Solutions + Rubric

Math 1A Spring 2025 Quiz 4

Name:

1. Explain why the function $f(x)$ is discontinuous at $x = 3$ where the function

$$f(x) = \begin{cases} \frac{2x^2-5x-3}{x-3} & x \neq 3 \\ 6 & x = 3 \end{cases}$$

$$\lim_{x\to 3} \frac{2x^2-5x-3}{x-3} = \lim_{x\to 3} \frac{(2x+1)(x-3)}{(x-3)} = \lim_{x\to 3} 2x+1 = 7$$

$$f(x) = 6 \neq \lim_{x\to 3} f(x)$$

- Recall limit defn. of Cont.
- Evaluate

2. Use continuity to evaluate the limit:

$$\lim_{x\to 4} 2^{\sqrt{9+x^2}}$$

$$2^{\sqrt{25}} = 2^5 = 32$$

- "Plug in"
- Evaluate

3. Find the limit or show it does not exist:

$$\lim_{x\to\infty} \frac{\sqrt{3+3x^2}}{2x+1} \cdot \frac{\frac{1}{x}}{\frac{1}{x}}$$

$$\lim_{x\to\infty} \frac{\sqrt{\frac{3}{x^2}+3}}{2+\frac{1}{x}} = \sqrt{3}/2$$

- Either multiply by $\frac{1/x}{1/x}$ or take ratio of Coeff.

4. The limit

$$\lim_{x\to 9} \frac{x^2-81}{x-9}$$

represents the derivative of some function f at a points a. State the function f, the point a, and evaluate $f'(a)$.

$f(x) = x^2$

$a = 9$

$$f'(a) = \lim_{x\to 9} \frac{\cancel{(x-9)}(x+9)}{\cancel{(x-9)}} = 18$$

- $f(x)$
- a
- Derivative