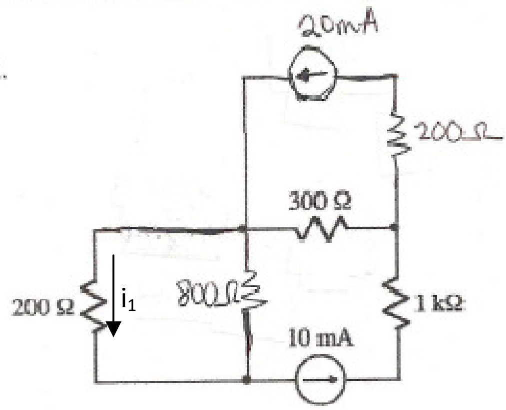
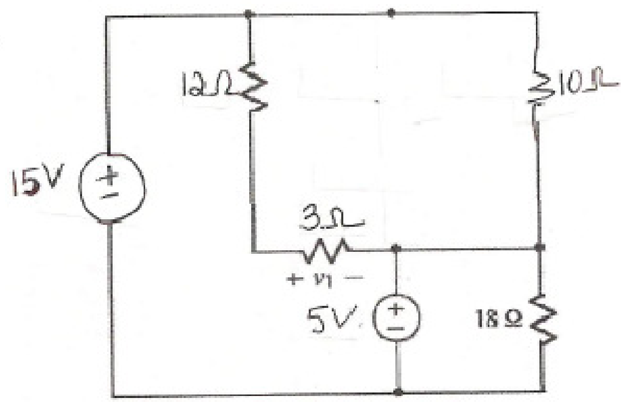
1.



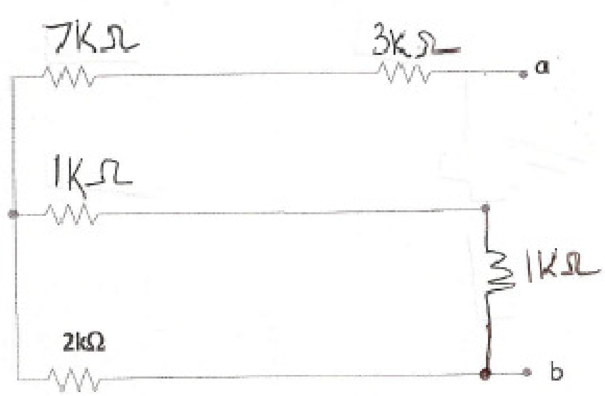
Calculate i_1.

2.

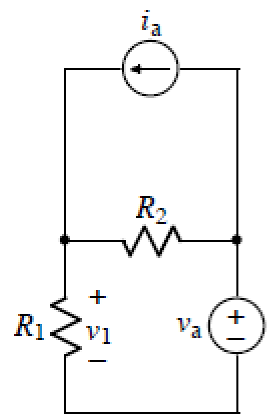


Calculate v_1.

3. Find the value of total resistance between terminals **a** and **b**.



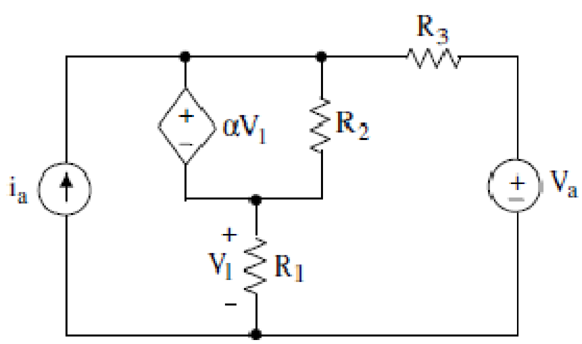
4.



Derive an expression for v_1. The expression must not contain more than the circuit parameters i_a, v_a, R_1, and R_2.

5. Derive an expression using the circuit in Problem #4 above for the power through R2 resistor. The known values are i_a,V_a, R_1, and R_2.

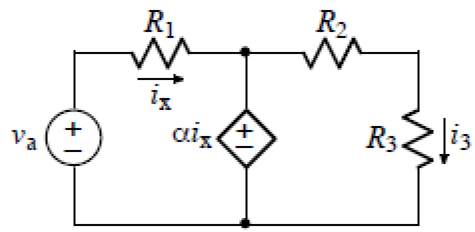
6.



Derive the expression for V_1 containing not more than circuit parameters α, R_1, R_2, R_3, V_a, and i_a.

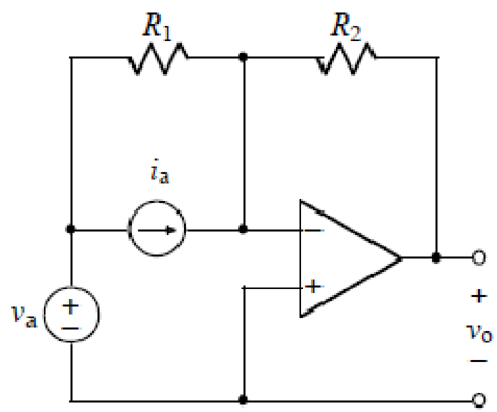
7. Using the circuit shown in Problem #6, derive an expression for the power through R2. The known values are α, i_a,V_a, R_1, R_2 and R_3.

8.



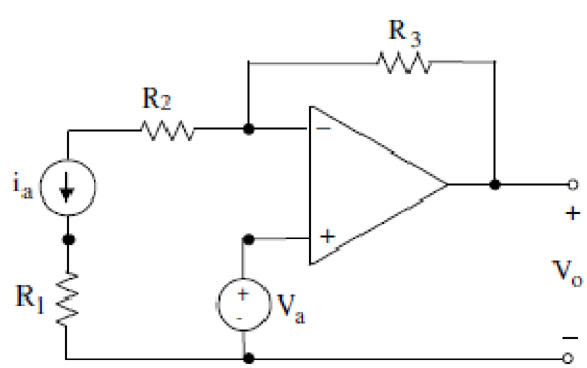
Derive an expression for i_3. The expression must not contain more than the circuit parameters α, v_a, R_1, R_2, and R_3. **Note:** $\alpha > 0$.

9.



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_a, v_a, R_1, and R_2.

10.



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_a, R_1, R_2, R_3, and V_a.