Date: 9/13/13.

Instructor: Cody Clifton.

Name: ________________________

This 10-point quiz will test your knowledge of domain, limits, and continuity. Read carefully and always show your work. You have 15 minutes... good luck!

(1) State the domain of the function $f(x) = \dfrac{\sqrt{x+5}}{x^2-1}$.

Solution. The domain of $\sqrt{x+5}$ is $[-5, \infty)$. Since the denominator of f cannot equal zero, we must then exclude the points

$$x^2 - 1 = 0 \implies x^2 = 1 \implies x = \pm 1.$$

Thus, the domain of f is: $[-5, -1) \cup (-1, 1) \cup (1, \infty)$.

(2) Find $\lim\limits_{x \to ☺} 5x^4 + 4x^3 + 3x^2 + 2x + 1$.

Solution. Since the function is a polynomial, we use the direct substation property:

$$\lim_{x \to ☺} 5x^4 + 4x^3 + 3x^2 + 2x + 1 = 5☺^4 + 4☺^3 + 3☺^2 + 2☺ + 1.$$

(3) Evaluate (a) $\lim\limits_{x \to 1} \dfrac{x^2-9}{x-3}$ and (b) $\lim\limits_{x \to 3} \dfrac{x^2-9}{x-3}$.

Solution. For (a), the direct substitution property gives: $\lim\limits_{x \to 1} \dfrac{x^2-9}{x-3} = \dfrac{1^2-9}{1-3} = 4$.

For (b), we must factor and simplify: $\lim\limits_{x \to 3} \dfrac{x^2-9}{x-3} = \lim\limits_{x \to 3} \dfrac{(x-3)(x+3)}{x-3} = \lim\limits_{x \to 3} x + 3 = 6$.

(4) Estimate (a) $\lim\limits_{x \to 2^-} \dfrac{1}{2-x}$ and (b) $\lim\limits_{x \to 2^+} \dfrac{1}{2-x}$.

Solution. For (a), $\lim\limits_{x \to 2^-} \dfrac{1}{2-x} = \infty$, and for (b), $\lim\limits_{x \to 2^+} \dfrac{1}{2-x} = -\infty$.

(5) Where is the following function continuous?

$$f(x) = \begin{cases} -1, & -1 \le x \le 0, \\ \frac{1}{x^2}, & 0 < x < 1, \\ x^2, & 1 \le x < 2, \\ 2, & x \ge 2. \end{cases}$$

Solution. The function is continuous on $[-1, 0) \cup (0, 2) \cup (2, \infty)$.