

## Comments

After testing all 4 algorithms (MGD, PMGD, CG, PCD) using the zero vector for  $x$ , I got these results:

- Method of Gradient Descent converged in 68 iterations.
- Preconditioned Method of Gradient Descent converged in 56 iterations.
- Conjugate Gradient converged in 19 iterations.
- Preconditioned Conjugate Gradient converged in 11 iterations.

The results are similar to our expectations since in most cases the conjugate gradient method tends to converge faster than the gradient descent method. In addition, adding a preconditioner helped improve the convergence rate of the algorithms even further since it transforms the linear system of equations into one that is easier to solve.