ECE 3510 homework AF2 Due: Thur, 12/8 May be handed in Tue, 12/13 for full credit b

Find your textbook from your electronics class (ECE 2280 here at the U). Find the chapter or section which covers feedback in amplifiers. Read the sections covering bandwidth or frequency response, noise reduction, distortion reduction and gain reduction.

1. Show that the low-frequency 3dB roll-off point = $\omega_{Lf} = \dfrac{\omega_L}{1 + A_o \cdot B}$

   where:
   A_o = Midband gain of basic amplifier
   B = the feedback factor
   ω_L = Low-frequency 3dB roll-off point of basic amplifier
   ω_{Lf} = Low-frequency 3dB roll-off point with feedback

   Note: To do this, you'll take the basic open-loop amplifier transfer function and use it to write the closed-loop transfer function. Unfortunately the result is pretty messy and it can be hard to see what you can reasonably leave out to approximate the closed-loop transfer function.

   A much easier approach is to pretend the basic amplifier doesn't have a high-frequency roll-off and eliminate the high-frequency pole from it's transfer function before you write the closed-loop transfer function. This is reasonable to do because the high-frequency roll-off will have very little effect on the low-frequency roll-off point.

2. Draw the ideal series-shunt feedback topology. You may leave out the output impedance (or source resistance) of the input voltage and the input impedance of the feedback network. By "leave out" you may consider them to be zero and ∞, respectively.

3. Show that the input resistance with feedback is: $R_{if} = \left(1 + A_o \cdot B\right) \cdot R_i$

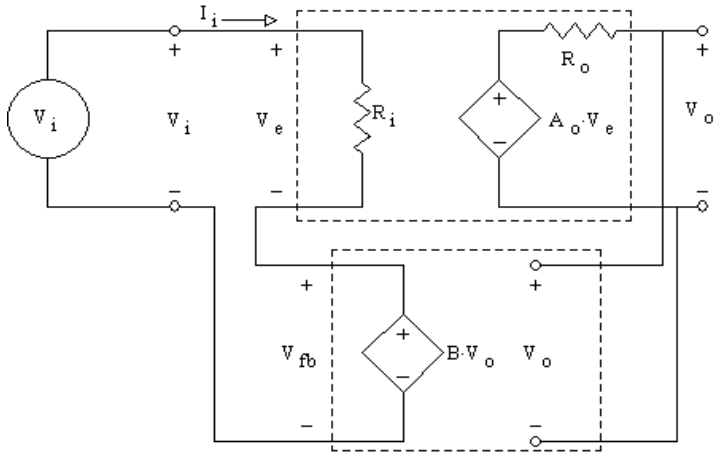
   where:
   A_o = the open-loop amplifier gain
   R_i = the open-loop input resistance
   B = the feedback factor

4. Show that the output resistance with feedback is: $R_{of} = \dfrac{R_o}{\left(1 + A_o \cdot B\right)}$

   R_o = the open-loop output resistance

Answers

2.



ECE 3510 homework # M1 Requires action on Tue, 12/6 Due Thur, 12/8

Go to ME Design day in the Union on Thursday, 12/6 sometime from 11:00 to 3:00.
See http://mech.utah.edu/newsroom/design-day/

Write **several paragraphs** about what you see there. Especially:

1. Note control systems and/or systems with feedback.
2. Tell which senior project most impressed you and why.
3. Observe at least part of one of the competitions (main mechatronics robot competition, 1:00 - 3:00) and write at least one paragraph about it (suggest improvements).