

## Quiz 4-1

Formulate a matrix equation.

$$\begin{cases} 2x + y = 5 \\ x - 3y = -1 \end{cases} \iff \begin{bmatrix} a & b \\ c & d \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} l \\ m \end{bmatrix}$$

# Cramer's rule

Using a Determinant of a matrix

$$\begin{bmatrix} a & b \\ c & d \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} l \\ m \end{bmatrix}, \quad \begin{vmatrix} a & b \\ c & d \end{vmatrix} = ad - bc$$

$$\rightarrow x = \frac{\begin{vmatrix} l & b \\ m & d \end{vmatrix}}{\begin{vmatrix} a & b \\ c & d \end{vmatrix}} = \frac{ld - bm}{ad - bc}, \quad y = \frac{\begin{vmatrix} a & l \\ c & m \end{vmatrix}}{\begin{vmatrix} a & b \\ c & d \end{vmatrix}} = \frac{am - lc}{ad - bc}$$

## Quiz 4-2

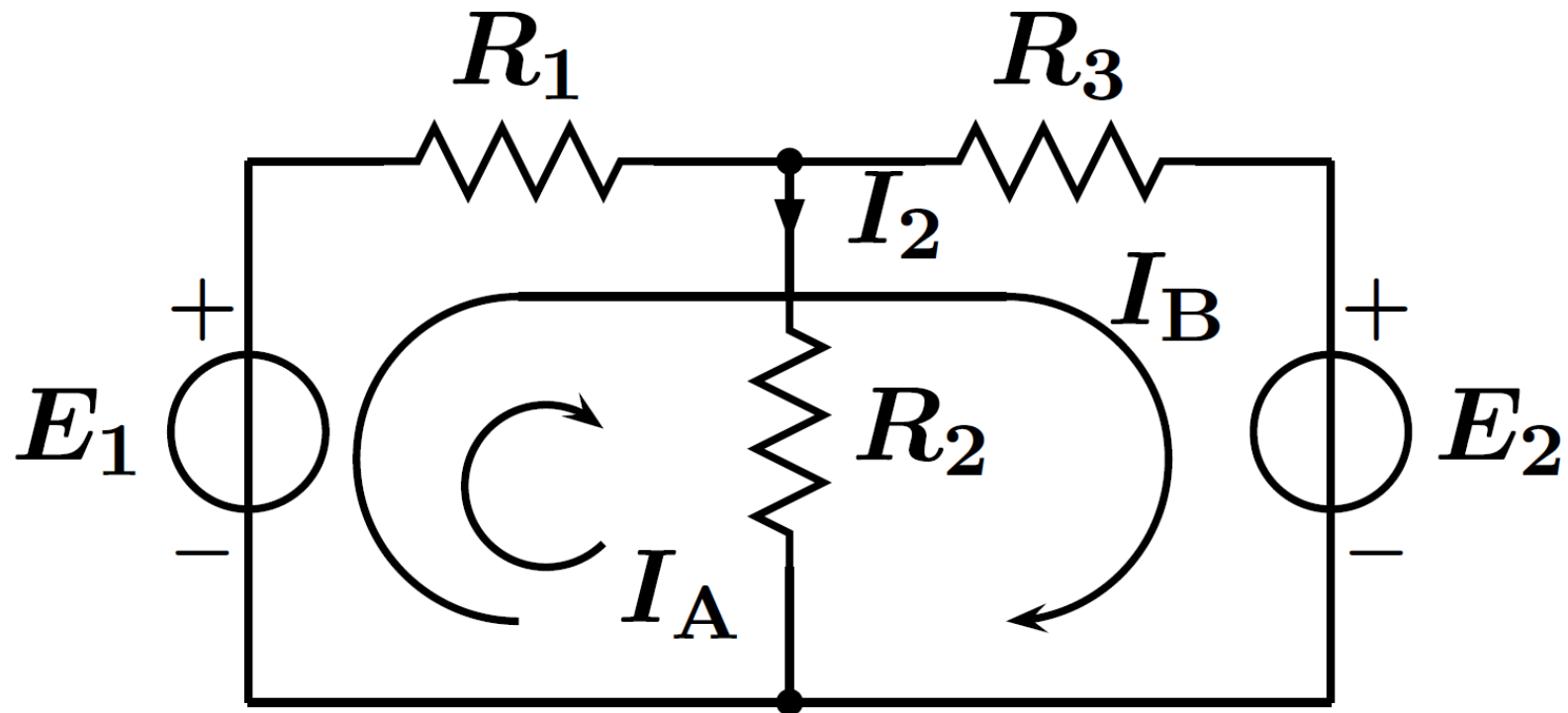
Solve  $x$  and  $y$  using the Cramer's rule.

