

Math 432 - Numerical Linear Algebra - Fall 2013

Homework 12

Assigned: Sunday, December 8, 2013

Due: **Friday, December 13, 2013**

1. Apply the Geršgorin disk theorems to obtain bounds for the eigenvalues of the following matrices:

$$(a) A = \begin{pmatrix} 10 & 1 & 1 \\ 2 & 10 & 1 \\ 2 & 2 & 10 \end{pmatrix}, \quad (b) \begin{pmatrix} 1 & 0 & 0 \\ 2 & 5 & 0 \\ 1 & 1 & 6 \end{pmatrix},$$

$$(c) \begin{pmatrix} 1 - i & 0 & 1 \\ 1 & 1 & 1 \\ 0 & 1 - i & 1 + i \end{pmatrix}$$

2. Apply the power method and inverse power method, find the dominant eigenvalue and the corresponding eigenvector for matrix A in exercise 1 (a).
3. Compute the smallest eigenvalue of the matrix A in exercise 1 (c) by applying the power method to A^{-1} , without explicitly computing A^{-1} .
4. Use example 9.20 on page 303 on the textbook to continue Rayleigh Quotient iterations with $k = 2, 3$ and 4 to find approximations of an eigenvalue and its corresponding eigenvector of the matrix

$$A = \begin{pmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \\ 3 & 4 & 5 \end{pmatrix}, \quad \text{with } x_0 = \begin{pmatrix} 0.5246 \\ 0.7622 \\ 1.000 \end{pmatrix}$$