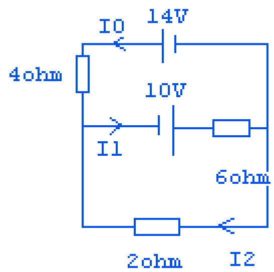
Equation System Using Matrix Inversion



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14 - I_0 * 4 + 10 - I_1 * 6=0

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$4 \cdot I_0 + 6 \cdot I_1 + 0 \cdot I_2 = 24$ **Equation for the top loop**

Find all currents: I2..I0

$$4 \cdot I_0 + 6 \cdot I_1 + 0 \cdot I_2 = 24$$

$$1 \cdot I_0 + -1 \cdot I_1 + 1 \cdot I_2 = 0$$

$$0 \cdot I_0 + 6 \cdot I_1 + 2 \cdot I_2 = 10$$

Answer: $I = \begin{pmatrix} 3 \\ 2 \\ -1 \end{pmatrix}$

=================== Solution ===================================

$$A := \begin{pmatrix} 4 & 6 & 0 \\ 1 & -1 & 1 \\ 0 & 6 & 2 \end{pmatrix} \quad X \quad I := \begin{bmatrix} I_0 \\ I_1 \\ I_2 \end{bmatrix} \quad = \quad E := \begin{pmatrix} 24 \\ 0 \\ 10 \end{pmatrix}$$

$$A^{-1} \cdot A = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} \quad \Rightarrow \quad A^{-1} \cdot A \cdot I = \begin{pmatrix} 3 \\ 2 \\ -1 \end{pmatrix} \quad \textbf{So..} \quad A^{-1} \cdot E = \begin{pmatrix} 3 \\ 2 \\ -1 \end{pmatrix} \quad = \quad I = \begin{pmatrix} 3 \\ 2 \\ -1 \end{pmatrix}$$

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FYI: $\left(A^{T}\right)^{\langle 0 \rangle T} = \begin{pmatrix} 4 & 6 & 0 \end{pmatrix}$ $\quad \left(A^{T}\right)^{\langle 0 \rangle T} \cdot I = 24$

$I_0 := 3$ $I_1 := 2$ $I_2 := -1$