $\lim_{x \rightarrow -4} f(x) = \underline{\hspace{2cm}}$

3.  $\lim_{x \rightarrow -4^-} f(x) = \underline{\hspace{2cm}}$

6.  $f(-4) = \underline{\hspace{2cm}}$

7. Is  $f(x)$  continuous at  $x = -4$ ? Why or why not? If it is not continuous, state the type of discontinuity and explain why it has that type of discontinuity.

8.  $\lim_{x \rightarrow -2^-} f(x) = \underline{\hspace{2cm}}$

10.  $\lim_{x \rightarrow -2} f(x) = \underline{\hspace{2cm}}$

9.  $\lim_{x \rightarrow -2^+} f(x) = \underline{\hspace{2cm}}$

11.  $f(-2) = \underline{\hspace{2cm}}$

12. Is  $f(x)$  continuous at  $x = -2$ ? Why or why not? If it is not continuous, state the type of discontinuity and explain why it has that type of discontinuity.

13.  $\lim_{x \rightarrow 0^-} f(x) = \underline{\hspace{2cm}}$

15.  $\lim_{x \rightarrow 0} f(x) = \underline{\hspace{2cm}}$

14.  $\lim_{x \rightarrow 0^+} f(x) = \underline{\hspace{2cm}}$

16.  $f(0) = \underline{\hspace{2cm}}$

17. Is continuous at  $x = 0$ ? Why or why not? If it is not continuous, state the type of discontinuity and explain why it has that type of discontinuity

18.  $\lim_{x \rightarrow 2^-} f(x) = \underline{\hspace{2cm}}$

20.  $\lim_{x \rightarrow 2} f(x) = \underline{\hspace{2cm}}$

19.  $\lim_{x \rightarrow 2^+} f(x) = \underline{\hspace{2cm}}$

21.  $f(2) = \underline{\hspace{2cm}}$

22. Is continuous at  $x = 2$ ? Why or why not? If it is not continuous, state the type of discontinuity and explain why it has that type of discontinuity.

23.  $\lim_{x \rightarrow 4^-} f(x) = \underline{\hspace{2cm}}$

25.  $\lim_{x \rightarrow 4} f(x) = \underline{\hspace{2cm}}$

24.  $\lim_{x \rightarrow 4^+} f(x) = \underline{\hspace{2cm}}$

26.  $f(4) = \underline{\hspace{2cm}}$

27. Is continuous at  $x = 4$ ? Why or why not? If it is not continuous, state the type of discontinuity and explain why it has that type of discontinuity.

Limits and Continuity  
Calculus Concepts  
Unit 1 – Worksheet 3

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Let  $f(x) = \frac{x^2 - 9}{x + 3}$ .

a.  $\lim_{x \rightarrow -3^-} f(x) = \underline{\hspace{2cm}}$

c.  $\lim_{x \rightarrow -3} f(x) = \underline{\hspace{2cm}}$

b.  $\lim_{x \rightarrow -3^+} f(x) = \underline{\hspace{2cm}}$

d.  $f(-3) = \underline{\hspace{2cm}}$

e. Is continuous at  $x = -3$ ? Why or why not? If it is not continuous, state the type of discontinuity and explain why it has that type of discontinuity.

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

a.  $\lim_{x \rightarrow -2^-} f(x) = \underline{\hspace{2cm}}$

c.  $\lim_{x \rightarrow -2} f(x) = \underline{\hspace{2cm}}$

b.  $\lim_{x \rightarrow -2^+} f(x) = \underline{\hspace{2cm}}$

d.  $f(-2) = \underline{\hspace{2cm}}$

e. Is continuous at  $x = -2$ ? Why or why not? If it is not continuous, state the type of discontinuity and explain why it has that type of discontinuity.

3. Let  $f(x) = \begin{cases} \frac{x^2 + 3x + 2}{x + 2} & x \neq -2 \\ \frac{1}{2} & x = -2 \end{cases}$ .

a.  $\lim_{x \rightarrow -2^-} f(x) = \underline{\hspace{2cm}}$

c.  $\lim_{x \rightarrow -2} f(x) = \underline{\hspace{2cm}}$

b.  $\lim_{x \rightarrow -2^+} f(x) = \underline{\hspace{2cm}}$

d.  $f(-2) = \underline{\hspace{2cm}}$

e. Is continuous at  $x = -2$ ? Why or why not? If it is not continuous, state the type of discontinuity and explain why it has that type of discontinuity.

4. Given  $f(x) = \begin{cases} 3x+2 & \text{if } x < 4 \\ 5x+k & \text{if } x \geq 4 \end{cases}$ .

Find the value of  $k$  such that  $\lim_{x \rightarrow 4} f(x)$  exists.

5. Given  $f(x) = \begin{cases} 2x-a & \text{if } x < -3 \\ ax+2b & \text{if } -3 \leq x \leq 3 \\ b-5x & \text{if } x > 3 \end{cases}$ .

Find the values of  $a$  and  $b$  such that  $\lim_{x \rightarrow -3} f(x)$  and  $\lim_{x \rightarrow 3} f(x)$  both exist.

**Please show all work.  
Full credit will not be given if appropriate work is not shown.**

Find each of the following limits. Please use proper notation.

1.  $\lim_{x \rightarrow 1} (x^2 + 2x - 1)$

2.  $\lim_{x \rightarrow 0} |x|$

3.  $\lim_{x \rightarrow 3} \left( \frac{x-3}{x^2-9} \right)$

4.  $\lim_{x \rightarrow 0} \left( \frac{1}{x} \right)$

5.  $f(x) = \begin{cases} \frac{x^3-1}{x-1} & \text{if } x \neq 0 \\ 1 & \text{if } x = 0 \end{cases} ; \lim_{x \rightarrow 0} f(x)$

Use limits to find the constant  $a$  so that the function is continuous for all real values of  $x$ . Please focus on the use of proper notation.

$$6. f(x) = \begin{cases} \frac{x^2 - a^2}{x - a} & \text{if } x \neq a \\ 8 & \text{if } x = a \end{cases}$$

Use limits to find the constant  $a$  so that the function is continuous for all real values of  $x$ . Please focus on the use of proper notation. Use the TI-Nspire to graph the function to confirm, visually, that the determined value of  $a$  makes the function continuous.

$$7. f(x) = \begin{cases} 3x + 2 & \text{if } x < 4 \\ 5x + a & \text{if } x \geq 4 \end{cases}$$

Use limits to find the constants  $a$  and  $b$  so that the function is continuous for all real values of  $x$ . Please focus on the use of proper notation. Use the TI-Nspire to graph the function to confirm, visually, that the determined values of  $a$  and  $b$  make the function continuous.

$$8. f(x) = \begin{cases} 2 & \text{if } x \leq -1 \\ ax + b & \text{if } -1 < x < 3 \\ -2 & \text{if } x \geq 3 \end{cases}$$