

Math 56 Compu & Expt Math, Spring 2013: Quiz 1

in class 4/11/13, 25 mins, just pencil and paper

1. Prove whether $\frac{\cos(x)}{x-100} = O(1/x)$ as $x \rightarrow \infty$
2. Estimate, giving working, the *relative error* in computing $1000.001 - 1000$ with a machine using standard “double precision” arithmetic.
3. We wish to approximate $\tan x$ at $x = 1$ by the n -term Taylor series expanding about the origin. What type, and order/rate, of convergence would you expect? Explain. [Hint: you don’t need the series, and \tan is smooth off the real axis.]

4. We wish to approximate $\sin x$ at $x = 0.1$ by the first non-trivial term in its Taylor series expanding about the origin. Give a *rigorous* bound on the error.

5. What is the relative condition number κ of computing $1/(x - 1)$?