CS 111: Extra homework problem

Assigned Wed Jan 20, 2015

Due by class time Wed Jan 27

Problem 1a. Find a 2-by-2 matrix A that is symmetric and nonsingular, but for which neither A nor $-A$ is positive definite. Use Matlab's `chol()` to test positive definiteness. Use Matlab's `eig()` to find the eigenvalues of your A. Find a 2-vector y such that $y^T A y < 0$.

Problem 1b. For your A as above, find a 2-vector b such that the conjugate gradient algorithm, when started with the zero vector as an initial guess, does not converge to the solution of $Ax = b$. Show what happens on the first two iterations of CG, following the January 20 class slides. How do you know it won't converge to the right answer?