MATH 105        QUIZ 10        MARCH 17, 2010

NAME: KEY

YOUR GRADE IS BASED ON CORRECTNESS, COMPLETENESS, AND CLARITY ON EACH EXERCISE. YOU MAY USE A CALCULATOR, BUT NO NOTES, BOOKS, OR OTHER STUDENTS. GOOD LUCK!

1.) (5 pts.) Does the function \( h(x) = |x - 1| \) have any critical points? If so, where are they located?

Yes:

\[
\begin{align*}
\text{Since there is a corner at } x = 1, \quad h'(x) \text{ does not exist at } x = 1. \\
\end{align*}
\]

Therefore \( h(x) \) has a critical point at \( x = 1 \).

2.) (5 pts.) Use l'Hôpital's Rule to evaluate the limit

\[
\lim_{x \to 0} \frac{1 - \cos x}{\sin(2x)}.
\]

Remember to verify that this is a limit with which you can use l'Hôpital's Rule.

As \( x \to 0 \), \( \cos x \to 1 \), so \( 1 - \cos x \to 0 \)

As \( x \to 0 \), \( \sin(2x) \to 0 \)

So: both top and bottom approach 0.

L'Hôpital: \[
\lim_{x \to 0} \frac{1 - \cos x}{\sin(2x)} = \lim_{x \to 0} \frac{\sin x}{2 \cos(2x)} = \frac{0}{2} = 0.
\]