Math 56 Compu & Expt Math, Spring 2014: Quiz 1

in class 4/10/14, 25 mins, just pencil + paper + brain

1. Prove whether $10^3 + n = O(n)$ as $n \to \infty$ (if so, give C and n_0)

2. The Taylor expansion of log about $a = 1$ is

$$\log x = (x-1) - \frac{(x-1)^2}{2} + \frac{(x-1)^3}{3} - \cdots$$

What is the *type and order/rate* of convergence of this series when evaluated at $x = 1.5$?

Give a *rigorous* upper bound on the absolute error in approximating $\log x$ by $(x-1) - (x-1)^2/2$ at $x = 0.9$:

3. Estimate, giving working, the *relative error* in computing 100.00001 - 100 with a machine using standard "double precision" arithmetic.

4. What is the relative condition number $\kappa(x)$ of the function $f(x) = \sqrt{1 - x^2}$ in $-1 \leq x \leq 1$?

BONUS: Discuss its consequences for the machine evaluation error of this function over the interval.