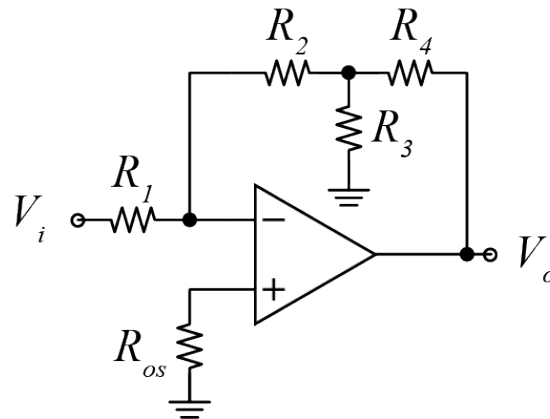


**PROBLEM SET #4**

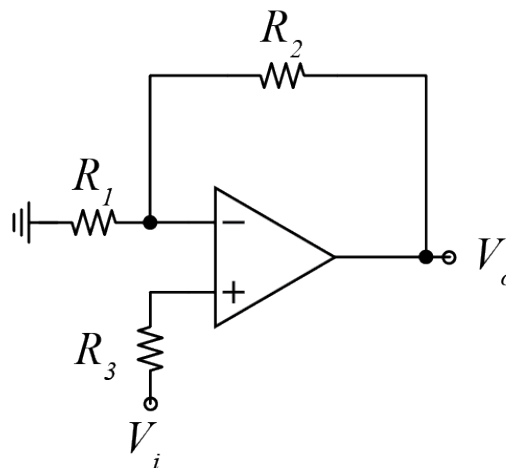
Issued: Friday, September 20, 2019

Due: Friday, September 27, 2019, 12:00 noon via **Gradescope**.

1. Sedra & Smith, Problem 2.98
2. Sedra & Smith, Problem 2.119
3. Sedra & Smith, Problem 2.120
4. Sedra & Smith, Problem 3.4
5. In the following circuit, find the value of  $R_{os}$  to cancel out the offset due to amplifier bias currents ( $I_B$ ).



6. The op amp in the following circuit has an open-loop gain of 1000, an offset voltage of  $1mV$ , and an input-bias current of  $100nA$  ( $R_1=2K\Omega$ ,  $R_2=100K\Omega$ ,  $R_3=1K\Omega$ ).
  - (a) What would be the output voltage for an op amp with no offset?
  - (b) What is the actual output voltage for the worst-case polarity of offset voltage?
  - (c) What is the percentage error in the output voltage compared to the ideal output voltage?



7. A diode has  $I_S = 10^{-16}A$  and  $n = 1$ .
- (a) What is the diode voltage if the diode current is  $100\mu A$ ?
  - (b) What is the diode voltage if the diode current is  $10\mu A$ ?
  - (c) What is the diode current for  $v_D = 0$ ?
  - (d) What is the diode current for  $v_D = -0.05V$ ?
  - (e) What is the diode current for  $v_D = 0.8V$ ?