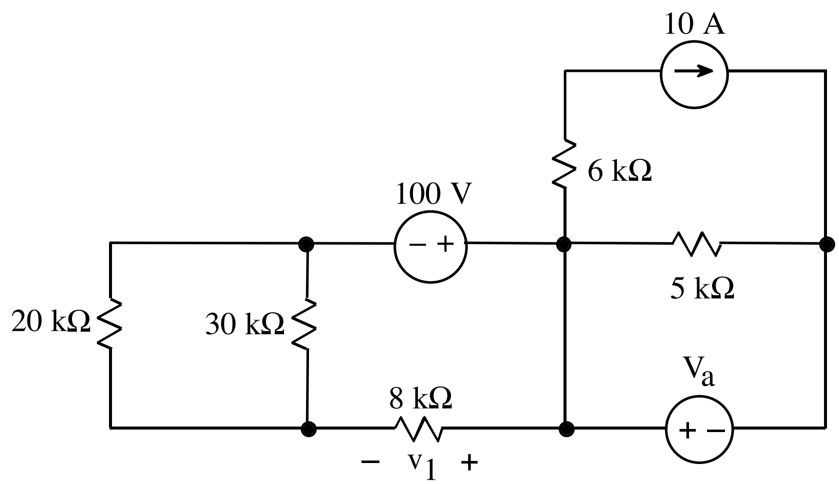
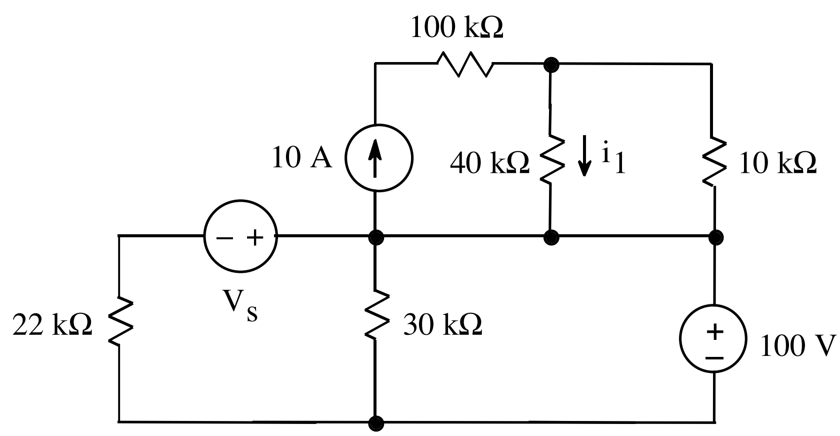
1.

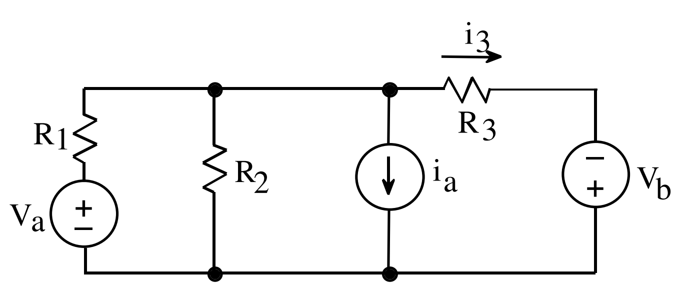


a. Calculate v_1.



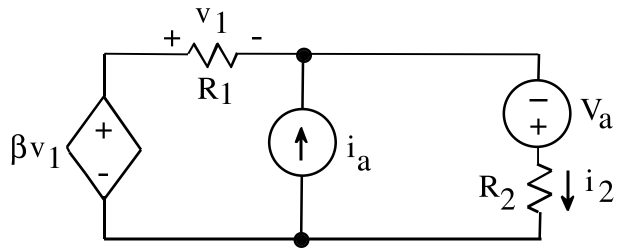
b. Calculate i_1.

2.



Derive an expression for i_3. The expression must not contain more than the circuit parameters V_a, V_b, i_a, R_1, R_2, and R_3.

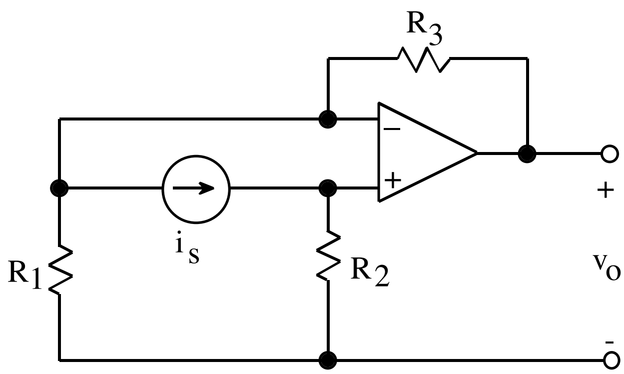
3.



a. Derive an expression for i_2. The expression must not contain more than the circuit parameters ß, V_a, i_a, R_1, and R_2.

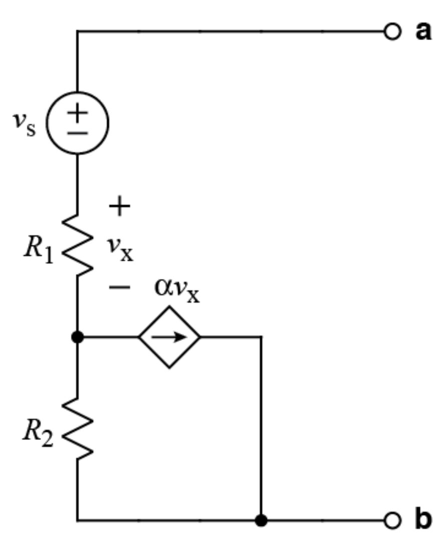
b. Make at least one consistency check (other than a units check) on your expression. Explain the consistency check clearly.

4.



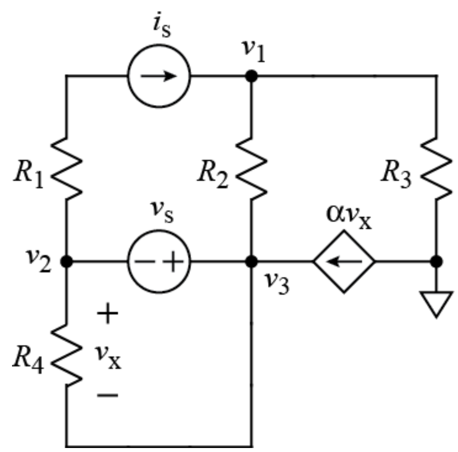
The op amp operates in the linear mode. Using an appropriate model of the op amp, derive an expression for v_o in terms of not more than i_s, R_1, R_2, and R_3.

5.



Find the Thevenin equivalent circuit at terminals **a** and **b**. v_x must not appear in your solution. **Note:** $\alpha \neq 0$.

6.



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

b) Make a consistency check on your equations for part (a) by setting resistors and sources to numerical values for which the values of v_1, v_2, and v_3 are obvious. State the values of resistors, sources, and node-voltages for your consistency check, and show that your equations for part (a) are satisfied for these values. (In other words, plug the values into your equations for part (a) and show that the left side and the right side of each equation are equal.)