

Chapter 12

Iterative Methods for System of Equations

Iterative Methods for Solving Matrix Equations

$$Ax = b \quad \Rightarrow$$
$$x = Cx + d, \quad C_{ii} = 0$$

- **Jacobi method**
- **Gauss-Seidel Method***
- **Successive Over Relaxation (SOR)**
- **MATLAB's Methods**

Iterative Methods

$$\begin{cases} a_{11}x_1 + a_{12}x_2 + a_{13}x_3 + a_{14}x_4 = b_1 \\ a_{21}x_1 + a_{22}x_2 + a_{23}x_3 + a_{24}x_4 = b_2 \\ a_{31}x_1 + a_{32}x_2 + a_{33}x_3 + a_{34}x_4 = b_3 \\ a_{41}x_1 + a_{42}x_2 + a_{43}x_3 + a_{44}x_4 = b_4 \end{cases}$$

Can be converted to

$$\begin{cases} x_1 = (b_1 - a_{12}x_2 - a_{13}x_3 - a_{14}x_4) / a_{11} \\ x_2 = (b_2 - a_{21}x_1 - a_{23}x_3 - a_{24}x_4) / a_{22} \\ x_3 = (b_3 - a_{31}x_1 - a_{32}x_2 - a_{34}x_4) / a_{33} \\ x_4 = (b_4 - a_{41}x_1 - a_{42}x_2 - a_{43}x_3) / a_{44} \end{cases}$$