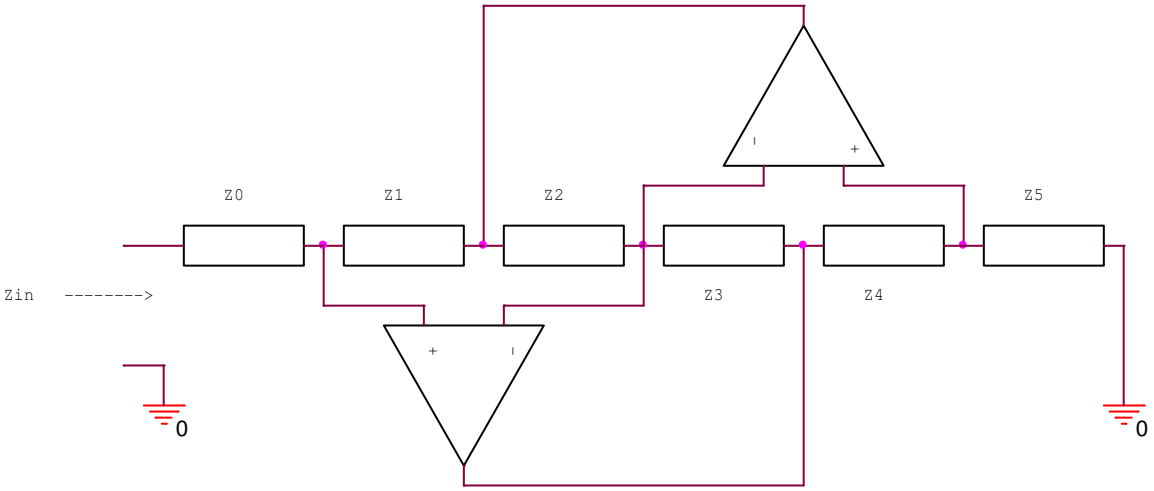
File: c:\temp\courses\spring2018\07\307ActiveC.doc RWN 04/29/18

ENEE 307 In Lab Final Spring 2018
Experiments on an Active GIC

1. The following circuit is called a GIC (=General Impedance Converter). When the op-amps are ideal, it is known that (where all Z's are impedances)

$$Zin(s) = Z0(s)+(Z1(s)\cdot Z3(s)\cdot Z5(s))/(Z2(s)\cdot Z4(s))$$



Assuming only resistors and capacitors are available for the impedances, $Z_i(s)$, and loads; choose one from among the following two possibilities for the input of the above circuit to behave as:

1. A frequency dependent resistor $Zin(s)=Rs^2$ (of R = [value]/40 Ohms with value = last 3 digits of ID)
2. A frequency dependent conductor $Zin(s)=R/s^2$ (of R = [value]x10^6 Ohms with value = last 3 digits of ID)

Then using 1458 op-amps, as many 10K Ohm resistors as possible, and, where needed, 0.474 MicroFarad capacitors [assume also when possible Z0 = 0] design a circuit and test it (key components will be in your component box, others are available in the lab or through your TA).

In your report

a) Give your circuit choice with your intended value of R.
b) Screen shots of your circuit design via Spice (or similar) simulations
c) Determination of an experimental means to tell if your circuit will give the intended value.
d) Your experimentally created circuit on your breadboard and experimentally determined characteristics.
e) Submit a report to your TA prior to the end of the period.

Note that the return of signal current of the op-amps is not shown, allowing the circuit input current to differ from the current in Z5. Also a special case is analyzed on p. 1286 of Sedra/Smith, 6th edition.