Math 121 S09N02 - Quiz 2 Name: SOLUTIONS
Jan 23 2009 Stu#:

(1) **[5 points]** Evaluate the limit, if it exists: $\lim_{h\to 0} \frac{(4+h)^2-16}{h}$. $\sim$ "$\frac{0}{0}$"

$$\lim_{h\to 0} \frac{(4+h)^2-16}{h}$$

$$= \lim_{h\to 0} \frac{\cancel{16}+8h+h^2-\cancel{16}}{h}$$

$$= \lim_{h\to 0} \frac{\cancel{h}(8+h)}{\cancel{h}}$$

$$= 8$$

(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: $\lim_{\theta\to 0} \frac{\sin\theta}{\theta+\tan\theta}$ $\sim$ "$\frac{0}{0}$"

$$\lim_{\theta\to 0} \frac{\sin\theta}{\theta+\tan\theta}$$

$$= \lim_{\theta\to 0} \frac{\sin\theta \div \theta}{\left(\theta + \frac{\sin\theta}{\cos\theta}\right) \div \theta}$$

$$= \lim_{\theta\to 0} \frac{\frac{\sin\theta}{\theta}}{\frac{\theta}{\theta} + \frac{\sin\theta}{\theta} \cdot \frac{1}{\cos\theta}}$$

$$= \frac{1}{1+1}$$

$$= \frac{1}{2}$$