Question 1) For the circuit in picture,
a) what is the minimum number of mesh (or loop) equations required to find all branch currents in the circuit. Arrange the mesh equations in a matrix form.
b) What is the minimum number of node equations required to solve for all voltages across the components of the circuit. Arrange the node equations in a matrix form.
c) Which method (mesh or node) do you think is more computationally efficient for this circuit.
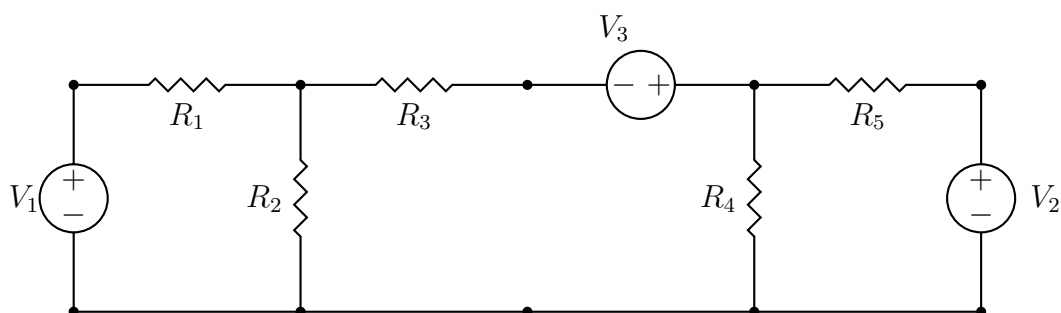

Figure 1: Circuit for Question 1

Question 2) Let the current through resistor R_j be i_j. Find the values of i_j in the circuit shown below.
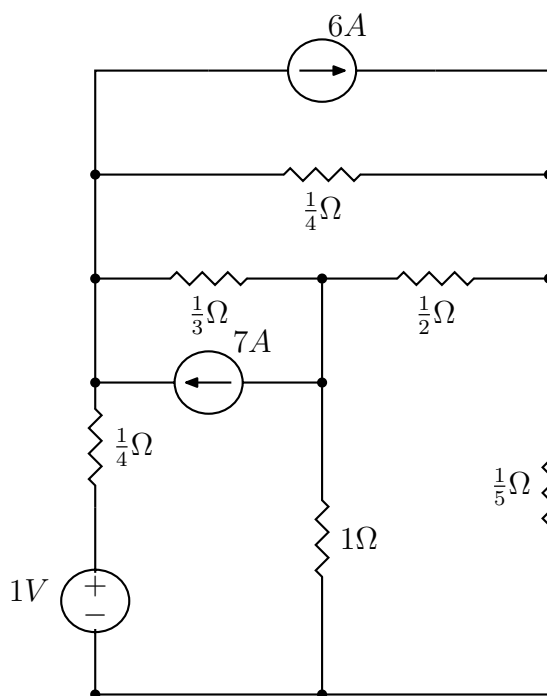

Figure 2: Circuit for Question 2

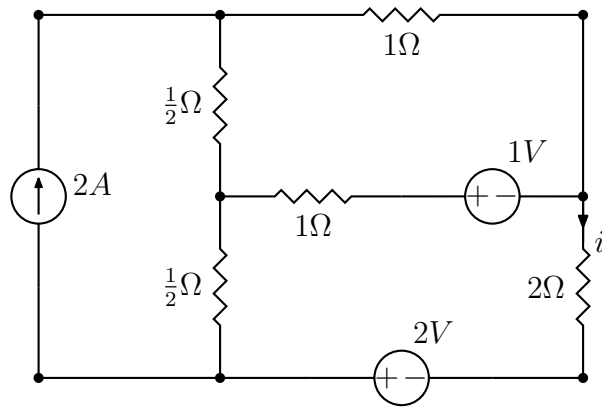**Question 3)** In Figure 3, find the current i through the 2Ω resistor using loop analysis.
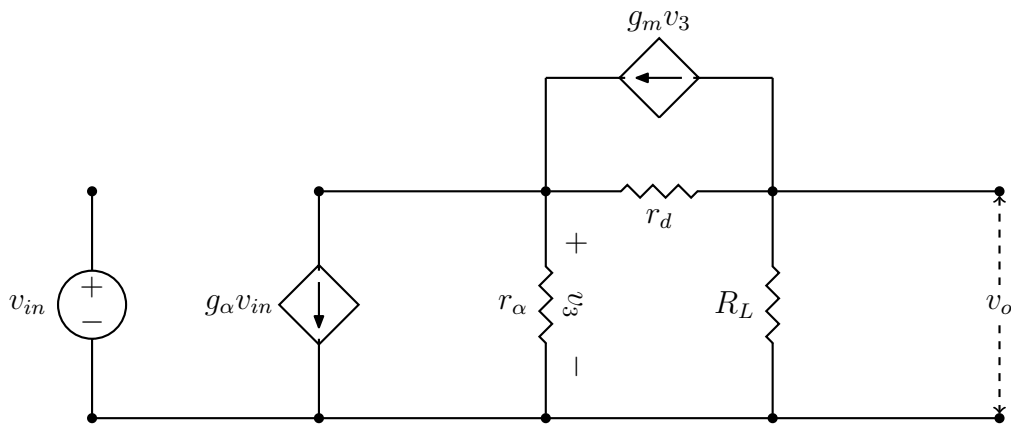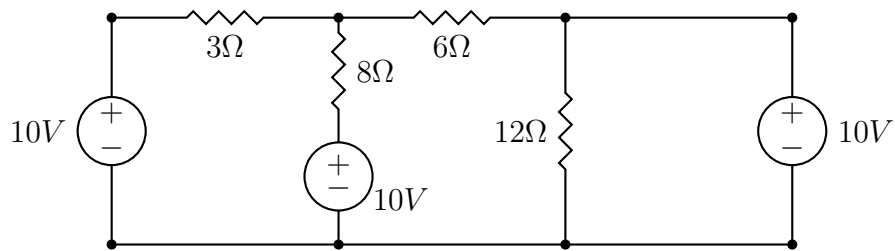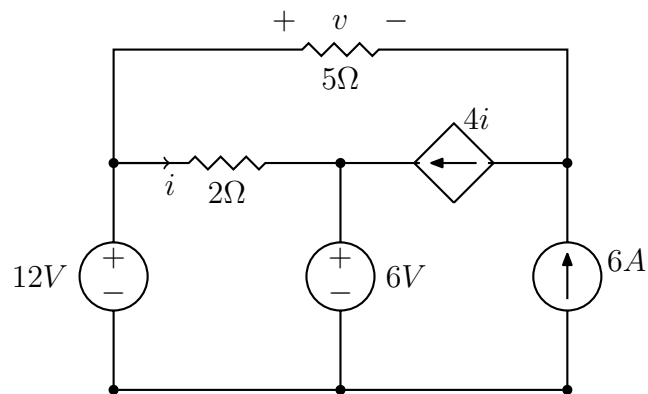
Figure 3: Circuit for Question 3

Question 4) Find the voltage gain, i.e. $\frac{v_o}{v_{in}}$ from the circuit below.

Question 5) Determine the currents that flow in each resistor using superposition theorem.

Question 6) Determine i and v using superposition theorem.

Question 7) Solve the problem in Question 2 using mesh analysis(if you have used node analysis there).