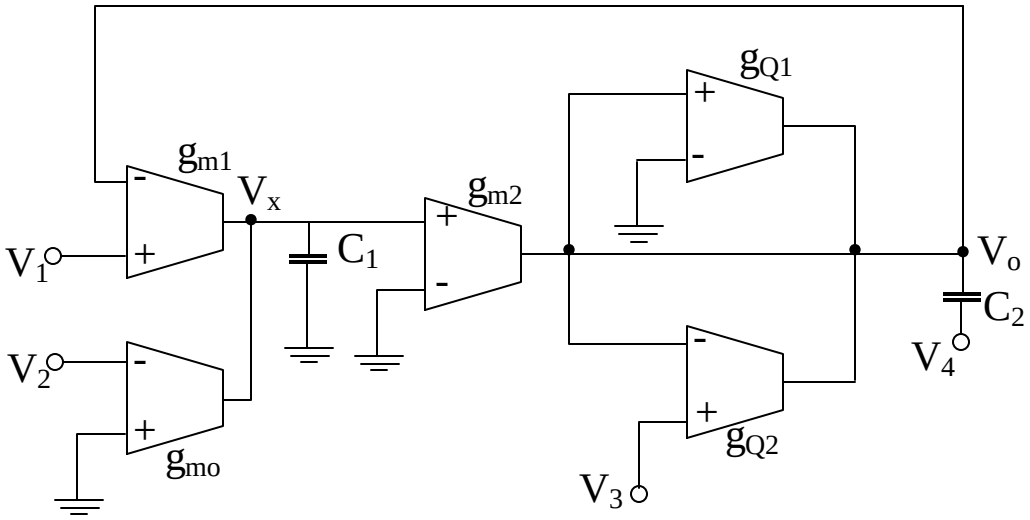
ELEN 458 (ESS) Name _____

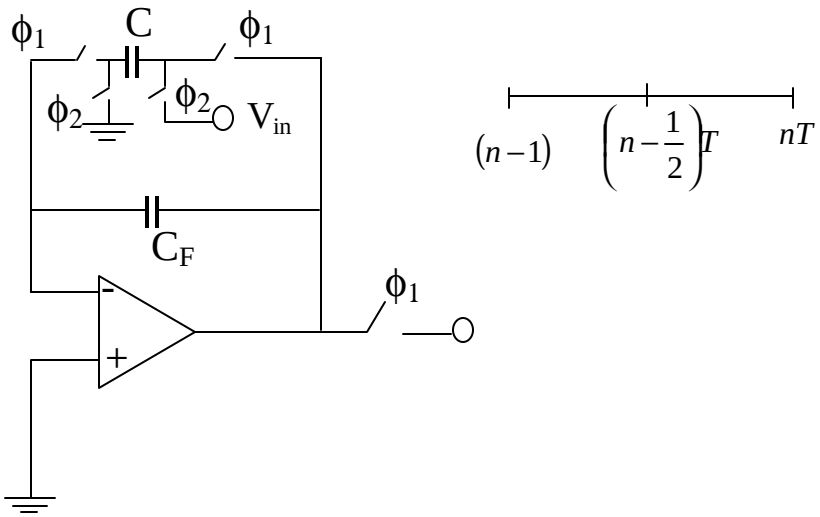
EXAM #2

This is a closed book exam. Only one page summary is allowed. This exam is worth 15% of your total grade.

