LU Decomposition Method: Basis

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$$[A]_{n\times n}[X]_{n\times 1} = [C]_{n\times 1}$$

coefficient matrix — unknown vector — rhs vector.

$$[A] = [L][U]$$

lower triangular matrix — upper triangular matrix

$$[A] = [P][L][U]$$

perturbation matrix.

$$[A][X] = [C]$$

$$[A] = [L][U]$$

$$[L][U][X] = [C]$$

$$[L]^{-1}[L][U][X] = [L]^{-1}[C]$$

$$[I][U][X] = [L]^{-1}[C]$$

$$[U][X] = [L]^{-1}[C]$$

Let $[U]_{n\times n}[X]_{n\times 1} = [Z]_{n\times 1}$ (say)

$$[L]^{-1}[C] = [Z]$$

$$[L][L]^{-1}[C] = [L][Z]$$

$$[I][C] = [L][Z]$$

$$[C] = [L][Z]$$

$$[L]_{n\times n}[Z]_{n\times 1} = [C]_{n\times 1} \quad (1)$$

$$[A][X] = [C]$$

$$[A] = [L][U]$$

$$[L][Z] = [C] \quad \text{—— (1)}$$

$$[U][X] = [Z] \quad \text{—— (2)}$$

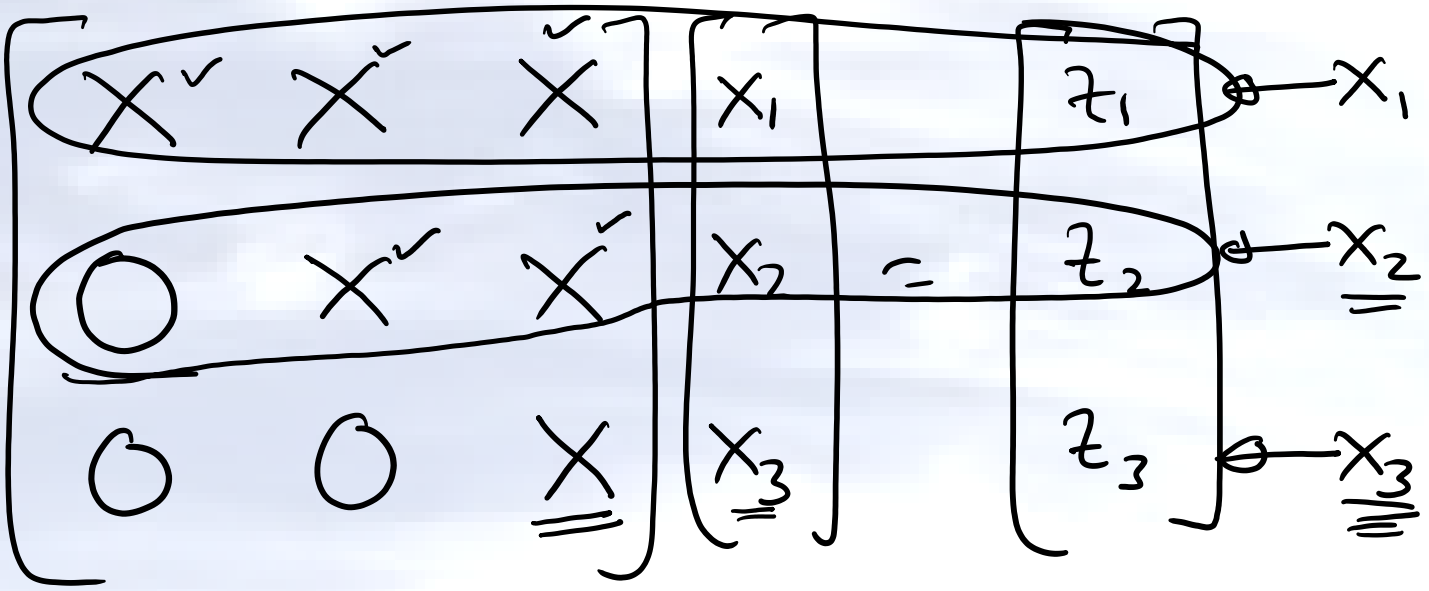
$[L][z] = [c]$

$$\begin{bmatrix} \times & 0 & 0 \\ \times & \times & 0 \\ \times & \times & \times \end{bmatrix} \begin{bmatrix} z_1 \\ z_2 \\ z_3 \end{bmatrix} = \begin{bmatrix} c_1 \\ c_2 \\ c_3 \end{bmatrix}$$

z_1, z_2, z_3

Forward Substitution.

$[U][\tilde{X}] = [\tilde{z}]$



Back substitution

END

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