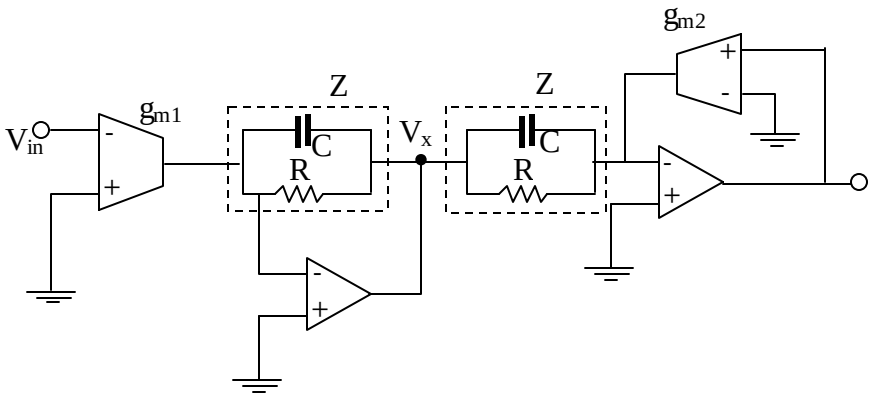
ELEN 458 (ESS) **NAME** _____
Fall 98

EXAM #1

First, please read all the problems and pick the ones you can easily solve. The total point (or %) of this exam is 20 points, plus an extra credit of 2 points. Only one review page is allowed to use in this closed book exam.

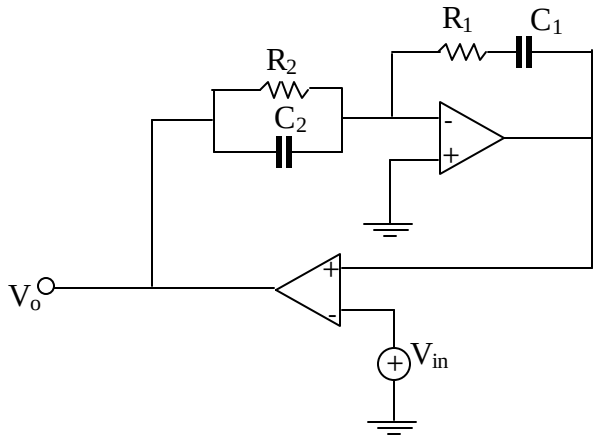
Prob. 1. (4p) Assume ideal components and obtain the simplified expression of the Transfer function $V_o(s)/V_{in}(s)$.



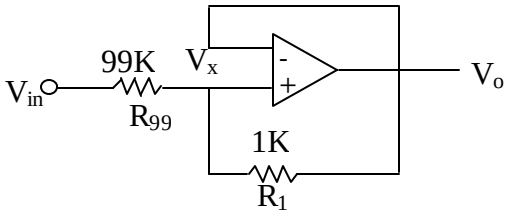
Prob. 2. (4p) (a) Show that the circuit shown below has a transfer function of the form:

$$H(s) = \frac{V_o(s)}{V_{in}(s)} = \frac{K_S}{(s+a)(s+b)}$$

(b) Obtain K, a and b as functions of R_1, C_1, R_2 and C_2.



Prob. 3. (4p) Assume the open loop gain of the Op Amp is characterized as GB/s. If the 3dB of the circuit is 10KHz, determine the value of GB.



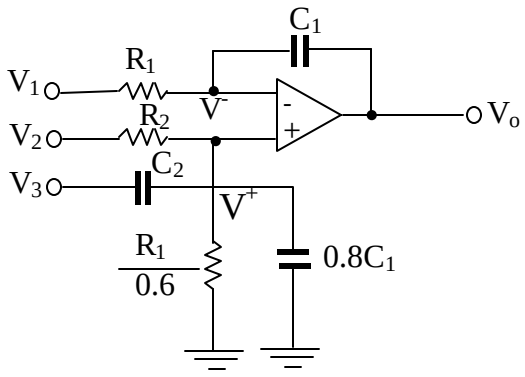
$$A(s)=\frac{GB}{S}$$

Prob. 4 (4p) Using only two Op Amps, obtain a circuit implementation of

$$H(s) = \frac{K(s-a)(s+b)}{(s+a)s}$$

Prob. 5 (4p) Determine the values of C_2 and R_2 (as functions of C_1 and R_1, respectively) Such that the output is given by

$$V_o = \frac{V_1}{sR_1C_1} + \frac{0.4}{sR_1C_1}V_2 + 0.2\,V_3$$



EXTRA CREDIT (2p) (No partial credit). Obtain the maximum Q value for a second-Order BP with real poles (no complex poles).

$$H(s) = \frac{K_S}{(s+a)(s+b)} = \frac{K_S}{s^2 + (w_o/Q)s + w_o^2}$$