

Math 141 Homework #4
Due Tuesday, 9/11/07
Extra Problems

#1. Let $f(x) = p(x)/q(x)$ be a rational function, where $p(x)$ and $q(x)$ are polynomials. When does $f(x)$ have a diagonal asymptote? If indeed it does have a diagonal asymptote, how can you find its equation from the formula for $f(x)$?

Evaluate the following limits. You can use a table of values to estimate them if you want to, but your final answer should use precise tools such as the Limit Laws (see §2.3), continuity, and the Squeeze Theorem.

#2. $\lim_{x \rightarrow 0} \frac{\sin x}{x + x^2}$

#3. $\lim_{x \rightarrow 0} \frac{\sin^2(3x)}{x^2 \cos x}$

#4. $\lim_{x \rightarrow 0} \frac{x - \tan x}{\sin x}$

#5. $\lim_{\theta \rightarrow 0} \frac{\cos \theta - 1}{\sin^2 \theta}$

Hint for #5: In the following picture, compare the length of the arc BC and the lengths of the line segments BC and AC . Then apply the Squeeze Theorem.

