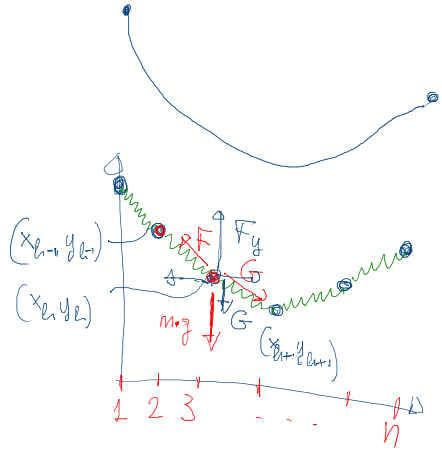


$$\begin{bmatrix} 2 & -1 & & & \\ -1 & 2 & -1 & & \\ & -1 & 2 & -1 & \\ & & \ddots & \ddots & \ddots \\ & & & 2 & -1 \\ & & & & -1 & 2 \end{bmatrix} \in \mathbb{R}^{n \times n}$$

function $L = \text{laplacian}(n)$



$$F_y = k(y_R - y_{R-1});$$

$$G_y = k(y_R - y_{R+1});$$

$$\forall R \quad k(y_R - y_{R-1}) + k(y_R - y_{R+1}) + m \cdot g = 0$$

$$\forall h \quad -y_{h-1} + 2y_h - y_{h+1} = \frac{-m \cdot g}{k}$$

$$\begin{bmatrix} 2 & -1 & & & \\ -1 & \ddots & \ddots & \ddots & \\ & \ddots & \ddots & \ddots & -1 \\ & & & -1 & 2 \end{bmatrix}$$

$$\begin{bmatrix} L_{11} & 0 & 0 & 0 \\ L_{21} & L_{22} & 0 & 0 \\ L_{31} & L_{32} & L_{33} & 0 \\ L_{41} & L_{42} & L_{43} & L_{44} \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix} = \begin{bmatrix} b_1 \\ b_2 \\ b_3 \\ b_4 \end{bmatrix}$$

$$x_1 = \frac{b_1}{L_{11}} \quad L_{11}x_1 = b_1$$

$$x_2 = \frac{b_2 - L_{21}x_1}{L_{22}} \quad L_{21}x_1 + L_{22}x_2 = b_2$$

$$x_3 = \frac{b_3 - L_{31}x_1 - L_{32}x_2}{L_{33}} \quad L_{31}x_1 + L_{32}x_2 + L_{33}x_3 = b_3$$

$$x_k = \frac{b_k - \sum_{j=1}^{k-1} L_{kj}x_j}{L_{kk}}$$

$$\begin{bmatrix} U_{11} & U_{12} & U_{13} & U_{14} \\ 0 & U_{22} & U_{23} & U_{24} \\ 0 & 0 & U_{33} & U_{34} \\ 0 & 0 & 0 & U_{44} \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix} = \begin{bmatrix} b_1 \\ b_2 \\ b_3 \\ b_4 \end{bmatrix}$$

$$U_{44}x_4 = b_4 \quad x_4 = \frac{b_4}{U_{44}}$$

$$U_{33}x_3 + U_{34}x_4 = b_3 \quad x_3 = \frac{b_3 - U_{34}x_4}{U_{33}}$$

$$x_k = \frac{b_k - \sum_{j=k+1}^n U_{kj}x_j}{U_{kk}}$$

$$[LU] = lu(A);$$

$$A = LU \quad Ax = b \quad LUx = b$$

$$1) \text{ risolvo } Ly = b$$

$$2) \text{ risolvo } Ux = y$$

$[y, z] = \text{function_esempio}(\dots)$

$\gg [a, b] = \text{esempio}(\dots)$