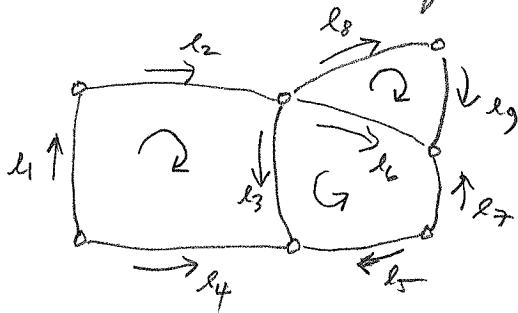


2. Make a LS solution by observations only

$r=3 \Rightarrow c=3$ condition equations



$$\hat{l}_1 + \hat{l}_2 + \hat{l}_3 - \hat{l}_4 = 0$$

$$\hat{l}_3 - \hat{l}_5 + \hat{l}_7 - \hat{l}_6 = 0$$

$$\hat{l}_8 + \hat{l}_9 - \hat{l}_6 = 0$$

$$A\hat{l} = 0, \quad A = \begin{bmatrix} 1 & 1 & 1 & -1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & -1 & -1 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -1 & 0 & 1 & 1 \end{bmatrix}$$

$$A(l+v) = 0 \quad f = \begin{bmatrix} -.14 \\ -.29 \\ -2.10 \end{bmatrix}$$

$$Av = -Al$$

$$Av = f$$

W same as IO problem

$$Q = W^{-1}$$

$$k = (AQA^T)^{-1} f = \begin{bmatrix} -.0816 \\ .1341 \\ -.7447 \end{bmatrix}$$

,

$$v = QA^T k =$$

$$\begin{bmatrix} -.0816 \\ -.0816 \\ .0525 \\ .0294 \\ -.1341 \\ .6106 \\ .1341 \\ -.7447 \\ -.7447 \end{bmatrix}$$

Same as
IO ✓