Note: **Do not use Mesh or Node analysis.** This homework set is meant to give you practice in using KVL, KCL, Ohm’s law and the passive sign convention. All of your solutions should be neat and indicate which loop or node you are writing the equation for followed by the equation with variable, then one with numbers.

**Problem 1**

Using the passive sign convention, mark the polarity of the current source and the direction of current flow through the voltage source and resistors.

![Circuit Diagram](image)

**Problem 2**

Given:
- $i_1 = -1 \text{ mA}$
- $i_3 = 0.5 \text{ mA}$
- $i_6 = 0.2 \text{ mA}$

Find:
Write KCL equations for nodes A, B, C, and D.
Solve for: $i_2, i_4,$ and $i_5$
Use the extra equation to check your work.

**Problem 3**

Given:
- $v_1 = 5 \text{ V}$
- $v_2 = -3 \text{ V}$
- $v_4 = 10 \text{ V}$

Find:
Write KVL equations for all three loops
Solve for: $v_3,$ and $v_5$
Use the extra equation to check your work
**Problem 4**

Given:
\[ V_s = 30 \text{ V}, \quad R_1 = 100 \, \Omega, \]
\[ R_2 = 200 \, \Omega, \quad R_3 = 300 \, \Omega \]

Find:
- Ohm’s law equations for each resistor.
- Write KVL equations for all loops
- Write KCL equations for all nodes
- Solve for \( i_{VS}, i_{R1}, i_{R2}, i_{R3}, v_{R1}, v_{R2}, v_{R3} \)

**Problem 5**

Using KCL, KVL and Ohm’s Law:

Given:
\[ V_s = 30 \text{ V} \]
\[ R_1 = 500 \, \Omega, \quad R_2 = 500 \, \Omega, \quad R_3 = 500 \, \Omega \]

Find:
1. The voltage across each resistor
2. The current through each resistor
3. The power added by the source
4. The power dissipated by each resistor.
5. Is the power added by the source equal to the sum of the power dissipated by the resistors?

**Problem 6**

1. Solve for \( I_1, I_2 \) and \( I_3 \)
2. Show that KCL is valid for the supernode.