



Midterm Exam Outline

Math 104A: Numerical Analysis
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- Numerical representation and round-off error
 - signed integers (32-bit).
 - floating point IEEE 754 standard
 - 32-bit, 64-bit.
 - k-digit chopping.
 - k-digit rounding.
- Error Analysis
 - absolute error, relative error.
 - number of significant digits.
- Analysis of algorithms
 - definition of algorithms.
 - “big oh” and “little oh” notations: $O(f(n))$, $o(g(n))$.
 - rates of convergence.
- Equations of one variable
 - zero finding problems: $f(p) = 0$
 - existence.
 - uniqueness.
 - bisection method
 - conditions for convergence.
 - rate of convergence.
 - different types of stopping criteria.
 - fixed-point problems: $f(p) = p$
 - existence.
 - uniqueness.
 - relations between zero finding problems and fixed-point problems
 - fixed-point iteration
 - conditions for convergence.
 - rate of convergence.
 - stable and unstable fixed points.
 - Newton’s Method and Secant Method
 - sufficient conditions for convergence.
 - rate of convergence.
 - general error analysis of methods.
 - rates of convergence.
- Lagrange polynomial interpolation basics
 - existence and uniqueness for $n+1$ distinct nodes
 - error bound and analysis
 - evaluation using Neville’s method