

AP Calculus AB

Name _____

Limits and Continuity Review

Date _____ Pd. _____

1. If $f(x) = \frac{x^2 - 9}{x + 3}$ is continuous at $x = -3$, then $f(-3) =$ _____

2. $\lim_{x \rightarrow 0} \frac{(3-x)^2}{(x-3)} =$

3. $\lim_{x \rightarrow \pi} (\sin 2x)$

4. **Non-Calculator** If f is a continuous function defined by $f(x) = \begin{cases} x^2 + bx, & x \leq 5 \\ 5 \sin\left(\frac{\pi x}{2}\right), & x > 5 \end{cases}$

Find b .

5. If $y = 7$ is a horizontal asymptote of a rational function f , then which of the following is true

a) $\lim_{x \rightarrow 7} f(x) = \infty$ b) $\lim_{x \rightarrow \infty} f(x) = 7$ c) $\lim_{x \rightarrow 0} f(x) = 7$
 d) $\lim_{x \rightarrow 7} f(x) = 0$ e) $\lim_{x \rightarrow -\infty} f(x) = -7$

6. **Non-Calculator** Which of the following is continuous at $x = 0$?

I. $f(x) = |x|$

II. $f(x) = e^x$

III. $f(x) = \ln(e^x - 1)$

a) I only

b) II only

c) I and II only

d) II and III only

e) none

7. **Non-Calculator** If $f(x) = \begin{cases} \ln x, & 0 < x \leq 2 \\ x^2 \ln 2, & 2 < x \leq 4 \end{cases}$ then $\lim_{x \rightarrow 2} f(x)$ is

a) $\ln 2$

b) $\ln 8$

c) $\ln 16$

d) 4

e) nonexistent

8. Let $f(x) = \begin{cases} \sqrt{-x}, & x < 0 \\ 3-x, & 0 \leq x < 3 \\ (x-3)^2, & x > 3 \end{cases}$

a) $\lim_{x \rightarrow 0^+} f(x) =$

b) $\lim_{x \rightarrow 0^-} f(x) =$

c) $\lim_{x \rightarrow 0} f(x) =$

d) $\lim_{x \rightarrow 3^-} f(x) =$

e) $\lim_{x \rightarrow 3^+} f(x) =$

f) $\lim_{x \rightarrow 3} f(x) =$

9. Let the function f be defined by $f(x) = \begin{cases} \sqrt{x+1}, & 0 \leq x \leq 3 \\ 5-x, & 3 < x \leq 5 \end{cases}$

Is $f(x)$ continuous at $x = 3$? Why or why not?

10. $\lim_{x \rightarrow 0^+} \frac{\ln x}{x} =$

11. $\lim_{x \rightarrow \infty} \frac{\sin x}{e^x + \cos x} =$

12. Let f be the function given by $f(x) = 2xe^{2x}$

a) Find $\lim_{x \rightarrow -\infty} f(x)$ and $\lim_{x \rightarrow \infty} f(x)$