

Review Topics for Midterm

1. Non-linear root finding
 - (a) Secant method
 - (b) Newton's method
 - (c) Fixed point iteration
 - (d) Convergence rates (quadratic, linear, etc.)
 - (e) Contraction Mapping Theorem

2. Floating point arithmetic
 - (a) Base-2 representation of floating point numbers
 - (b) Machine precision
 - (c) Round-off error

3. Conditioning
 - (a) Forward error analysis
 - (b) Backward error analysis
 - (c) Absolute condition number of a problem
 - (d) Relative condition number of a problem

4. Numerical linear algebra
 - (a) Gaussian elimination with pivoting
 - (b) LU decomposition with pivoting
 - (c) Vector and matrix norms
 - (d) Condition number of a matrix
 - (e) The singular value decomposition