1. Calculate $v_1$.

2. Calculate $i_1$. 

Calculate $v_1$.

Calculate $i_1$. 
3. Derive an expression for $v_1$. The expression must not contain more than the circuit parameters $v_a, i_a, R_1, R_2,$ and $R_3$.

4. a) Derive an expression for $i_1$. The expression must not contain more than the circuit parameters $\alpha, v_a, R_1,$ and $R_2$. **Note:** $\alpha \neq 0$.

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

5. 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 $v_s, i_s, R_1, R_2, R_3,$ and $R_4$. 