Chapter 2 Problems

1) Find $i$ and $V_o$ in the circuit below. This is to practice calculating $R_{eq}$ for different purposes – first collapsing the circuit to a single $R_{eq}$ value and then expanding it back out gradually to find $V_o$.

![Circuit 1](image1.png)

2) Calculate the equivalent resistance, $R_{ab}$, at terminals a-b for the circuit below.

![Circuit 2](image2.png)
3) Calculate the equivalent resistance, $R_{ab}$, at terminals a-b for the circuit below.

![Circuit Diagram](image)

**Problem 4 (related to Lab 2)**
Assume you have built the circuit below in lab, and are going to use the multi-meter, as a voltmeter to measure the voltage across different branches in the circuit.

**4a)** Calculate the value of $i$ and $V_{ab}$ without a voltmeter in the circuit.

**4b)** If you were to measure $V_{ab}$ across the 2Ω resistor, what affect would the voltmeter have on your measurement if the internal resistance of the voltmeter were: 0Ω? 2Ω? 10MΩ?

**4c)** Without the voltmeter in the circuit, what is the current, $i$? Now assuming the voltmeter is attached across the 2Ω resistor, state if the current in the circuit would increase, decrease, or remain essentially unchanged, if the voltmeter’s internal resistance were to be: 0Ω, 2Ω, or 10MΩ.

![Circuit Diagram](image)

**Problem 5 (related to Lab 2)**
Assume you have built the circuit below in lab, and are going to use the multi-meter, as an ammeter to measure the current through different branches in the circuit.

**5a)** Without the ammeter in the circuit, calculate the current $i_1$ and the voltage, $v_o$.

**5b)** If you were to measure $i_1$, what affect would the ammeter have on your measurement if the internal resistance of the ammeter were: 0Ω? 9kΩ? 10MΩ? Calculate the numerical value of $i_1$ in each case.
5c) Assuming the ammeter is inserted such that $i_1$ will be measured, determine if the voltage $v_o$ in the circuit would increase, decrease, or remain essentially unchanged, if the ammeter’s internal resistance were to be: 0Ω, 9kΩ, 10MΩ. Calculate the numerical value of $v_o$ in each case.