CMPSC/Mathematics 451
MATLAB Program One
Due 26 February 2020
Spring 2020

You are to write a MATLAB function to implement the Hager–Higham method to estimate the condition number of the matrix A in the one-norm. This is explained in the notes on Canvas and in class.

Your function should have the form

[kappa,z,jmax]=cond1(L,U,p,A).

Thus, here L, U, and p are outputs from the command `[L,U,p]=lu(A,'vector')`.

Here **kappa** is the condition number $\kappa_1(A) = \|A\|_1\|A^{-1}\|_1$, **z** is the vector such that $\|\mathbf{z}\|_\infty = 1$, $\|A^{-1}\mathbf{z}\|_\infty = \|A^{-1}\|_1 = \|A^{-T}\|_\infty$, and **jmax** is a column of the identity matrix such that $\|A^{-1}\mathbf{e}_{jmax}\|_1 = \|A^{-1}\|_1$. Test your routine with the matrices generated by the m-files **matrix1.m**, **matrix2.m**, **matrix3.m** posted on Canvas in the **MATLAB codes** folder.

Your code should do no more than four iterations and it should be short. You can check your answer with the MATLAB function **cond**. The MATLAB statement $kappa1 = cond(A, 1)$ gives you the condition number in the one-norm. If A is well conditioned, your value of *kappa* should be close to $kappa1$. If A is badly conditioned, they should both be very large.

A possible starting vector for **z** could the one recommended by Higham (in the notes) or it could be the one produced from the MATLAB statements

$$\begin{aligned} f &= randn(n, 1); \\ z &= f/norm(f, Inf); \end{aligned}$$

where n is the dimension of A.

Assignment Project Exam Help
https://tutorcs.com
WeChat: cstutorcs