

Math 1450, Honor Calculus Practice 3, Fall 2015.

September 14, 2015

PSID: _____ Name: _____

1. Find the limit $\lim_{x \rightarrow \infty} (\sqrt{9x^2 + x} - 3x)$.

2. Find $\lim_{x \rightarrow \infty} f(x)$ if, for all $x > 1$, $\frac{10e^x - 21}{2e^x} < f(x) < \frac{5\sqrt{x}}{\sqrt{x-1}}$.

3. Determine whether $f'(0)$ exists if $f(x) = \begin{cases} x^2 \sin\left(\frac{1}{x}\right) & \text{if } x \neq 0; \\ 0 & \text{if } x = 0. \end{cases}$

4. (a) Find the limit $\lim_{x \rightarrow 0} \ln(1+x)^{\frac{1}{x}}$. (b) Using (a), find the limit $\lim_{x \rightarrow 0} (1+x)^{\frac{3}{x}}$.