Instructions

- Make a document (either in .doc and .pdf) containing code, results. Named the file using both of your Roll nos. *i.e.* 140100001_140100002
- Write Up: (i) Software in which code is written, (ii) output results for each case, and (iii) explanation of results.
- Please upload all assignments to turnitin

Assignment 3
Due date: 08/09/2017, time: 12 midnight
Solver

A. Write programs for (i) Tri-diagonal Matrix Algorithm (TDMA) and (ii) Gauss-Seidel iteration.
B. The programs should first read in the size of the matrix $N \times N$ and then read the values of the $N \times N$ matrix elements & the N elements of vector b.
C. For any problem, the program should identify if the matrix is Tri-diagonal matrix or not.

1. Solve the following equation using TDMA:

$$2.04x_1 - x_2 = 40.8$$
$$-x_1 + 2.04x_2 - x_3 = 0.8$$
$$-x_2 + 2.04x_3 - x_4 = 0.8$$
$$-x_3 + 2.04x_4 = 200.8$$

2. Solve the following equation using Gauss-Seidel:

$$27x_1 + 6x_2 - x_3 = 85$$
$$6x_1 + 15x_2 + 2x_3 = 72$$
$$x_1 + x_2 + 54x_3 = 110$$

a. Start with an initial guess of x_1=0, x_2=0 and x_3 =0. Solve Iteratively within error norm range $10^{-4}10^{-12}$. Show how the number of iterations to obtain solution change with error norm.

3. Solve the following equation using Gauss-Seidel:

$$3.122x_1 + 0.5756x_2 - 0.1565x_3 - 0.0067x_4 = 1.571$$
$$0.5756x_1 + 2.93x_2 + 0.1103x_3 - 0.0015x_4 = -0.9275$$
$$-0.1565x_1 + 0.1103x_2 + 4.127x_3 + 0.2051x_4 = -0.0652$$
$$-0.0067x_1 - 0.0015x_2 + 0.2051x_3 + 4.133x_4 = -0.0178$$

Start with an initial guess of x_1=x_2=x_3 =x_4 = 0

For Gauss Seidel Iterative problems: Iterate till error norm is less than 10^{-5} and maximum iteration 100. Tabulate successive errors and values of x_1, x_2, x_3 *and* x_4. Calculate Norm of the M

matrix (as defined in class -you can do this by hand calculation or use the matrix inversion program you wrote last time)