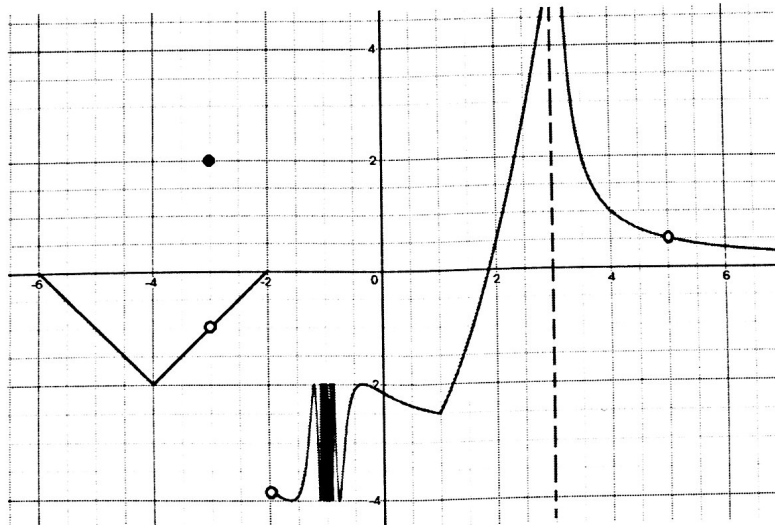


Unit 2 Review – Year-Long Calculus AB

I. Use the pictured graph of $g(x)$ for #1 and #2.



1. Evaluate each:

a) $\lim_{x \rightarrow -1} g(x)$
DNE

b) $\lim_{x \rightarrow 5} g(x)$
 $1/2$

c) $\lim_{x \rightarrow -4} g(x)$
 -2

d) $\lim_{x \rightarrow 3} g(x) = \infty$, so DNE

e) $\lim_{x \rightarrow -3} g(x)$
 -1

f) $\lim_{x \rightarrow 1} g(x)$
 -2.5

g) $\lim_{x \rightarrow -2} g(x)$
DNE

h) $g(-3)$
 2

2. Determine whether or not the graph is continuous for each interval. Be sure to state why/why not.

a) $[2, 4]$ No

b) $(-2, 1)$ YES

c) $[0, 3)$ YES

d) $[-6, -2]$ No

II. Write a limit statement based on the table:

3.

x	y
4.9	2.51
4.99	2.9501
4.999	2.995
5	DNE
5.0001	3.0005
5.001	3.005
5.01	3.0501

$\lim_{x \rightarrow 5} y = 3$

4.

x	y
1.9	-.995
1.99	-.9995
1.999	-.99995
2	DNE
2.001	-.99995
2.01	-.9995
2.1	-.995

$\lim_{x \rightarrow 2} y = -1$

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III. Evaluate each:

5. $\lim_{x \rightarrow 0} \frac{\sec 7x}{\csc 4x} = 0$ 6. $\lim_{x \rightarrow 0} \frac{17 \sin 10x}{x} = 170$ 7. $\lim_{x \rightarrow 0} \frac{x^2 - 9x - 10}{x^2 - 1} = 10$
8. $\lim_{\Delta x \rightarrow 0} \frac{5(x + \Delta x)^2 + 1 - (5x^2 + 1)}{\Delta x} = 0$ 9. $\lim_{h \rightarrow 0} \frac{\frac{2}{x+h-3} - \frac{2}{x-3}}{h} = \frac{-2}{(x-3)^2}$ 10. $\lim_{x \rightarrow 11} \frac{\sqrt{x+5} - 4}{x-11} = \frac{1}{8}$
11. $\lim_{x \rightarrow 3} [x] - x = \text{DNE}$ 12. $\lim_{x \rightarrow 7} \frac{7-x}{x^2-49} = \frac{1}{14}$ 13. $\lim_{x \rightarrow \infty} \sqrt[5]{\frac{32x^8 - 9x^2 + 3}{7+x^8}} = 2$
14. $\lim_{x \rightarrow -\infty} \frac{x^5 + 3x^2 - 8}{x^2 + 4x^7 - 1} = 0$ 15. $\lim_{x \rightarrow 8^-} \frac{x+8}{x^2-64} = -\infty$ 16. $\lim_{x \rightarrow \infty} \frac{-x^9 + 2x^4 - 3}{x^4 + 5} = -\infty$
17. $\lim_{x \rightarrow -\infty} \frac{\sqrt{4x^2+1}}{x-6} = -2$ 18. $\lim_{x \rightarrow \infty} \frac{\sqrt{4x^2+1}}{x-6} = 2$ 19. $\lim_{x \rightarrow 0} |x| \sin x = 0$
20. $\lim_{x \rightarrow 0^+} 4 - \frac{1}{x^2} = -\infty$ 21. $\lim_{x \rightarrow \infty} \frac{19x^2}{(x^{16}-2)^{1/4}} = 0$ 22. $\lim_{x \rightarrow \infty} \frac{x - \cos x}{x} = 1$

23. Find $\lim_{x \rightarrow 8} f(x)$ if $\frac{x^2 - 7x - 8}{x - 8} \leq f(x) \leq x^2 - 55$
 $= 9$

IV. Is the function continuous at $x = 15$? Be sure to justify, citing your definition of continuity.

24. $g(x) = \begin{cases} \frac{x^2 - 13x - 30}{x^2 - 15x} & \text{if } x \neq 15 \\ \frac{1}{225}x + \frac{16}{15} & \text{if } x = 15 \end{cases}$ YES $\lim_{x \rightarrow 15} g(x) = g(15)$

25. $p(x) = \frac{1}{x-15}$ No $\lim_{x \rightarrow 15} p(x) = \text{DNE}$

26. $r(x) = \begin{cases} \frac{2x^2 - 31x - 15}{x^2 - 225} & \text{if } x \neq 15 \\ x + 3 & \text{if } x = 15 \end{cases}$ No $\lim_{x \rightarrow 15} r(x) = \text{DNE}$

V. AP Practice:

27.

If $\begin{cases} f(x) = \frac{\sqrt{2x+5} - \sqrt{x+7}}{x-2}, & \text{for } x \neq 2, \\ f(2) = k \end{cases}$ and if f is continuous at $x = 2$, then $k =$

- (A) 0 (B) $\frac{1}{6}$ (C) $\frac{1}{3}$ (D) 1 (E) $\frac{7}{5}$

28.

Which of the following functions are continuous for all real numbers x ?

I. $y = x^{\frac{2}{3}}$

II. $y = e^x$

III. $y = \tan x$

- (A) None (B) I only (C) II only (D) I and II (E) I and III

29.

If $\lim_{x \rightarrow a} f(x) = L$, where L is a real number, which of the following must be true?

(A) $f'(a)$ exists.

(B) $f(x)$ is continuous at $x = a$.

(C) $f(x)$ is defined at $x = a$.

(D) $f(a) = L$

(E) None of the above

30.

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Consider the following functions defined for all x :

$f_1(x) = x$

$f_2(x) = x \cos x$

$f_3(x) = 3e^{2x}$

$f_4(x) = x - |x|$

Answer the following questions (a, b, c, and d) about each of these functions. Indicate your answer by writing either yes or no in the appropriate space in the given rectangular grid. No justification is required but each blank space will be scored as an incorrect answer.

Questions	Functions			
	f_1	f_2	f_3	f_4
(a) Does $f(-x) = -f(x)$	Y	N	N	N
(b) Does the inverse function exist for all x ?	Y	N	Y	N
(c) Is the function periodic?	N	Y	N	N
(d) Is the function continuous at $x = 0$?	Y	Y	Y	Y