

## JACOBI AND GAUSS-SEIDEL METHODS

- 1) Apply the Jacobi method to the following system of linear equations using initial approximation  $x = (0, 0, 0)$ . Round to three significant digits.

$$2x_1 - x_2 = 2$$

$$x_1 - 3x_2 + x_3 = -2$$

$$-x_1 + x_2 - 3x_3 = -6$$

- 2) Show that the Gauss-Seidel method diverges for the following system given initial approximation  $x = (0, 0)$

$$x_1 - 2x_2 = -1$$

$$2x_1 + x_2 = 3$$

- 3) Which of the following matrices are strictly diagonally dominant?

a)  $\begin{bmatrix} 2 & 1 \\ 3 & 5 \end{bmatrix}$       b)  $\begin{bmatrix} -1 & -2 \\ 0 & 1 \end{bmatrix}$       c)  $\begin{bmatrix} 12 & 6 & 0 \\ 2 & -3 & 2 \\ 0 & 6 & 13 \end{bmatrix}$       d)  $\begin{bmatrix} 7 & 5 & -1 \\ 1 & -4 & 1 \\ 0 & 2 & -3 \end{bmatrix}$

- 4) Interchange the rows of the following system of linear equations to obtain a system with a strictly diagonally dominant coefficient matrix. Then apply the Gauss-Seidel method to approximate the solution to two significant digits.

$$2x_1 - 3x_2 = -7$$

$$x_1 + 3x_2 - 10x_3 = 9$$

$$3x_1 + x_3 = 13$$