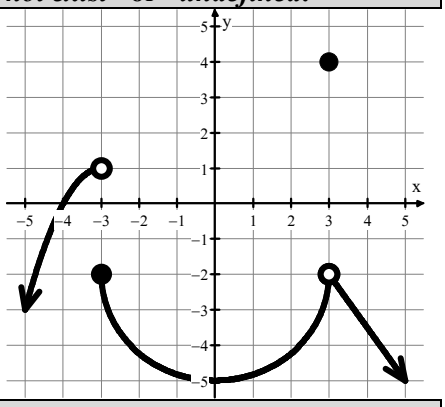
Name: _____ Date:_____

Corrective Assignment

End of Unit 1 Corrective Assignment – Limits and Continuity

Give the value of each statement. If the value does not exist, write "*does not exist*" or "*undefined*."

1.



a. $\lim_{x\to 3^-} f(x) =$

b. $f(-3) =$

c. $\lim_{x\to -3^-} f(x) =$

d. $\lim_{x\to -3^+} f(x) =$

e. $f(3) =$

f. $\lim_{x\to 3} f(x) =$

Evaluate the limit.

2. $\lim_{x\to 1} \frac{\sqrt{x+15}-4}{x-1}$

3. $\lim_{x\to -7^-} \frac{x}{x+7}$

4. $\lim_{x\to \infty} \sin\left(\frac{\frac{\sqrt{2}}{2}x+\pi x^2}{4x^2-x^3+2}\right)$

5. $\lim_{x\to 3} \frac{x-1}{x^2-6x+9}$

6. $\lim_{x\to 3} \frac{x^2-3x}{x^2-9}$

7. $\lim_{x\to 0} \frac{x}{\frac{1}{x+7}-\frac{1}{7}}$

8. $\lim_{x\to \infty} \frac{5x^4-3x^3-1}{x^3-2x^4}$

9. $\lim_{x\to 0} \frac{\sin^2(2x)}{2x^2}$

10. $\lim_{x\to -7^-} \frac{|x+7|}{x+7}$

11. If $f(x) = \begin{cases} \sin(2x), & x < \frac{\pi}{4} \\ \sin x, & \frac{\pi}{4} \le x \le \pi \\ \cos\left(\frac{x}{2}\right), & x > \pi \end{cases}$

find the following:

a. $\lim_{x \to \frac{\pi}{4}^+} f(x) =$

b. $\lim_{x \to \frac{\pi}{4}^-} f(x) =$

c. $\lim_{x \to \pi^-} f(x) =$

d. $\lim_{x \to \pi^+} f(x) =$

e. $f\left(\frac{\pi}{4}\right) =$

f. $f(\pi) =$

g. $\lim_{x \to \frac{\pi}{4}} f(x) =$

h. $\lim_{x \to \pi} f(x) =$

Identify any horizontal asymptote(s) of the following functions

12. $f(x) = 4^x$

13. $f(x) = \frac{(x+4)(x+1)}{(2x-1)^2}$

14. $f(x) = \frac{\sqrt{9x^4+x^3-4}}{x^2+2x-1}$

15. Let g and h be the functions defined by $g(x) = -x^2 + 2x + 3$ and $h(x) = 2x - 1$. If f is a function that satisfies $g(x) \le f(x) \le h(x)$ for all x, what is $\lim_{x \to -2} f(x)$?

In a certain country, the number of deaths in a year can be modeled by d, where $d(t)$ is the number of deaths and t is the year since 1975 for $0 \le t \le 30$.

16. What does $d(25)$ represent?

17. What does $\frac{d(30)-d(20)}{30-20}$ represent?

18. What does $\frac{d(15)-d(14.999)}{15-14.999}$ represent?

For each function identify the type of each discontinuity and where it is located.

19. $g(x) = \begin{cases} \ln(ex), & x < 1 \\ 2, & x = 1 \\ x - 1, & 1 < x \leq 2 \\ x^2 - 3 & x > 2 \end{cases}$

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

21. $f(x) = \frac{x^2+9x+14}{x+7}$

State whether the function is continuous at the given x values. Justify your answers!

22. $f(x) = \begin{cases} \frac{1}{x^2+5}, & x \leq -2 \\ 3^x, & -2 < x < 1 \\ \cos(3\pi x), & x \geq 1 \end{cases}$

a. Continuous at $x = -2$?

b. Continuous at $x = 1$?

Find the domain of each function.

23. $w(t) = \frac{t-7}{\sqrt{t+49}}$

24. $f(x) = \ln(6x - 5)$

25. If the function f is continuous for all real numbers and if $f(x) = \frac{x^2-2x-63}{x-9}$ when $x \neq 9$, then $f(9) =$

26. Let f be the function defined by $f(x) = \begin{cases} \frac{3\sin(5x)}{2x}, & x \neq 0 \\ a, & x = 0 \end{cases}$. For what value of a is f continuous at $x = 0$?

27. According to the table, what is value of $\lim_{x \to 2} f(x)$?

x	1.8	1.99	2.01	2.3
$f(x)$	-5.6	-5.501	-5.499	-5.3

Answers

1a. -2	1b. -2	1c. 1	1d. -2	1e. 4	1f. -2
2. $\frac{1}{8}$	3. ∞	4. 0	5. ∞	6. $\frac{1}{2}$	7. -49
8. $-\frac{5}{2}$	9. 2	10. -1	11a. $\frac{\sqrt{2}}{2}$	11b. 1	11c. 0
11d. 0	11e. $\frac{\sqrt{2}}{2}$	11f. 0	11g. DNE	11h. 0	12. $y = 0$
13. $y = \frac{1}{4}$	14. $y = 3$	15. -5	16. The number of deaths in the year 2000.	17. The average number of deaths per year from 1995 to 2005.	
18. The number of deaths per year in 1990.		19. Jump at $x = 1$	20. Hole at $x = 0$ V.A. at $x = 4$	21. Hole at $x = -7$	
22a. Yes. $f(-2) = \frac{1}{9}$ and $\lim_{x \to -2} f(x) = f(-2)$		22b. No. $\lim_{x \to 1^-} f(x) \neq \lim_{x \to 1^+} f(x)$	23. $t > -49$	24. $x > \frac{5}{6}$	
25. 16		26. $\frac{15}{2}$		27. -5.5	