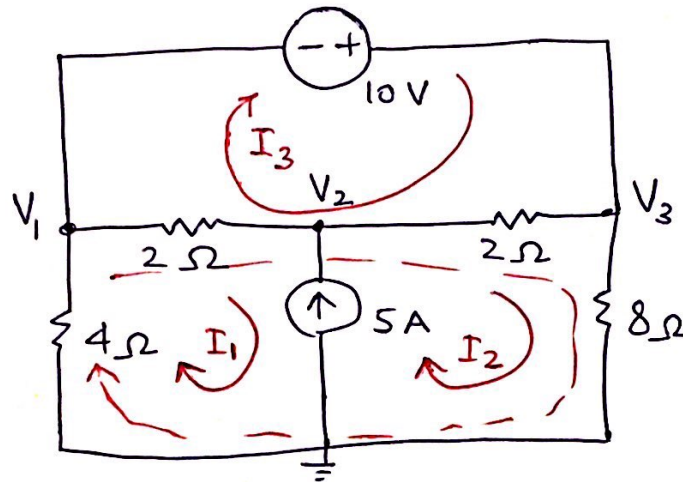# Prob: Mesh Analysis

Determine node voltages V_1, V_2 and V_3 using mesh analysis.

Solution:

Assign clockwise mesh currents to each mesh. Make a "supermesh" by considering mesh '1' and '2' together. Draw a broken line to show "supermesh".

— Apply KVL to "supermesh" and remaining meshes.

$$4I_1 + 2(I_1 - I_3) + 2(I_2 - I_3) + 8I_2 = 0 \quad \text{——①}$$

— Apply KVL to mesh "3";

$$2(I_3 - I_1) - 10 + 2(I_3 - I_2) = 0 \quad \text{——②}$$

— The third required information is:

$$\text{Constraint} \Rightarrow I_2 - I_1 = 5 \quad \text{——③}$$

— By solving ①, ② and ③

$$I_1 = -\frac{30}{12} A, \quad I_2 = \frac{30}{12} A \quad \text{and} \quad I_3 = \frac{30}{12} A$$

So $V_1 = 10$ volts

$V_2 = 20$ volts

$V_3 = 20$ volts

Note: No current flows thru $2\,\Omega$ between V_2 and V_3.