1. (a) (10 points)

For the circuit shown, write three independent equations for the node voltages \( v_1, v_2, \) and \( v_3 \). The quantity \( i_x \) must not appear in the equations.

(b) (10 points)

Make a consistency check on your equations by setting one or more resistor values to 0 or \( \infty \) and setting other sources and resistor to values for which \( v_1, v_2, \) and \( v_3 \) are obvious.

(c) (10 points)

For the circuit shown, write three independent equations for the three mesh currents \( i_1, i_2, \) and \( i_3 \). The quantity \( v_1 \) must not appear in the equations.

(d) (10 points)

Make a consistency check on your equations by setting one or more sources to zero and using convenient resistor and source values.
2. (30 points)

Find the Thevenin's equivalent circuit at terminals a-b. Hint: Use node voltage method to find \( v_{\text{th}} \).

3. (30 points)

Calculate the power furnished or absorbed by the 30V voltage source, and state whether it is furnished or absorbed.