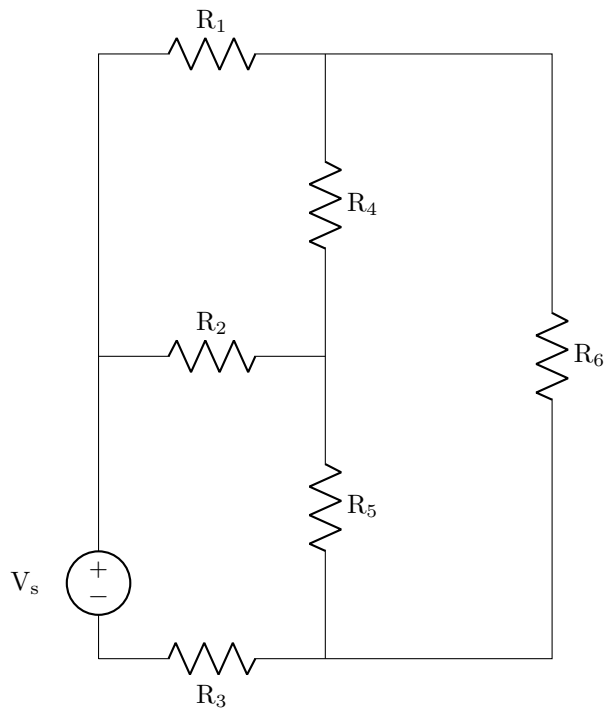1. Given the circuit below:
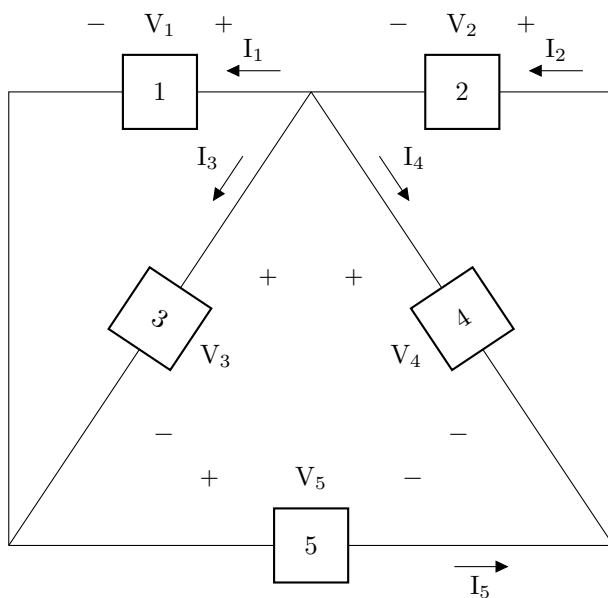

   (a) Identify the number of branches, the number of nodes, and the number of meshes.

   Branches = [ ]   Nodes = [ ]   Meshes = [ ]

   (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 = [ ]   Meshes = [ ]

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

$V_3 = $ [ ] $V_4 = $ [ ] $V_5 = $ [ ]

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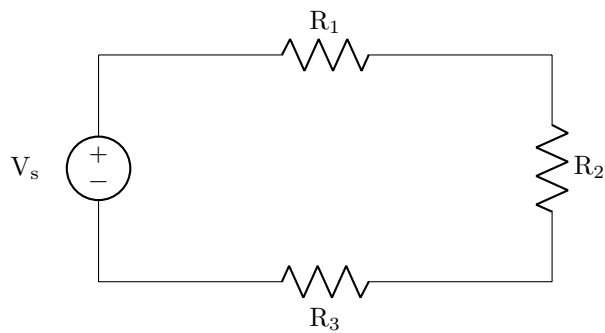
$I_3 = $ [ ] $I_4 = $ [ ]

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

$P_1 = $ [ ] $P_2 = $ [ ] $P_3 = $ [ ]

$P_4 = $ [ ] $P_5 = $ [ ]

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

Parallel $= $ [ ]

3. Given the following circuit:

(a) How many nodes and meshes are there?

$$\text{Nodes} = \boxed{} \qquad \text{Meshes} = \boxed{}$$

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

(A) Series   (B) Parallel   (C) Neither
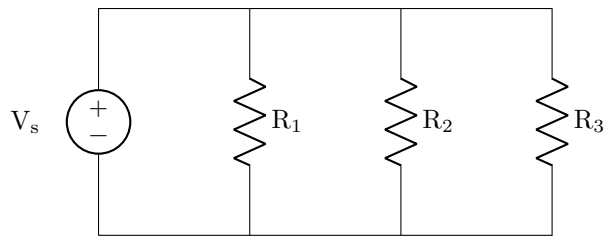
(c) If $V_s = 24\text{V}$ and $R_1 = R_3 = 1\Omega$, what value of R_2 will make the current coming out of the voltage source equal 2A?

$$R_2 = \boxed{}$$

(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?

$$R_2 = \boxed{}$$

4. Given the following circuit:

(a) How many nodes and meshes are there?

$$\text{Nodes} = \boxed{} \quad\quad \text{Meshes} = \boxed{}$$

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

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

(c) If $V_s = 36$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?

$$R_3 = \boxed{}$$

(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 = $ [ ] $R_3 = $ [ ] $I_2 = $ [ ] $I_3 = $ [ ]