

Name: _____ Date: _____

Take home quiz-Limits, Continuity & IVT

AP Calculus BC

Evaluate the following limits.

1. $\lim_{x \rightarrow 8} (x^2 - 5x - 11)$

7. $\lim_{x \rightarrow 0} \frac{\sin x}{3x^2 - 2x}$

2. $\lim_{x \rightarrow 0} \pi^2$

8. $\lim_{x \rightarrow 0^+} \left(\frac{x}{|x|} \right)$

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

9. $\lim_{x \rightarrow 3^-} \sqrt{x - 3}$

4. $\lim_{x \rightarrow \infty} \left(\frac{10x^2 + 25x + 1}{x^4 - 8} \right)$

10. $\lim_{x \rightarrow 0} \frac{5x + \sin x}{x}$

5. $\lim_{x \rightarrow \infty} \left(\frac{x^4 - 8}{10x^4 + 25x + 1} \right)$

11. $\lim_{x \rightarrow 24} \left(\frac{\sqrt{x+1} - 5}{x - 24} \right)$

6. $\lim_{x \rightarrow 6^+} \left(\frac{x+2}{x^2 - 4x - 12} \right)$

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

13. Let $f(x) = \begin{cases} x^2 - 5, & x \leq 3 \\ x + 2, & x > 3 \end{cases}$

Find (a) $\lim_{x \rightarrow 3^-} f(x)$ (b) $\lim_{x \rightarrow 3^+} f(x)$ (c) $\lim_{x \rightarrow 3} f(x)$

14. Let $f(x) = \begin{cases} x^2 - 2x + 5, & x < 0 \\ 5\sin x, & x \geq 0 \end{cases}$

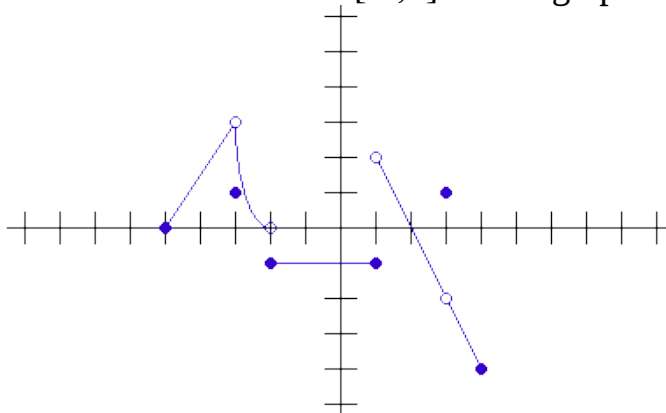
Find (a) $\lim_{x \rightarrow 0^-} f(x)$ (b) $\lim_{x \rightarrow 0^+} f(x)$ (c) $\lim_{x \rightarrow 0} f(x)$

15. Find the value(s) of x , if any, where f is not continuous. Identify the type of discontinuity.

a. $f(x) = \frac{x^2 - 5x}{x^2 - 3x - 10}$ b. $f(x) = \begin{cases} x + 7, & x < 2 \\ 9, & x = 2 \\ 3x + 3, & x > 2 \end{cases}$

16. If $g(x) = \begin{cases} \frac{4\sin x}{x}, & x < 0 \\ a - 2x, & x \geq 0 \end{cases}$, find a so that the function is continuous.

17. Let g be a function defined on the interval $[-5, 4]$ whose graph is given as:



Using the graph, find the following limits if they exist, and if not explain why not.

a) $\lim_{x \rightarrow 3} g(x)$

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

b) $\lim_{x \rightarrow 0} g(x)$

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

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

h) $\lim_{x \rightarrow 4} g(x)$

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

i) $\lim_{x \rightarrow 2} g(x)$

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

j) $\lim_{x \rightarrow -2^+} g(x)$

18. The functions f and g are continuous functions for all real numbers. The table gives values of both functions at selected values of x .

x	1	2	3	4
$f(x)$	6	9	10	-1
$g(x)$	2	3	4	6

If $h(x) = f(g(x)) - 6$, explain why there must be a value r for $1 < r < 3$ such that $h(r) = -5$.