Hambley Problems Problem Set 3

1.67. The circuit shown in Figure P1.67 is the electrical model for an electronic megaphone, in which the 8-Ω resistance models a loudspeaker, the source V_x and the 5-kΩ resistance represent a microphone, and the remaining elements model an amplifier. Given that the power delivered to the 8-Ω resistance is 8 W, determine the current circulating in the right-hand loop of the circuit. Also, determine the value of the microphone voltage V_x.

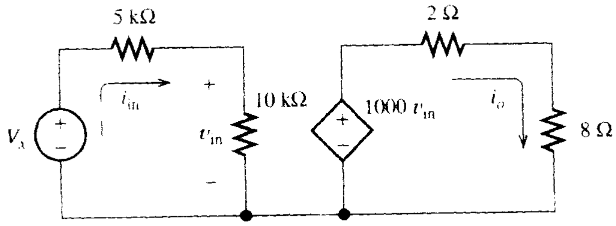

Figure P1.67

***P14.32.** Consider the amplifier shown in Figure P14.32. Find an expression for the output current i_o. What is the input impedance? What is the output impedance seen by R_L?

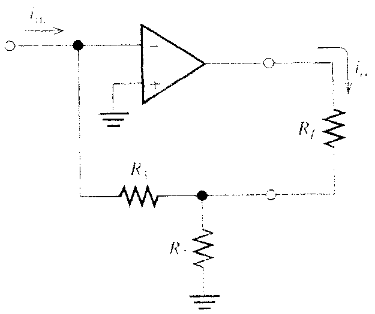

Figure P14.32

P2.80. An automotive battery has an open-circuit voltage of 12.6 V and supplies 100 A when a 0.1-Ω resistance is connected across the battery terminals. Draw the Thévenin and Norton equivalent circuits, including values for the circuit parameters. What current can this battery deliver to a short circuit? Considering that the energy stored in the battery remains constant under open-circuit conditions, which of these equivalent circuits is more realistic? Explain.

P14.12. Consider the inverting amplifier shown in Figure P14.12, in which one of the resistors has been replaced with a diode. Assume an ideal op amp, v_{in} positive, and a diode current given by Equation 10.4, which states that $i_D = I_s$

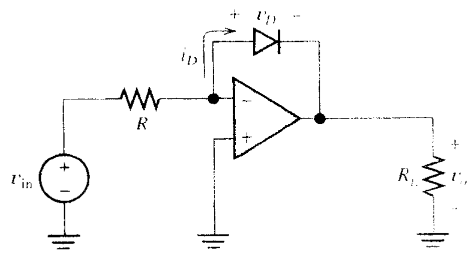

Figure P14.12

P14.34. The circuit shown in Figure P14.34 employs negative feedback. Use the summing-point constraint (for both op amps) to derive expressions for the voltage gains $A_1 = v_{o1}/v_{in}$ and $A_2 = v_{o2}/v_{in}$.