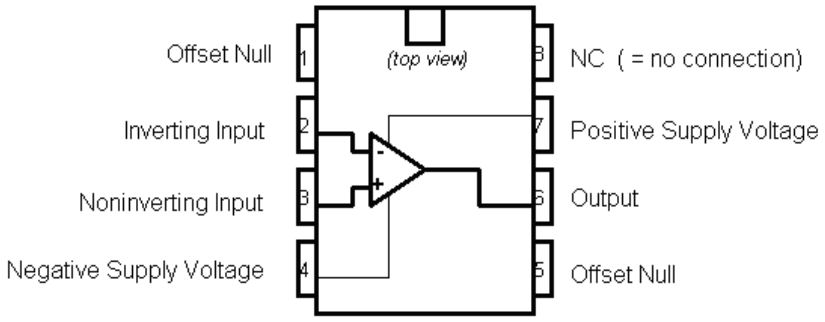
Name: _____

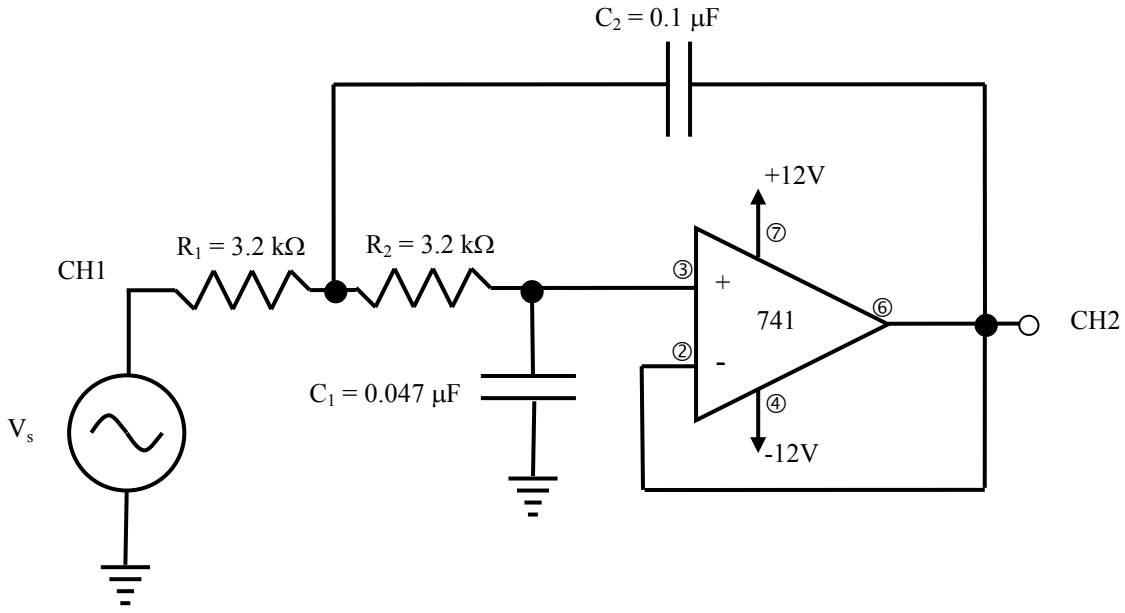
MUST 382 / EELE 491

Spring 2014
Lab experience #5

Procedure

P1. Using the bench power supply and your breadboard, carefully assemble the op amp circuit shown below. REMEMBER TO ASSEMBLE THE CIRCUIT WITH THE POWER OFF, then TEST and VERIFY the bench supply to make sure the voltages are correct BEFORE applying power to the circuit. Start with the function generator set for minimum output.





Use the function generator and the oscilloscope to observe simultaneously the source voltage (CH1) and the voltage at the op amp's output (CH2), and fill out the table on the next page.

Observe the output as the input frequency is varied.

Frequency	*CH1 Voltage Vs (p to p)*	*CH2 Output Voltage (p to p)*	*Gain (|Vc| / |Vs|)*
50 Hz	2 V		
100 Hz	2 V		
200 Hz	2 V		
500 Hz	2 V		
1 kHz	2 V		
2 kHz	2 V		
5 kHz	2 V		
10 kHz	2 V		
20 kHz	2 V		

What does this circuit do as a function of frequency?