$$\begin{bmatrix} 2 & 1 \\ 1 & -3 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 5 \\ -1 \end{bmatrix}, \quad \begin{vmatrix} a & b \\ c & d \end{vmatrix} = ad - bc$$

$$\rightarrow x = \frac{\begin{vmatrix} l & b \\ m & d \end{vmatrix}}{\begin{vmatrix} a & b \\ c & d \end{vmatrix}} = \frac{ld - bm}{ad - bc}, \quad y = \frac{\begin{vmatrix} a & l \\ c & m \end{vmatrix}}{\begin{vmatrix} a & b \\ c & d \end{vmatrix}} = \frac{am - lc}{ad - bc}$$

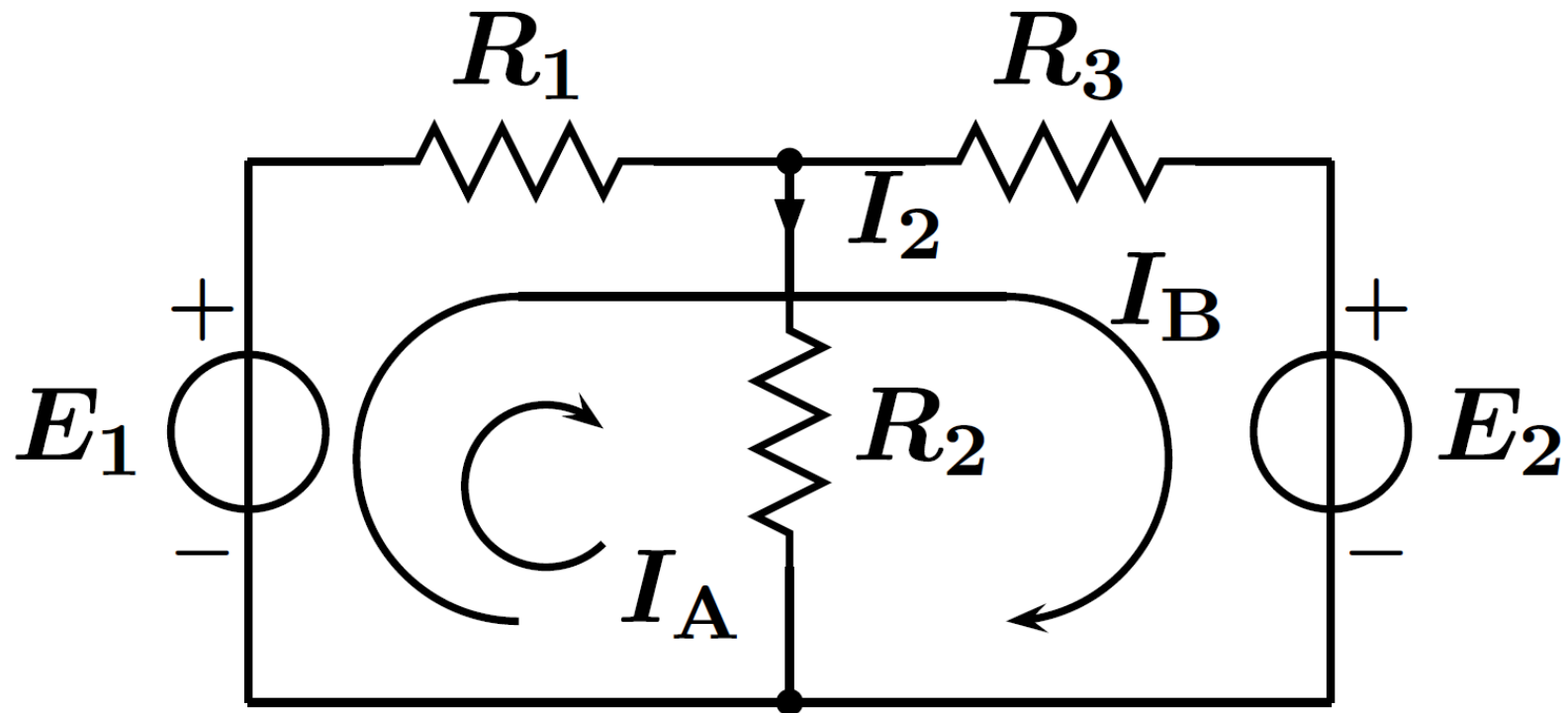
# Quiz 5-1

- Formulate a matrix equation wrt  $I_A$  and  $I_B$  by formulating Kirchhoff's voltage laws across loops A and B.



## Quiz 5-2

- Formulate a matrix equation wrt  $I_A$  and  $I_B$  based on the heuristic way.



# Quiz 6

- Formulate a matrix equation heuristically for voltages at points A and B denoted as  $U_A$  and  $U_B$ .

