MATH 170 – Sections 003 and 004 – Quiz 3

You may work with other class members on this quiz, but you may not receive assistance from people not in your MATH 170 section. You must show all of your work to receive full credit. Do all your work on other sheets of paper and be sure to staple all the pieces of paper together or YOU WILL GET A ‘ZERO’ ON THE QUIZ. Do not use decimal approximations unless asked to do so. Your work on this quiz must be handed in by the beginning of class on Friday, 10 February 2006. GOOD LUCK!

Note: You may not use techniques that are introduced in Chapter 3 and beyond.

1) Let

\[ f(x) = \begin{cases} 
\cos x & \text{if } x \leq 0 \\
-x & \text{if } x > 0 
\end{cases} \]

a) Sketch the graph of \( y = f(x) \).

b) Is \( f \) continuous from the left at \( x = 0 \)? Explain.

c) Is \( f \) continuous from the right at \( x = 0 \)? Explain.

d) Is \( f \) continuous \( x = 0 \)? Explain.

2) Prove that the equation

\[ \log_2 x + 2x = 3 \]

has a solution somewhere in the interval \((1, 2)\). Note: a picture is not a proof!

3) Evaluate the following limits:

a) \[ \lim_{x \to -\infty} \frac{7x - 3}{\sqrt{4x^2 - 5}} \]

b) \[ \lim_{x \to \infty} \left[ 5x - \sqrt{25x^2 + 8x} \right] \]

4) Find an equation of the line tangent to \( y = x^{-2} \) at \( x = 4 \).

5) The position of a particle is given by \( s(t) = 1 + t^{-1} \), where \( t \) is measured in seconds and \( s \) is measured in meters. Find the velocity and speed of the particle when \( t = 3 \).