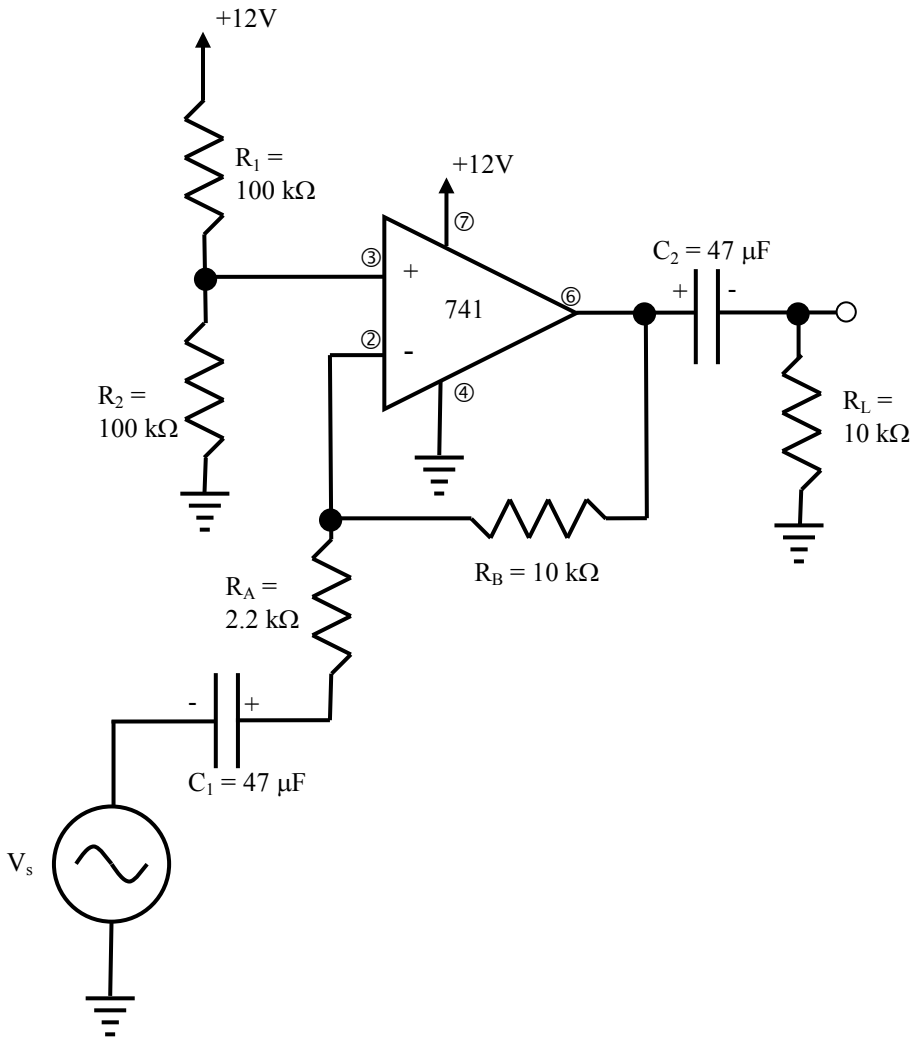
Now try changing the resistor values R_1 and R_2. Try making them both 2.2k, for example. How does this change the circuit behavior?

P2. If time permits, carefully assemble the *single power supply circuit* shown on the next page. Note that instead of +12V and -12V supply, the circuit specifies +12 and ground as the power source. This essentially shifts the "zero" point up to +6V, so the input and output signal are *AC-coupled* using capacitors to block the 6V level shift.

REMEMBER TO TURN OFF THE POWER BEFORE MODIFYING THE CIRCUIT, THEN REMEMBER TO TURN THE POWER BACK ON WHEN YOU ARE READY TO MAKE MEASUREMENTS.

The large capacitors, 47 μF, used in this circuit are electrolytic capacitors. This type of capacitor is *polarized*, meaning that it is necessary to follow the indicated circuit polarity: the capacitor is labeled with a negative polarity mark for one of the leads, and needs to be inserted into the circuit with the proper indicated +/- orientation shown in the schematic diagram.

Apply a 1 kHz sinusoid and observe the signal at various nodes in the circuit. Note that the DC level changes (shifts up) to allow the amplifier output to swing up and down with respect to the "reference" voltage half way between zero and +12 volts.



Describe your observations of how this circuit behaves. What does the output waveform across R_L look like compared to the input waveform from V_s?