Mathematics 571 Winter 1999
J. Rauch

Assignment #11. Due April 8.

1. (Golub and VanLoan 8.5-4). How many positive eigenvalues does the following symmetric tridiagonal matrix have?

$$B = \begin{pmatrix} 2 & 1 & 0 & 0 & 0 \\ 1 & 0 & 3 & 0 & 0 \\ 0 & 3 & 4 & 1 & 0 \\ 0 & 0 & 1 & 1 & 2 \\ 0 & 0 & 0 & 2 & 7 \end{pmatrix}.$$

How many repeated eigenvalues does it have? These are exact calculation using Theorem 6.2-3.

2. (Conte-DeBoor 4.8-12). Reduce the matrix

$$A = \begin{pmatrix} 4 & -1 & -1 & -1 \\ -1 & 4 & -1 & -1 \\ -1 & -1 & 4 & -1 \\ -1 & -1 & -1 & 4 \end{pmatrix}$$

from the last assignment to tridiagonal form using Householder matrices.

3. Find all the eigenvalues of the tridiagonal matrix of problem 2 by the bisection algorithm on page 203 of Ciarlet.

4. Find all the eigenvalues of the tridiagonal matrix of problem 2 by the classical Jacobi algorithm. Compare the performance with the bisection algorithm.