ASSIGNMENT 1 - due 29 January, 2016

1. Find the first two iterations of the Jacobi method for the following linear system, using $\mathbf{x}^{(0)} = \mathbf{0}$:

a.

$$\begin{aligned} -2x_1 + x_2 + \frac{1}{2}x_3 &= 4 \\ x_1 - 2x_2 - \frac{1}{2}x_3 &= -4 \\ x_2 + 2x_3 &= 0 \end{aligned}$$

b.

$$\begin{aligned} 10x_1 + 5x_2 &= 6 \\ 5x_1 + 10x_2 - 4x_3 &= 25 \\ -4x_2 + 8x_3 - x_4 &= -11 \\ -x_3 + 5x_4 &= -11 \end{aligned}$$

2. Repeat Exercise 1 using the Gauss-Seidel method.

3. For the linear system

$$\begin{aligned} 2x_1 - x_2 + x_3 &= -1 \\ 2x_1 + 2x_2 + 2x_3 &= 4 \\ -x_1 - x_2 + 2x_3 &= -5, \end{aligned}$$

compute $\rho(T_j)$ and $\rho(T_g)$.

4. Show that if A is strictly diagonally dominant, then $||T_j||_\infty < 1$.