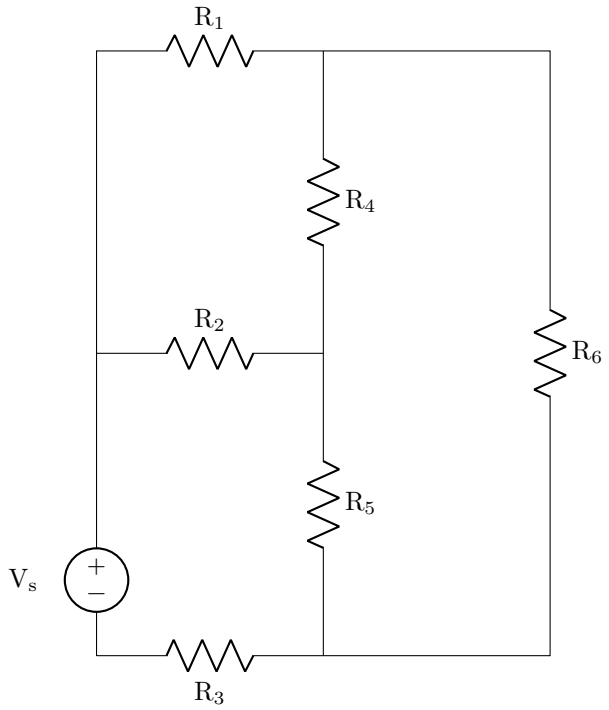
1. Given the circuit below:



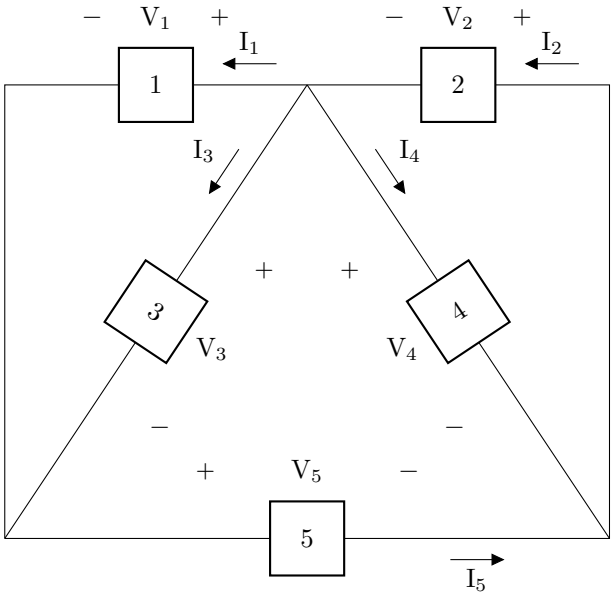
(a) Identify the number of branches, the number of nodes, and the number of meshes.

Branches = 7 Nodes = 5 Meshes = 3

(b) Which resistors, if any, are in series with other resistors?

(A) R1 (B) R2 (C) R3 (D) R4 (E) R5 (F) R6

2. Given the following circuit:



(a) How many nodes and meshes are there?

Nodes = 3 Meshes = 3

(b) If V_1 = 36V and V_2 = -18V, use KVL equations to solve for V_3, V_4, and V_5

V_3 = 36.0V V_4 = 18.0V V_5 = -18.0V

(c) If I_1 = -15A, I_2 = -3A, and I_5 = -9A, use KCL equations to solve for I_3 and I_4

I_3 = 6.00 A I_4 = 6.00 A

(d) Determine the power absorbed by each component (confirm that the sum of the powers absorbed must be zero).

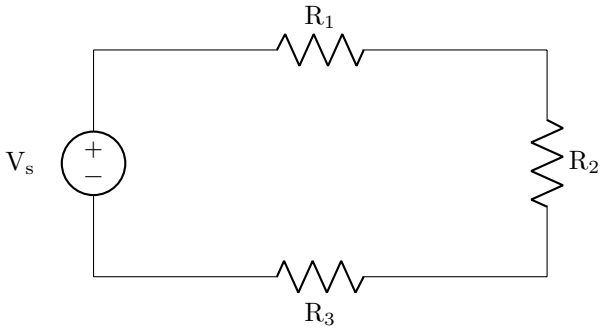
$P_1 =$ -540W $P_2 =$ 54 W $P_3 =$ 216 W

$P_4 =$ 108 W $P_5 =$ 162W

(e) Using the definition of parallel, which sets of components are in parallel?

Parallel = 1+3 and 2+4

3. Given the following circuit:



(a) How many nodes and meshes are there?

Nodes = 4 Meshes = 1

(b) Is the circuit series, parallel, or neither?

(A) Series (B) Parallel (C) Neither

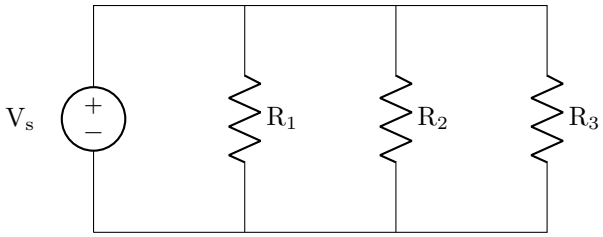
(c) If $V_s = 24\text{V}$ and $R_1 = R_3 = 1\Omega$, what value of R_2 will make the current coming out of the voltage source equal 2A?

$R_2 =$ 10.0 Ω

(d) If $V_S = 24\text{V}$ and $R_1 = R_3 = 1\Omega$, what new value of R_2 will make the voltage across R_2 equal 16V?

$R_2 =$ 4.00 Ω

4. Given the following circuit:



(a) How many nodes and meshes are there?

Nodes = 2 Meshes = 3

(b) Is the circuit series, parallel, or neither?

(A) Series (B) Parallel (C) Neither

(c) If $V_s = 36\text{V}$, $R_1 = 9\Omega$ and $R_2 = 12\Omega$, what value of R_3 will make the current coming out of the voltage source equal to 13A?

$R_3 =$ 6.005Ω

(d) Given $R_1 = 9\Omega$, $R_2 = 3\Omega$, the current through R_1 is 6A, and the source current is 33A, find the new value for V_s, R_3, and the currents through R_2 and R_3.
(*Hint:* $48V < V_s < 66V, 8A < I_3 < 11A$)

$V_s =$ 54.0V $R_3 =$ 6.00Ω $I_2 =$ 18.0A $I_3 =$ 9.00A