

Homework 8

MATH 5610 FALL 2016

NAME: _____

GRADE: _____

Problem 1. Implement Jacobi iteration for solving linear systems of equations and test to make sure the iteration converges for diagonally dominant matrices.

Problem 2. Implement Gauss-Seidel for solving linear systems of equations and test on the same matrices used in Problem 1. Write up your results separately including code descriptions.

Problem 3. Graph the results from the implementations of Jacobi iteration and Gauss-Seidel in terms of number of iterations. Is there a noticeable difference in the number of iterations.

Problem 4. Using your codes from Chapter 5, compare the run times for the LU-factorization approach to solving linear systems via Jacobi and Gauss-Seidel methods. Use both diagonally dominant and random matrices to test the methods.

Problem 5. Implement the conjugate gradient method given in the textbook. Test your code on positive definite matrices of sizes, $n = 10, 20, 40, 80, 160, .$ You should implement a code that will generate appropriate matrices for this problem. Note that generating these matrices will require a bit more than just requiring diagonal dominance.

Problem 6. Problem 7 in Chapter 7 of the textbook (page 212).

Problem 7. Problem 15 in Chapter 7 of the textbook (page 214).
