

## Lab exercise 8

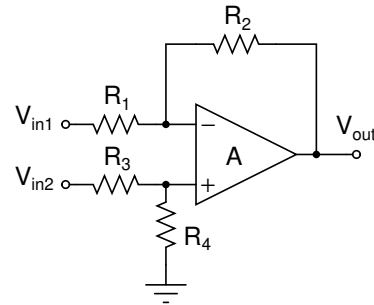
Name: \_\_\_\_\_

We will perform this lab in a simulator. Multisim should be adequate.

### Task 1

Use the design from the homework problem 8.2, i.e. set resistors to satisfy  $V_{out} = 10 \times (V_{in2} - V_{in1})$ .

Take a generator (AC-voltage source) with the sinusoidal output, 1 kHz frequency, peak amplitude 0.1 V, and zero DC offset. Connect it to input 1. Take another generator with the same settings but set its phase to  $180^\circ$ , connect this generator to the input 2. Prove to us that differential amplifier indeed work. Do not forget to check that it has proper response to each of the inputs as well.

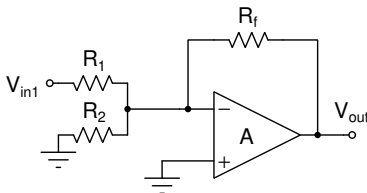


### Task 2

Create the schematic satisfying  $V_{out} = -0.1V_1 + 10V_2 - 20V_3$ . Prove that it works according to specification.

### Task 3

Build an amplifier with a variable bandwidth, see the figure below.



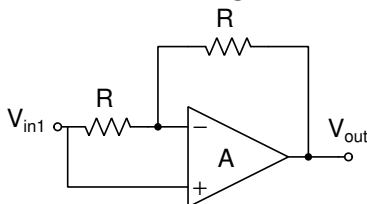
Construct it so the DC gain is equal to -100. Keep  $R_2 \gg R_1$ . Confirm that at a low frequency gain is -100.

Measure the bandwidth (3dB point/frequency) of this amplifier.

Now make  $R_2 = R_1/100$ . Confirm that at a low frequency gain is still -100. What is the bandwidth of the modified circuit?

### Problem 4

What is the DC gain of the circuit depicted below.



Find its input impedance  $Z_{in}$