

MATH 170 – Section 010 – Quiz 9

You may work with other class members on this quiz, but you may *not* receive assistance from people not in MATH 170 (Section 010). 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 Monday, 22 November 2004 at 1640. GOOD LUCK!

1) Evaluate the following limits:

a) $\lim_{x \rightarrow \infty} \frac{(\ln x)^2}{\sqrt{x}}$

b) $\lim_{x \rightarrow 0} \frac{\cos x - 1}{x^2}$

c) $\lim_{x \rightarrow 0^+} x^{\sin x}$

2) Draw a large and careful sketch of the graph of $y = \frac{\ln x}{x}$. Discuss intercepts, asymptotes, critical points, local maxima and minima, inflection points, intervals of increasing/decreasing, and intervals of concavity. (When you put the information you obtain into your sketch, you may need to use decimal approximations. Use decimal approximations for this purpose only.)

3) Consider the problem of using Newton's method to approximate $\sqrt{5}$. Construct a function $f(x)$ and a good first approximation x_1 to the value of $\sqrt{5}$. Then obtain the next two iterates x_2 and x_3 , using Newton's method. Compare x_3 to the calculator value for $\sqrt{5}$. (For this problem, feel free to use decimal numbers).

EXTRA CREDIT: Construct a function $f(x)$ and an initial guess x_1 to a solution of $f(x) = 0$ such that $f(x) = 0$ has a solution that is not x_1 and such that Newton's method produces numbers x_2, x_3, x_4, \dots where $x_1 = x_3 = x_5 = \dots$ and $x_2 = x_4 = x_6 = \dots$. We also require that $f(x_2) \neq 0$ and $x_1 \neq x_2$.