PROBLEM SET #2

Issued: Friday, August 31, 2018

Due: Friday, September 07, 2018, 12:00 noon via **Gradescope**.

1. Sedra & Smith, Problem 2.78

2. Sedra & Smith, Problem 2.84

3. Sedra & Smith, Problem 2.87

4. Sedra & Smith, Problem 2.93

5. Derive an expression for the current I_L in terms of I_S, R_1, and R_2 for the circuit in Figure PS2.1. Calculate the input and output resistance of this circuit if the OpAmp is ideal.

6. Find expressions for the voltage v_{o1} and v_{o2} in terms of v_s, R_1, R_2, and R_3 for the circuit in Figure PS2.2. The OpAmps are ideal.

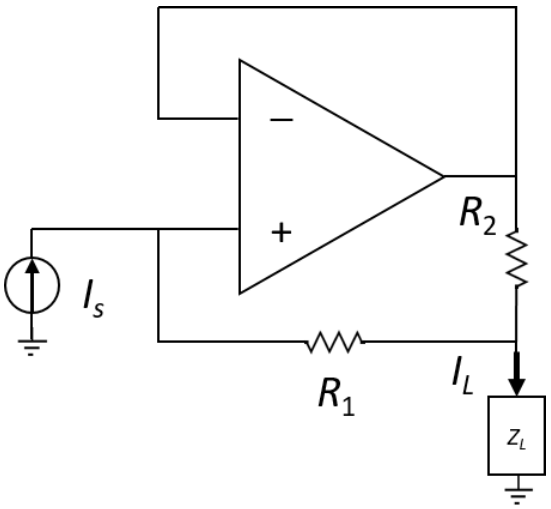

Figure PS2.1

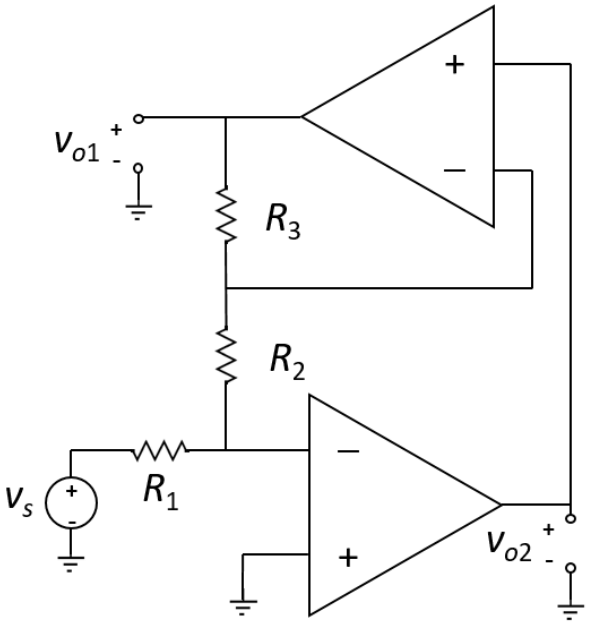

Figure PS2.2

7. Create a SPICE netlist for the circuit shown in Figure PS2.3 by following the procedures described in the handout "HSPICE Tutorial". Run a transient analysis. Attach the plot of V_{out} and I_{Diode} versus time for 5 periods.

(a) What is the magnitude of the peak-to-peak voltage ripple across the load resistor R_L?

(b) What is the peak current drawn through the diode?

(c) Suppose that the load resistor R_L and the input voltage are fixed, but the value of capacitor C varies. What value of capacitance C would you choose to reduce the output ripple to

$0.5V \pm 0.01V$ peak-to-peak? (Estimate using hand analysis before you verify with simulation. Show your hand analysis.)

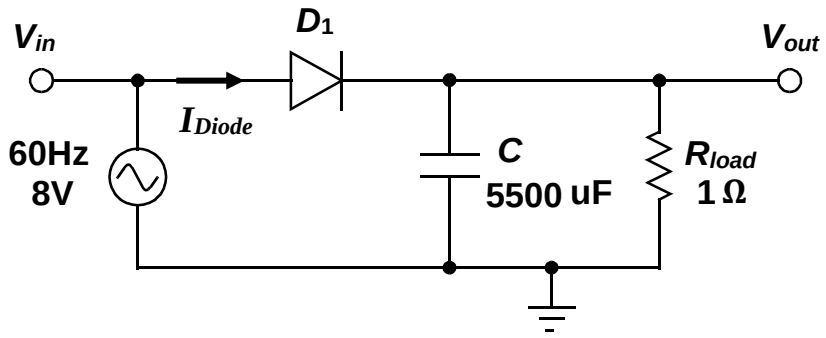

Figure PS2.3