

## Homework VII

Deadline: 2017-12-20

1. (20 pts) Write your own codes for gradient descent (GD) and conjugate gradient descent (CG) methods to solve a linear system  $\mathbf{A}\mathbf{x} = \mathbf{b}$ , where  $\mathbf{A} \in \mathbb{R}^{n \times n}$  is symmetric and positive definite. Conduct random tests to compare those two algorithms by making the `norm( $r_k$ )` vs `k` plot, where  $r_k$  is the residual of each iteration from GD or CG.