AP Calculus AB Chapter 1 Review Worksheet

The following problems should be done without a calculator.

True or False

- 1. If f(x) and g(x) are both polynomial functions and $\lim_{x \to 7} f(x)$ and $\lim_{x \to 7} g(x)$ both exist, then $\lim_{x \to 7} (f+g)(x) = f(7) + g(7)$.
- 2. The function $c(x) = \sqrt[3]{x^2 4x + 2}$ is continuous over the set of Reals.
- 3. The function $p(x) = \begin{cases} 2, & \text{if } x \le 0 \\ x^2 4, & \text{if } x > 0 \end{cases}$ is continuous.

Evaluate

4. $\lim_{x \to 16} \frac{16-x}{\sqrt{x-4}}$ 5. $g(x) = \begin{cases} x+1, & \text{if } x \le 1\\ 3+ax^2, & \text{if } x > 1 \end{cases}$ then g(x) is continuous for a = ?

6.
$$\lim_{x \to 4} f(x) \quad f(x) = \begin{cases} \frac{2x-8}{x-4}, & \text{if } x \neq 4\\ 3, & \text{if } x = 4 \end{cases}$$
7.
$$\lim_{x \to 2^{-}} g(x) \quad g(x) = \begin{cases} 3, & \text{if } x \leq -2\\ (x+2)^{2}, & \text{if } |x| < 2\\ 2x-5, & \text{if } x \geq 2 \end{cases}$$

Given: a.
$$f(x) = \frac{x(x+2)(x-2)}{x+2}$$
 b. $f(x) = x^3 - 2$ c. $f(x) = \frac{x^2 + 5x - 14}{x+2}$

- 8. Which of these functions is f(-2) defined?
- 9. Which of these functions does the limit as x approaches -2 exist?



16. List the values of *x* where the function is discontinuous and identify each type of discontinuity at the appropriate *x*-value.

Multiple Choice.

19.

17. Which is true with regard to the continuity of the function $f(x) = \frac{2^x}{x} + 1$?

a) is continuous everywhere

c) has jump discontinuity

- b) has removable discontinuityd) has infinite discontinuity
- 18. Let f be a continuous function on the closed interval [-3, 6]. If f(-3) = -1 and f(6) = 3, then the Intermediate Value Theorem guarantees that
 - a) f(0) = 0
 - b) $f'(c) = \frac{4}{9}$ for at least one c between -3 and 6
 - c) $-1 \le f(x) \le 3$ for all x between -3 and 6
 - d) f(c) = 1 for at least one c between -3 and 6
 - e) f(c) = 0 for at least one c between -1 and 3

Find the limit using the **numeric method**
$$\lim_{x \to 3} \frac{\left(\frac{1}{x+1}\right) - \left(\frac{1}{4}\right)}{x-3}$$

x	2.9	2.99	2.999	3	3.001	3.01	3.1
f(x)							

20. Determine $\lim_{x \to 1} \frac{\sin^3 x - 1}{3x \cos x}$ graphically to three decimal places.

- 21. A diver jumps off a board 25 ft. above the water. The height in feet of the diver as a function of time is $s(t) = -16t^2 + 12t + 25$.
 - a) What is the average velocity the diver is falling from 2 to 3 seconds after he jumped? Use the slope of the secant line.
 - b) What is the instantaneous velocity at t = 2 seconds? Use $\lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$
- 22. Draw a graph representing a function with the given information.

$$f(0) = 2 \qquad f(1) = 0 \qquad f(5) = -1 \qquad \lim_{x \to 0} f(x) = 0$$
$$\lim_{x \to 3^+} f(x) = \infty \qquad \lim_{x \to 3^-} f(x) = -\infty \qquad \lim_{x \to \infty} f(x) = 0 \qquad \lim_{x \to \infty} f(x) = -\infty$$