Lab 9: Basic Op Amp Circuits

1. **Open loop op-amp** *(1 hour)*

   Attempt to measure the open loop gain of an LM741 op amp by connecting the negative input to ground, and the positive input to the wiper arm of a 10 kΩ potentiometer that has its two ends connected to the ± variable supplies and possibly an additional voltage divider. Can you find an input voltage that does not drive the output to one of the rails (i.e. approximately V+ or V-)? Using an attenuated output from your function generator, try to measure the open-loop gain at 10 kHz and 100 kHz.

2. **Op-Amp with feedback** *(0.75 hours)*

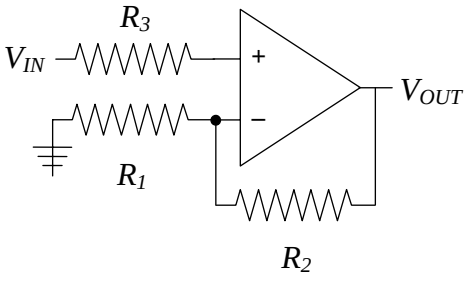
   Do either part a or b:

   a) Design and construct a non-inverting amplifier with a gain of 10. Measure your circuit's gain, output range, input impedance, and output impedance.

   b) Design and construct an inverting amplifier with a gain of 15. Measure your circuit's gain, output range, input impedance and output impedance.

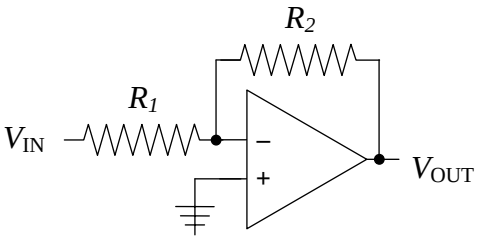
3. **Laboratory differential amplifier** *(1.25 hours …but infinite if you are not prepared)*

   Construct the differential amplifier you designed in design exercise 9.5. Construct two signals sources using a 1 V AC signal at 1 kHz from a function generator and two voltage dividers in parallel – one divider will be divide by 3, the other will be divide by 2. Show that the you can use the gain control knobs to cancel the two signals. Also, adjust the gain settings to produce an output of 5 V pk-pk and look for distortion. Repeat at 100 kHz.



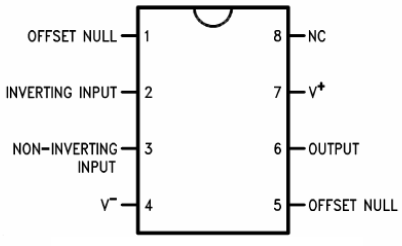
Non-inverting amplifier

$$G = \left(\frac{1}{A} + \frac{R_1}{R_1 + R_2} \right)^{-1}$$



Inverting amplifier

$$\frac{V_{OUT}}{R_2} + \frac{V_{IN}}{R_1} = 0$$



LM741 pin out