Math 128B, Spring 2021.

Homework 6, due March 6.

Prob 1. Create a MATLAB function that implements the QR algorithm with shifts as discussed on pp. 616-620 of our (main) textbook. Use it to determine, to within 10^{-5}, all eigenvalues of the matrix

$$\begin{bmatrix} 2 & -1 & 0 \\ -1 & -1 & -2 \\ 0 & -2 & 3 \end{bmatrix}.$$

Prob 2. Determine the singular values of the following matrices:

$$(a)\ \begin{bmatrix} 2 & 1 \\ 1 & 1 \\ 0 & 1 \end{bmatrix} \qquad (b)\ \begin{bmatrix} 1 & 1 & 0 \\ 1 & 0 & 1 \\ 0 & 1 & 1 \end{bmatrix}.$$

Prob 3. Show that if A is an $n \times n$ nonsingular matrix with singular values s_1, s_2, ..., s_n, then its ℓ_2-condition number is equal to $\kappa_2(A) = s_1/s_n$.