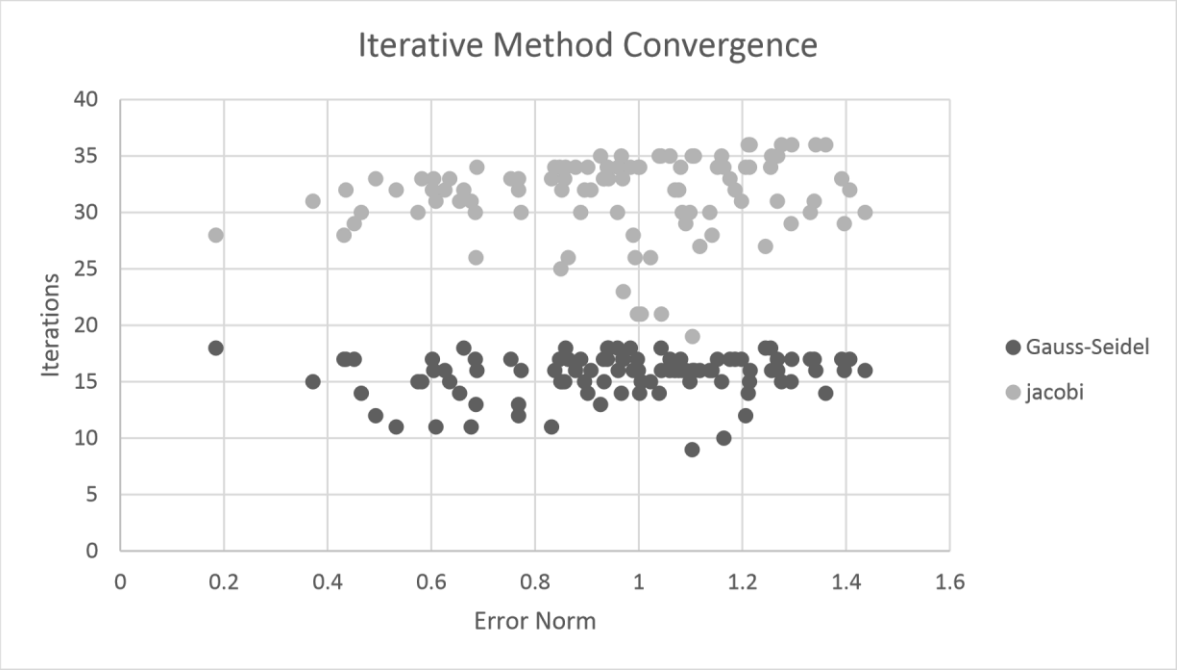
Part 2 Written Component

The Gauss-Seidel method converges approximately twice as fast as the Jacobi method, and with less error as well. The reason why the Gauss-Seidel method converges faster than the Jacobi method is because Gauss-Seidel method updates its $x^{(k+1)}$ as it computes. On the other hand the Jacobi method's values are over-written as computed, which leads to higher errors and failure rates. Although the formulae are similar, Jacobi method relies on the spectral radius less than 1 and a strictly diagonal matrix for convergence. Gauss-Seidel converges when the matrix is symmetric positive definite, or the matrix must be strictly diagonally dominant. Note also that neither method has to fulfill the condition in order to converge. The graph below show that there is a positive correlation between both of the methods but Gauss-Seidel has a stronger correlation.

Plot


Iterative Method Convergence
Iterations
Error Norm
0
5
10
15
20
25
30
35
40
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
Gauss-Seidel
jacobi

Work Cited

https://en.wikipedia.org/wiki/Special:BookSources/978-0-8018-5414-9 | *Matrix Computations (3rd ed.)*

http://mathworld.wolfram.com/Gauss-SeidelMethod.html | Gauss-Seidel Method

http://mathworld.wolfram.com/JacobiMethod.html | Jacobi Method