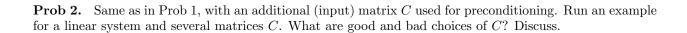
## Math 128B, Spring 2021. Homework 4, due February 20.

**Prob 1.** Create a MATLAB function that inputs a matrix A, vectors b and  $x^{(0)}$  and a tolerance tol and finds an approximate solution to Ax = b using the conjugate gradient method (without preconditioning). The algorithm should terminate after n steps and should output an error message in case the desired precision was not reached. Run the algorithm on a linear system of your choice.



Use the Gershgorin Circle theorem to determine bounds for the eigenvalues and the spectral radius of the following matrices:

$$(a) \left[ \begin{array}{cccc} 4 & 0 & 1 & 3 \\ 0 & 4 & 2 & 1 \\ 1 & 2 & -2 & 0 \\ 3 & 1 & 0 & 4 \end{array} \right]$$

(a)

 
$$\begin{bmatrix}
 4 & 0 & 1 & 3 \\
 0 & 4 & 2 & 1 \\
 1 & 2 & -2 & 0 \\
 3 & 1 & 0 & 4
 \end{bmatrix}$$

(b)

  $\begin{bmatrix}
 1 & 0 & -1 & 1 \\
 2 & 2 & -1 & 1 \\
 0 & 1 & 3 & -2 \\
 1 & 0 & 1 & 4
 \end{bmatrix}$ 

