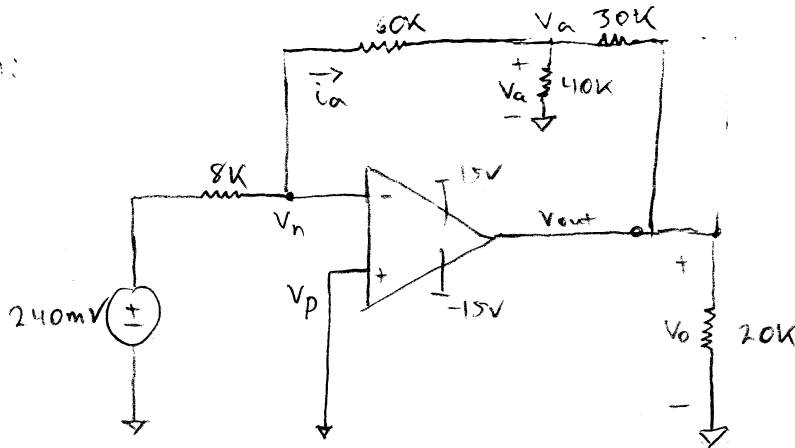


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Given:



Find: a) i_a
b) V_a
c) V_o
d) i_o

Solution:

$$\text{at } V_n: \frac{V_n - 240\text{mV}}{8\text{K}} + \frac{V_n - V_a}{60\text{K}} + \cancel{I_n} = 0$$

$$\text{at } V_a: \frac{V_a - V_n}{60\text{K}} + \frac{V_a}{40\text{K}} + \frac{V_a - V_o}{30\text{K}} = 0$$

$$\text{at } V_o: \frac{V_o - V_a}{30\text{K}} + \frac{V_o}{20\text{K}} + I_{out} = 0$$

$$1. V_n \left(\frac{1}{8\text{K}} + \frac{1}{60\text{K}} \right) + V_a \left(-\frac{1}{60\text{K}} \right) = \frac{240\text{mV}}{8\text{K}}$$

$$2. V_n \left(-\frac{1}{60\text{K}} \right) + V_a \left(\frac{1}{60\text{K}} + \frac{1}{40\text{K}} + \frac{1}{30\text{K}} \right) + V_o \left(-\frac{1}{30\text{K}} \right) = 0$$

$$3. V_n (0) + V_a \left(-\frac{1}{30\text{K}} \right) + V_o \left(\frac{1}{30\text{K}} + \frac{1}{20\text{K}} \right) + I_{out} = 0$$

$$\text{constraint: } \frac{V_n - V_a}{60\text{K}} - I_a = 0$$

$$\text{constraint: } \frac{V_o - V_a}{30\text{K}} - I_{out} = 0 \quad ?$$

$$I_{out} = \frac{V_o - V_a}{30}$$