Calculus 1 Unit 1 quiz 2: One sided limits and when a limit exists, The limit laws, Limits by algebra: factoring and rationalizing

Name _____ Date _____ Period _____

8 questions, 19 points

1. Let $g(x) = x^2 - 6\lfloor x \rfloor$. Find $\lim_{x \to -2^-} g(x)$ and $\lim_{x \to -2^+} g(x)$, and decide whether $\lim_{x \to -2} g(x)$ exists. (2 points)

2. Let $f(x) = \dfrac{6|x-3|}{x^2 - 9}$. Find $\lim_{x \to 3^-} f(x)$ and $\lim_{x \to 3^+} f(x)$, and decide whether $\lim_{x \to 3} f(x)$ exists. (2 points)

3. Find the limit below. Show that the quotient law applies before you use it.

$$\lim_{x \to -3} \frac{x^2 + 6x - 7}{4x - 6}$$

(2 points)

4. Evaluate $\lim_{x \to -4} \dfrac{x^2 + 5x + 4}{3x^2 + 13x + 4}$. (2 points)

5. Evaluate $\lim_{x \to -2} \dfrac{x^2 + 6x + 8}{\sqrt{2x + 13} - 3}$. (2 points)

6. Jin is asked for $\lim_{x \to 2} f(x)$, where

$$f(x) = \begin{cases} \dfrac{6}{x+1}, & x < 2 \\ 7, & x = 2 \\ \sqrt{x+2}, & x > 2 \end{cases}$$

He writes: "$f(2) = 7$, so $\lim_{x \to 2} f(x) = 7$." Explain what is wrong with his reasoning, and find the limit correctly, showing both one-sided limits. (3 points)

7. All that is known about a function f is that $\lim_{x \to -2} f(x) = 5$. Find the limit below, naming the law used at each step.

$$\lim_{x \to -2} \frac{f(x) + x^2}{x\, f(x) - 3}$$

(3 points)

8. Find the constants a and b for which both of these limits hold.

$$\lim_{x \to 2} \frac{ax^2 + b}{x + 2} = 4 \qquad \lim_{x \to -1} \frac{ax^2 + b}{x + 2} = 7$$

(3 points)

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