ECEN 457 (ESS)
Fall '15

Due: October 1, 2015

HOMEWORK ASSIGNMENT #3

Undergraduate students submit only two problems

5.6 The circuit of Fig. P5.6 exploits the matching properties of dual op amps to minimize the overall input current I_I. (*a*) Find the condition between R_2 and R_1 that yields $I_I = 0$ when the op amps are perfectly matched. (*b*) What if there is a 10% mismatch between the I_{BS} of the op amps?

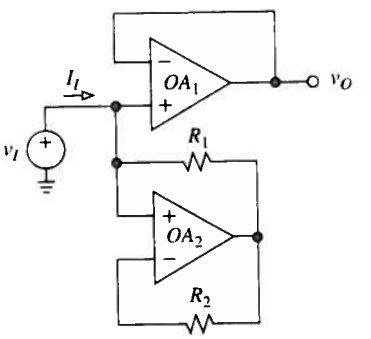

FIGURE P5.6

5.33 Figure P5.33 shows a widely used test fixture to characterize the op amp referred to as *device under test* (DUT). The purpose of OA_2, which is assumed ideal, is to keep DUT's output near 0 V, or in the middle of the linear region. Find V_{OSO}, I_P, I_N, I_B, I_{OS}, and the gain a for the DUT, given the following measurements: (*a*) $v_2 = -0.75$ V with SW_1 and SW_2 closed and $v_1 = 0$ V; (*b*) $v_2 = +0.30$ V with SW_1 closed, SW_2 open, and $v_1 = 0$ V; (*c*) $v_2 = -1.70$ V with SW_1 open, SW_2 closed, and $v_1 = 0$ V; (*d*) $v_2 = -0.25$ V with SW_1 and SW_2 closed, and $v_1 = -10$ V.

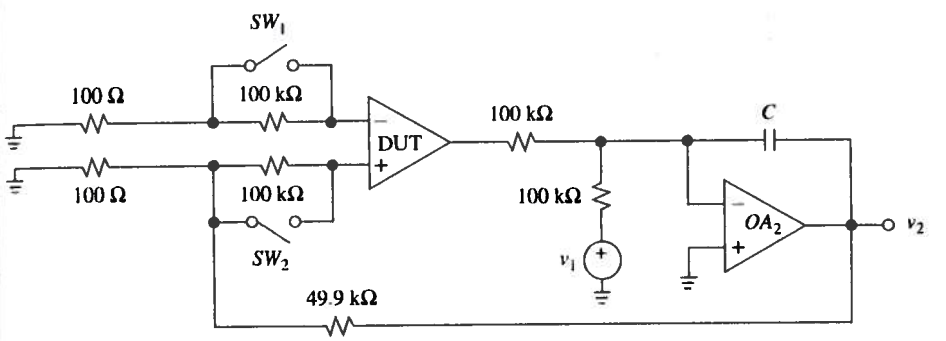

FIGURE P5.33

2.46 The gain of the dual-op-amp IA of Fig. P2.46 (see *EDN*, Feb. 20, 1986, pp. 241–242) is adjustable by means of a single resistor R_G. (*a*) Show that $v_O = 2(1 + R/R_G)(v_2 - v_1)$. (*b*) Specify suitable components to make A variable from 10 V/V to 100 V/V by means of a 10-kΩ pot.

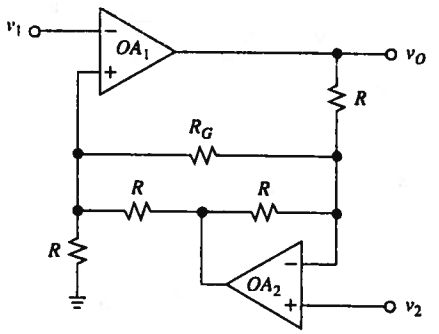

FIGURE P2.46

2.60 Show that the linearized bridge circuit of Fig. P2.60 yields $v_O = -RV_{REF}\delta/(R_1 + R)$. Name a disadvantage of this circuit.