

CS412 List of Topics for the Midterm

Note that this list is a summary of main topics you are expected to know for your midterm. You should be familiar with other subtopics and terms mentioned in your text (chapter 1-11) and discussed in class.

Mathematical model- closed form

Matlab

- Creating scripts & functions
- Input & output
- Build-in functions

Error

- Accuracy vs precision
- Absolute & relative error
- Estimation when solution is unknown
- Sources: human, model, data, machine
- Multiple sources: loss of significant digits, noise in function evaluation, overflow & underflow

Taylor polynomial

- forward, backward, centered difference approximation

Root finding methods

- Bracketing methods
 - Graphical
 - Incremental search
 - Bisection
 - False position
- Open methods
 - Newton-Raphson
 - Secant
 - Fixed Point iteration
- Multiple roots

Systems of Equations

Linear Algebra

Naïve Gauss

Gaussian Elimination

LU decomposition

Tridiagonal systems (sparse systems)

Cholesky

Matrix inverse & condition

Iterative methods

- Jacobi
- Gauss-Seidel
- Newton-Raphson

In studying, I recommend that you analyze each algorithm and identify the

- positive aspects
- negative aspects
- operation counts

and other vital information that makes the algorithm unique. It is also a good idea to look over assigned homework and the end of the chapter exercises in the text.