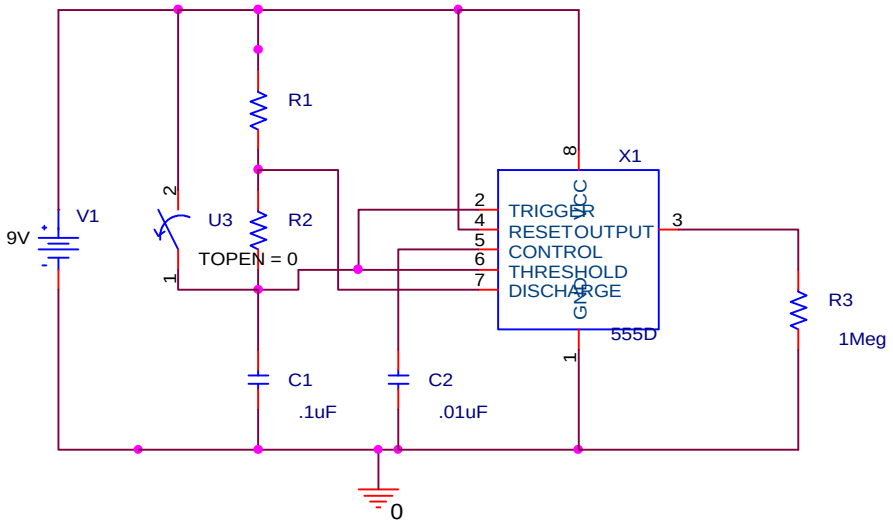
Electronics and Instrumentation

Name _____ **ENGR-4220 Fall 1999** **Section** _____

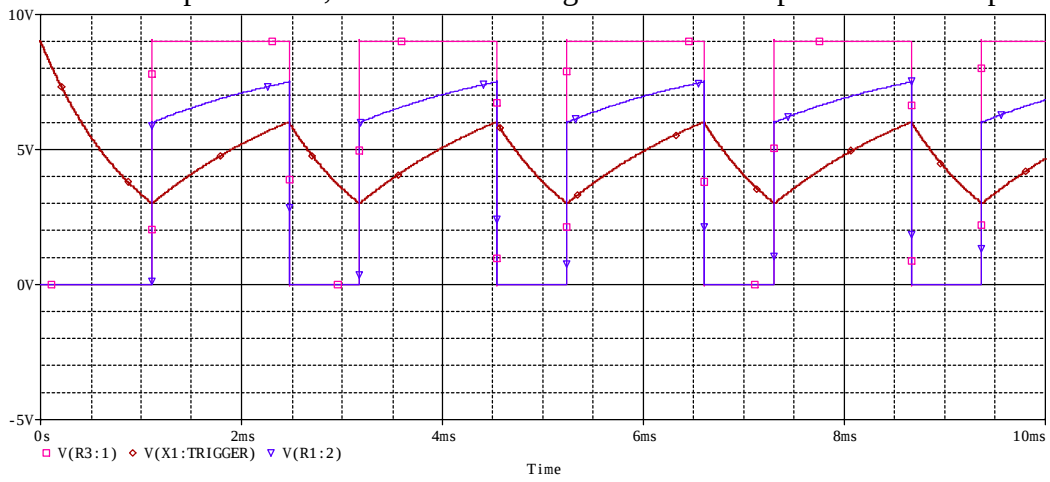
Be Sure to Explain All Answers

Quiz 3a

1. **Astable Multivibrator**

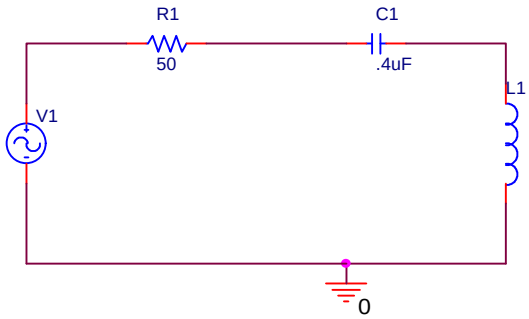


The circuit above has been simulated using PSpice. Using PROBE, the voltages at pins 2, 6, 7, and 3 have been displayed. Determine the values of resistors R1 and R2 from the information in this plot. Also, label which trace goes with which pin in each time period.

