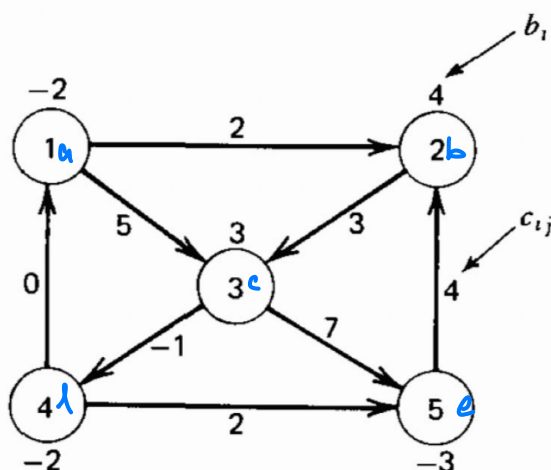


2. (5 points) Solve the supply and demand optimization problem associated to the network pictured below. Write down the linear system explaining what is the meaning of the variables, and a python routine solving the optimization problem. The material we covered about networks during class can be found in Chapter 14.1 of Vanderbei's book.



$$\text{minimize : } c^T \vec{x}$$

$$\text{subject to : } A\vec{x} = -\vec{b}$$

$$\vec{x} \geq 0$$

$$A = \begin{matrix} & \begin{matrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 \end{matrix} \\ \begin{matrix} x_{ab} \\ x_{ac} \\ x_{bc} \\ x_{cd} \\ x_{ce} \\ x_{da} \\ x_{de} \\ x_{eb} \end{matrix} & \begin{bmatrix} -1 & -1 & 0 & 0 & 0 & 1 & 0 & 0 \\ 1 & 0 & -1 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & -1 & -1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & -1 & -1 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 1 & -1 \end{bmatrix} \end{matrix}$$

$$\vec{b} = \begin{bmatrix} -2 \\ 4 \\ 3 \\ -2 \\ -3 \end{bmatrix} \rightarrow -\vec{b} = \begin{bmatrix} 2 \\ -4 \\ -3 \\ 2 \\ 3 \end{bmatrix}$$

$$c^T = \begin{bmatrix} 2 & 5 & 3 & -2 & 7 & 0 & 2 & 4 \end{bmatrix}$$