

Quiz Date: Friday, 01 February, 2019

Textbook Reading:

Sections 6.2 (GE with pivoting), 6.3 (review of matrix/vector arithmetic), 6.4 (determinant review), 6.5 (LU factorization)

Reminder: solutions will not be posted, but the TAs are expecting you to bring your questions to the tutorials. You may also bring questions to the Wednesday afternoon office hours.

0) **Basic Ideas**

Be very familiar with the following:

- the connection between GE and LU factorization,
- diagonally-dominant matrices,
- how continuity and the intermediate value theorem lead to the *bracketing* idea,
- the geometry of the bisection algorithm, and its convergence properties,
- the geometry of the secant method.

1) **LU Factorization**

Textbook problems from Section 6.5:

- #1 LU as solution by back substitutions only.
- #3 LU factorization with partial pivoting requires a $[P]$ matrix.
- #10 (a) use Matlab to check your answer!

Textbook problems from Section 6.6:

- #4 (don't do the LDL factorization) Explain, using the ideas on page 417, why it is that when you run $[mL, mU, mP] = lu(A)$ in Matlab, the LU factorization always has $[P] = [I]$, the identity matrix.

2) **BiSection Method**

Textbook problems from Section 2.1:

- #5, 13 For the quiz, be prepared to do several iterations using a calculator.
 - For any of the above problems, explain how to get an estimate for the number of iterations needed. Then, without doing the Bisection method, estimate how many more iterations would be needed to realize tolerances lower by a factor of 10^{-4} .

3) **Secant Method**

Textbook problems from Sections 2.3:

- #7 For the quiz, be prepared to do several iterations using a calculator.
 - Know how to derive the formulas for Newton's and Secant methods from the equations of the tangent and secant lines.