MATH 466, Spring 2004

Assignment 3

Due Date: April 5

IMPORTANT NOTE: A penalty of 30% of total points will be applied to the homework submitted one day later. A penalty of 60% of total points will be applied to the homework submitted two days later. No credit will be given to the homework after that. Write your answers clearly.

1. **Do the following problems:**
   Sec 9.1 : 1(c)(d), 2 with 1(c)(d) matrices, 3(a)(e).
   Sec 9.2 : 1 and 2 with 1(b) matrix (For 2, use $\mu = (x^{(0)})^t A x^{(0)}$).
   Sec 9.3 : 2(a), 3(a).

2. **Suppose A is a real and symmetric matrix. Show that**

$$\kappa_2(A) = |\lambda_1/\lambda_n|,$$

   where λ_1 and λ_n are the largest and smallest eigenvalues in magnitude of A, resp.

3. **Implement the Power method. Use your code to compute the dominant eigenvalue of the 1(b) matrix in Sec 9.2. Iterate until a tolerance of 10^{-4} is achieved or until the number of iterations exceeds 25. Print out numerical results. Attach the hard copy of your code.**

4. **Consider the following matrix:**

$$A = \begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$$

   (a) **Use the givens rotation to find the QR factorization of A.**

   (b) **Implement the "Pure QR Algorithm" using qr routine in MATLAB. Perform 20 iterations. Print out the approximate eigenvalues of A. Check your answer with the eigenvalues obtained from eig routine in MATLAB.**