Math 128B, Spring 2021.

Homework 2, due February 6.

For all problems, turn in your code (and MATLAB diaries when needed).

Prob 1. Create a MATLAB function that inputs a function A, vectors b and $x^{(0)}$ and a tolerance tol, and finds an approximate solution to $Ax = b$ using the Jacobi method.

Prob 2. Same as in Prob. 1 for the Gauss-Seidel method.

Prob 3. Pick three linear systems of your choice and analyze the performance of the algorithms from Prob. 1–2. If you observe differences in convergence, try to explain why that happens.

Prob 4. Let A be a square matrix and let $\|\cdot\|$ be any matrix norm (not necessarily natural/induced). Prove that $\lim_{k\to\infty}\|A^k\| = 0$ if $\rho(A) < 1$. Hint: without loss of generality, it is enough to prove this fact for a matrix in its Jordan normal form – and a particular matrix norm. (Why?)