AMCS 602 Fall 2017
Final Project, Due Dec. 6, 2017

Dr. Wang

The solutions of the following problems should be carefully written up and handed in.

1. Page 16. Problem 2.5 in [2].

2. Describe an algorithm for QR factorization based on Givens rotations and count the number of floating point operations. This already appeared in HW3, which is part of problem 10.4 on page 76. You can get the hint from page 122-123 in [1].

3. Page 85, Problem 11.3 in [2]. This is a Matlab project on least square problems.

4. Page 113, Problem 15.2 in [2]. See lecture 31 in [2] and section 5.4 in [1] for reference.

5. Page 171, Problem 22.3 in [2]. This is a Matlab project on the stability of Gaussian Elimination. Read carefully lecture 22 in [2] first.

6. Assume $A \in \mathbb{R}^{m\times m}$ is a real invertible matrix, and $B \in \mathbb{R}^{m\times m}$ is a *rank-one* perturbation of A as

$$B = A + uv^\top,$$

with both u and v are in $\mathbb{R}^m$. If A^{-1} is known, what is B^{-1}? How many operations needed to get B^{-1} if A^{-1} is known? This problem is a variant of Problem 2.6 in [2].

7. Read lecture 34 in [2], and in particular the discussion of the eigenvalue problems of nonhermitian matrices. Then carry out Problem 24.3 and Problem 26.2 in [2].

References

[1] J. W. Demmel, Applied numerical linear algebra. SIAM, Philadelphia, 1997.

[2] L. N. Trefethen and D. Bau III. Numerical Linear Algebra. SIAM, Philadelphia, 1997.