

CAS MA539 – Methods of Scientific Computing

Boston University, Fall 2005

Homework 2 – Due September 27

The following problems may be found in your textbook.

1. **Exercise 2.7, pg. 97:** A small (i.e., 2×2) matrix system that allows a “hands on” look at the sensitivity of some of the algorithms we’ve considered to perturbation of key entries.
2. **Exercise 2.19, pg. 98:** Evaluating the numerical stability of a proposed algorithm for Gaussian elimination.
3. **Exercise 2.39, pg. 99:** A chance to look closer at the algorithm for Cholesky factorizations.
4. **Exercise 2.40, pg. 99:** Banded matrices were the one class of matrices with “special” structure that we did not examine in class. Here you’re asked to do so yourself.
5. **Computer Problem 2.1, pg. 100:** An analytical and numerical study of when a singular matrix is not always exactly singular.
6. **Computer Problem 2.13, pg. 103:** You’ll want to use a combination of properties from linear algebra and computing methods to address this problem. Please include in your solutions (i) a formal statement of your algorithm, (ii) any background mathematical calculations and/or formulas, (iii) a copy of your code, and (iv) an illustration of your algorithm on a problem(s) of your choice (preferably with comparison to some “gold standard”, such as Matlab’s default ‘determinant’ function).