Homework 1, DN2230

Due November 11, 2010

1. Exercise 7.3 in "Numerical Linear Algebra" (NLA).

2. What is the computational work in flops to perform a QR factorization of a symmetric tridiagonal matrix $A \in \mathbb{R}^{m \times m}$? We are primarily interested in the order of the method; hence, the task here is to determine an optimal number α, such that the computational work is less than or equal to a constant times m^α.

3. Exercise 28.4 in NLA. Use your result from question 2 here. We are again interested in the orders of the methods, i.e. to get exponents α as in question 2.

4. Exercise 29.1 in NLA. In addition to the task in part (e), try your program to see how large a matrix $A \in \mathbb{R}^{m \times m}$ could be such that your program is able to find all the eigenvalues in a reasonable amount of time (say 30 seconds). Is it different when you use the unshifted QR algorithm and when you use the Wilkinson shift? Use matrices A similar to the one in the exercise (i.e. `A=diag(m:-1:1)+ones(m,m)`).