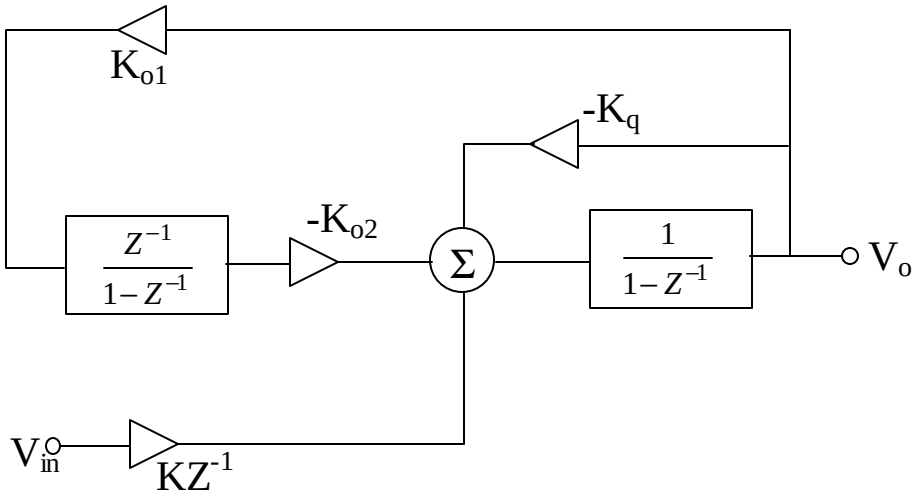
Prob. 1. (3 p) Assume ideal OTAs and obtain the simplified expression of V_o as a function of V_1, V_2, V_3, and V_4. Also indicate the input values yielding a notch filter.



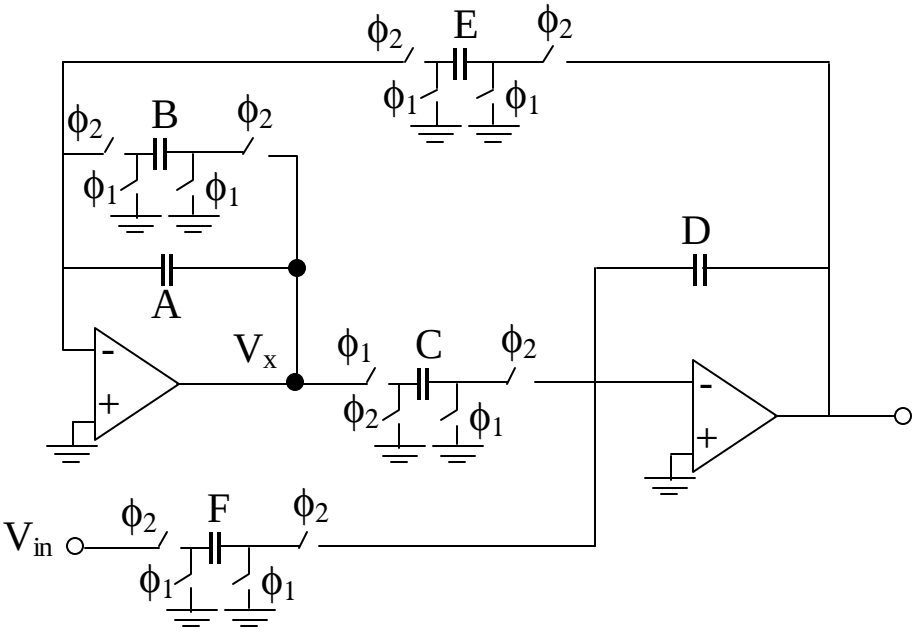
Prob. 2 (4 p) Obtain the transfer function of the SC circuit shown below. You could use charge conservation and then the Z-transform, or you can use block diagrams and Mason Rule.



Prob. 3 (4p) Given the block diagram obtain the corresponding SC Filter implementation. Also obtain the transfer function.



Prob. 4 (4p) Assume that the SC filter has been designed and its capacitor values are known (see below). However, the value of V_x must be reduced by 0.75. Modify V_x to be reduced by 0.75 by changing the suitable capacitors. Finally normalize the capacitor values such that the smallest capacitor is 1 per group.



Capacitor (p F)	Initial	Dynamic Range Adjusted	Final
A	1.0		
B	8		
C	.66		
D	1.0		
E	0.0333		
F	2.0		
Total Capac.			

Extra Credit (2 p) No partial credit

A LP first-order can be expressed as

$$H(Z) = \frac{-(C_1/C)Z}{Z(1+C_2/C)-1}$$

We want to approximately determine the 3dB cut-off frequency. By using a mapping from the Z- to S- plane *under high-sampling rate* conditions, determine an expression for the cut-off frequency.