PROBLEM SET #9

Issued: Tuesday, Nov. 10, 2015

Due (at 8 a.m.): Wednesday, Nov. 18, 2015, in the EE 140/240A HW box near 125 Cory.

1. The op amp in the circuit of Fig. PS9.1 has an open-loop gain of 100k and a single-pole roll-off with cut-off frequency $\omega_{3dB}= 10$ rad/s.

    (a) Sketch magnitude and phase Bode plots of the loop transmission

    (b) Find the frequency at which the loop transmission amplitude = 1, and find the corresponding phase margin.

    (c) Find the closed-loop transfer function, including its zeros and poles. Sketch a pole-zero plot. Sketch magnitude and phase Bode plots of the closed-loop circuit and label the important parameters on your sketch, e.g. low frequency gain, pole frequency, overshoot height.
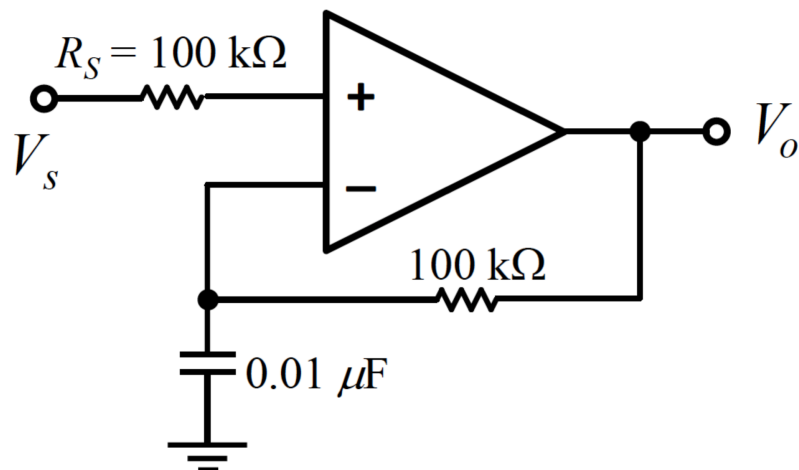

Fig. PS9-1

2. A two-stage op amp has a compensation capacitor connected between the input and the output of its second stage. Assume that the frequency of its second-pole is 60MHz and that this frequency stays constant with changes in the compensation capacitor. Assume the input stage generates a transconductance of 0.775mA/V, and the second stage provides a voltage gain of 100. What is the required size of the compensation capacitor if the phase margin is to be 55° for the feedback configuration as shown in Fig. PS9.2?
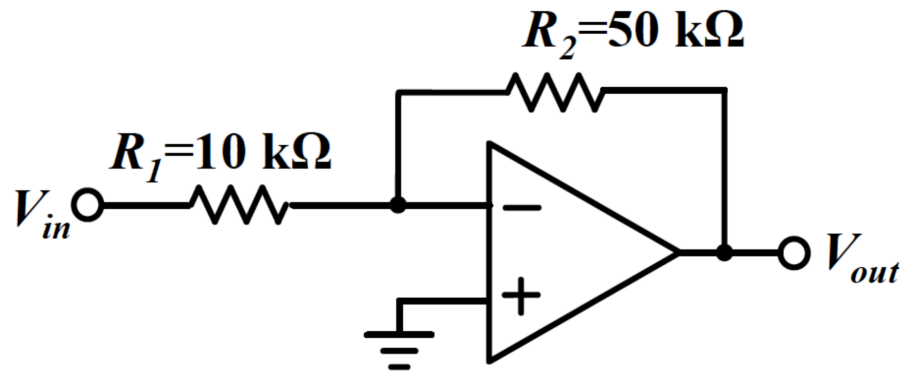

Fig. PS9-2