

Exam 2 - Problem 3

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When running the four different algorithms for solving the linear equations, I received the following number of iterations to complete:

Method	# of iterations
Method of Steepest Descent	35,401
Preconditioned Method of Steepest Descent	3,506
Conjugate Gradient	296
Preconditioned Conjugate Gradient	90

What this shows is that the pre-conditioning *greatly* reduces the number of iterations required to approximate the answer. Without any other tweaks, pre-conditioning is 10 times faster for method of steepest descent and 3 times faster for the conjugate gradient method. This tiny additional upfront calculation to precondition and additional triangle solves during each iteration saves thousands of calculations down the line and returns a result much more quickly.