Math 121 S09N03 - Quiz 2 Name: SOLUTIONS
Jan 23 2009 Stu#:

(1) [5 points] Evaluate the limit, if it exists:

$$\lim_{x \to -4} \frac{\frac{1}{4} + \frac{1}{x}}{4 + x} \sim \text{“}\frac{0}{0}\text{”}$$

$$\lim_{x \to -4} \frac{\left(\frac{1}{4} + \frac{1}{x}\right)}{4+x}$$

$$= \lim_{x \to -4} \frac{\left(\frac{4+x}{4x}\right)}{\frac{(4+x)}{1}}$$

$$= \lim_{x \to -4} \frac{\cancel{(4+x)}}{4x} \cdot \frac{1}{\cancel{(4+x)}}$$

$$= \frac{-1}{16}$$

(2) [5 points] Use the Squeeze Theorem to show that $\lim_{x \to 0} x^4 \cos\left(\frac{2}{x}\right) = 0$.

$$-x^4 \leq x^4 \cos\left(\frac{2}{x}\right) \leq x^4$$

Since $\lim_{x \to 0} (-x^4) = 0 = \lim_{x \to 0} (x^4)$, by the Squeeze Theorem,

$$\lim_{x \to 0} x^4 \cos\left(\frac{2}{x}\right) = 0.$$

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(3) [**5 points**] Find the limit: $\lim_{t \to 0} \frac{\tan(6t)}{\sin(2t)}$ $\sim$ "$\frac{0}{0}$"

$$\lim_{t \to 0} \frac{\tan(6t)}{\sin(2t)}$$

$$= \lim_{t \to 0} \frac{\left(\frac{\sin(6t)}{\cos(6t)}\right)}{\sin(2t)}$$

$$= \lim_{t \to 0} \frac{\sin(6t)}{6t} \cdot \frac{1}{\left(\frac{\sin(2t)}{2t}\right)} \cdot \frac{1}{\cos(6t)} \cdot \frac{6\cancel{t}}{2\cancel{t}}$$

$$= 1 \cdot \frac{1}{1} \cdot 1 \cdot 3$$

$$= 3$$