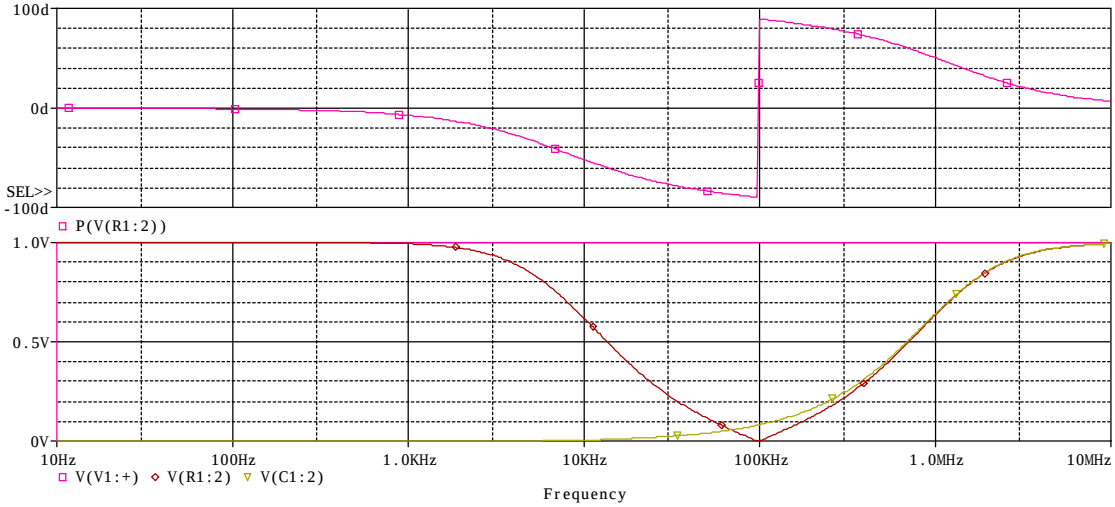


2. Inductance Measurement

The following circuit is constructed using an unknown inductor, a known capacitor, a known resistor and a function generator.



The following plot is obtained for the voltages at the indicated points in the circuit.

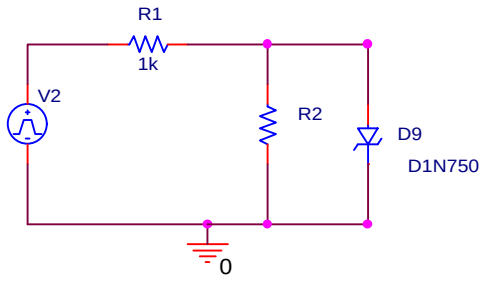


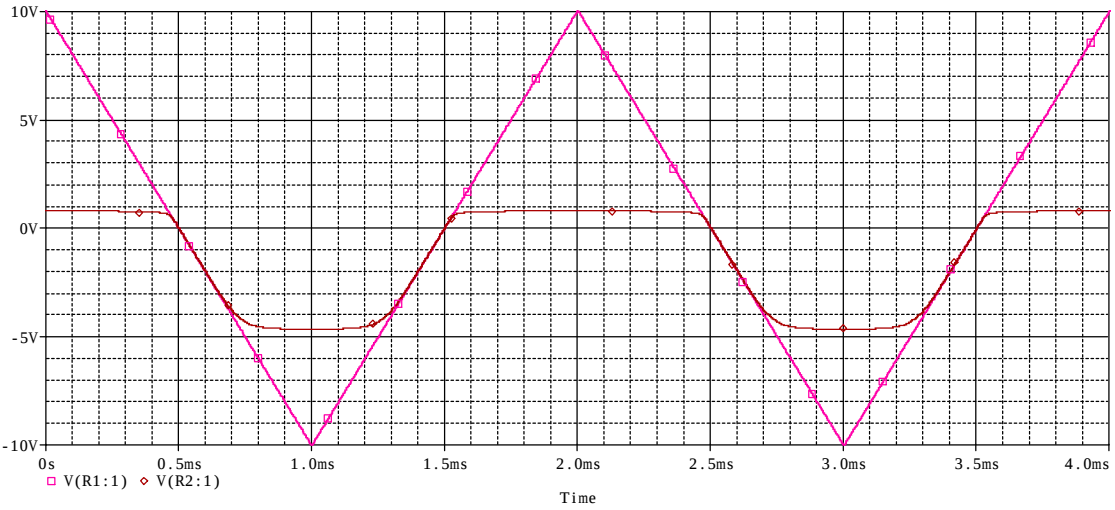
Determine the value of the unknown inductance.

