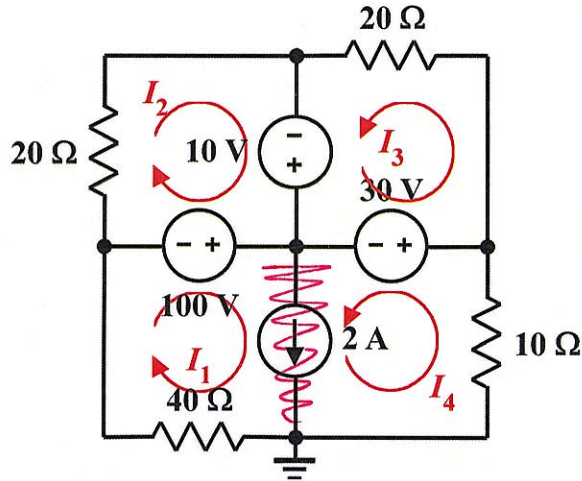


EE/EET 2240
Homework Problem 016

Express the mesh equations in the matrix form discussed in class. Note that mesh currents are already defined, and they are **not** all in the same direction.



$$\begin{aligned}
 I_1 + I_4 &= 2A && \text{(constraint equation for supermesh 1,4)} \\
 (20\Omega) I_2 - 10V + 100V &= 0 && \text{(KVL for mesh 2)} \\
 -10V - 30V + (20\Omega) I_3 &= 0 && \text{(KVL for mesh 3)} \\
 -100V - 30V - (10\Omega) I_4 + (40\Omega) I_1 &= 0 && \text{(KVL for supermesh 1,4)}
 \end{aligned}$$

In matrix form:

$$\begin{bmatrix} 1 & 0 & 0 & 1 \\ 0 & 20 & 0 & 0 \\ 0 & 0 & 20 & 0 \\ 40 & 0 & 0 & -10 \end{bmatrix} \begin{bmatrix} I_1 \\ I_2 \\ I_3 \\ I_4 \end{bmatrix} = \begin{bmatrix} 2 \\ -90 \\ 40 \\ 130 \end{bmatrix}$$