

Math 165 (Chris Kurth)
Spring 2008
Quiz 2 Solutions

Show all work. Answers without work will not receive credit. If a limit is infinite, state which infinity.

1. (6 points) Evaluate:

$$\lim_{x \rightarrow 0} \frac{\tan 4x}{\sin 3x}$$

Solution:

$$\begin{aligned} \lim_{x \rightarrow 0} \frac{\tan 4x}{\sin 3x} &= \lim_{x \rightarrow 0} \frac{\sin 4x}{\sin 3x \cos 4x} \\ &= \lim_{x \rightarrow 0} \frac{\sin 4x}{4x} \cdot \frac{3x}{\sin 3x} \cdot \frac{\frac{4}{3}}{\cos 4x} \\ &= \lim_{x \rightarrow 0} \frac{\sin 4x}{4x} \cdot \lim_{x \rightarrow 0} \frac{3x}{\sin 3x} \cdot \lim_{x \rightarrow 0} \frac{\frac{4}{3}}{\cos 4x} \\ &= 1 \cdot 1 \cdot \frac{\frac{4}{3}}{1} \\ &= \frac{4}{3} \end{aligned}$$

2. (8 points) Evaluate (If a limit is infinite, state which infinity):

(a)

$$\lim_{x \rightarrow 2^-} \frac{x^2 + 2x - 8}{x^2 - 4}$$

Solution:

$$\begin{aligned} \lim_{x \rightarrow 2^-} \frac{x^2 + 2x - 8}{x^2 - 4} &= \lim_{x \rightarrow 2^-} \frac{(x-2)(x+4)}{(x-2)(x+2)} \\ &= \lim_{x \rightarrow 2^-} \frac{x+4}{x+2} \\ &= \frac{6}{4} \end{aligned}$$

(b)

$$\lim_{x \rightarrow -2^-} \frac{x^2 + 2x - 8}{x^2 - 4}$$

Solution:

$$\begin{aligned} \lim_{x \rightarrow -2^-} \frac{x^2 + 2x - 8}{x^2 - 4} &= \lim_{x \rightarrow -2^-} \frac{x + 4}{x + 2} \\ &= \lim_{x \rightarrow -2^-} \frac{1}{x + 2} \cdot \lim_{x \rightarrow -2^-} (x + 4) \\ &= -\infty \cdot 2 \\ &= -\infty \end{aligned}$$

3. (6 points) Evaluate:

$$\lim_{x \rightarrow \infty} \frac{3x^2 + 2}{x^2 - 8x + 15}$$

Solution:

$$\begin{aligned} \lim_{x \rightarrow \infty} \frac{3x^2 + 2}{x^2 - 8x + 15} &= \lim_{x \rightarrow \infty} \frac{3 + \frac{2}{x^2}}{1 - \frac{8}{x} + \frac{15}{x^2}} \\ &= \frac{3 + 0}{1 + 0 + 0} \\ &= 3 \end{aligned}$$