

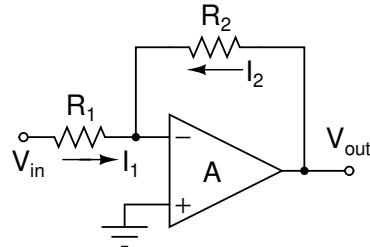
Homework 7

Name: _____

Total of 4 problems.

Problem 1 (5 points)

Derive the gain expression (G) for a non-ideal inverting amplifier (see the figure) with a correction due to a finite open loop gain of an OpAmp (A).



Problem 2 (5 points)

Show that in the above problem the inverting input potential is close to the non-inverting input potential, i.e. $V_- \approx V_+$, for the large, compared to G_{ideal} , values of A .

Problem 3 (5 points)

Derive the expression for the output impedance Z_{out} for an inverting amplifier based on an ideal OpAmp ($A \rightarrow \infty$, $R_{input_{internal}} \rightarrow \infty$, and $R_{out_{internal}} \rightarrow 0$). I.e. find the equivalent Thevenin resistance. Assume that you know V_{in} , R_1 , and R_2 .

Hint: imagine different load resistors (R_{load}) connected to the output and see what is the current (I_{load}) running through them. What does it tell about output impedance (Z_{out})?

Problem 4 (5 points)

Derive the expression for the input impedance (Z_{in}) for an inverting amplifier based on an ideal OpAmp ($A \rightarrow \infty$, $R_{input_{internal}} \rightarrow \infty$, and $R_{out_{internal}} \rightarrow 0$). Recall that it can be expressed as V_{in}/I_{in} , where I_{in} is the current sourced to or consumed by the amplifier.