PRINT Your Name:______________________________________

**Quiz – October 8, 2004**

Find

$$\lim_{x\to 0} \frac{\arctan x - x}{8x^3}.$$

**Answer:** The top and bottom both have limit zero. We apply L'hopital's rule to get that the limit is

$$\lim_{x\to 0} \frac{\frac{1}{1+x^2} - 1}{24x^2} = \lim_{x\to 0} \frac{\frac{1-(1+x^2)}{1+x^2}}{24x^2} = \lim_{x\to 0} \frac{\frac{-x^2}{1+x^2}}{24x^2} = \lim_{x\to 0} \frac{-1}{24(1+x^2)} = \boxed{\frac{-1}{24}.}$$