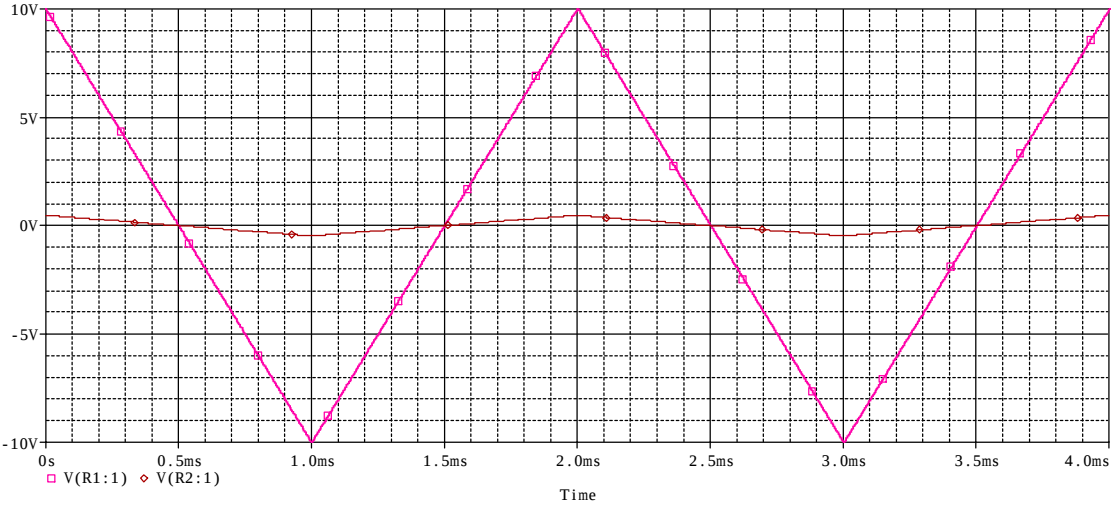
The top trace shows a shift in phase at f = 100 kHz for the voltage between the resistor and the inductor. Why does this happen?

3. Zener Diode Voltage Regulation

A zener diode is used to regulate the voltage across the load resistor R2 in the circuit below. Two different values for R2 are tried (50Ω and 50kΩ), producing the two plots which follow. Identify which plot goes with which resistance value. Explain your answer.

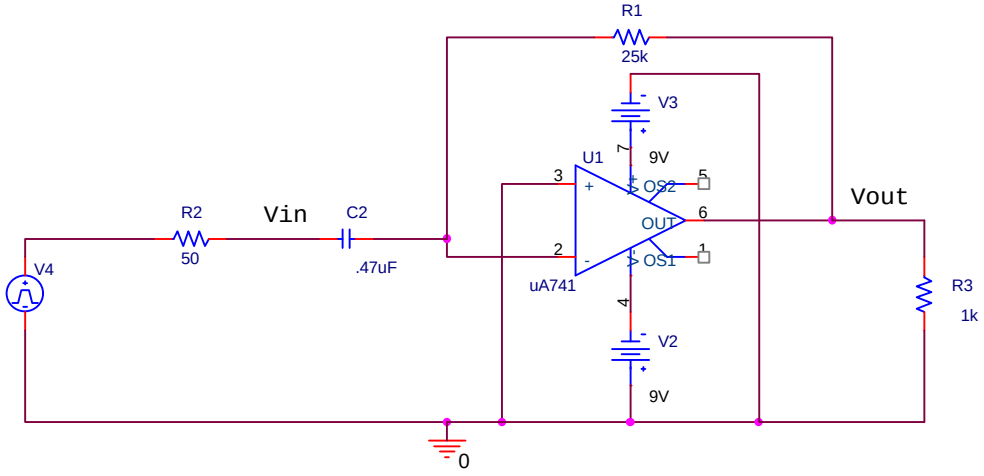


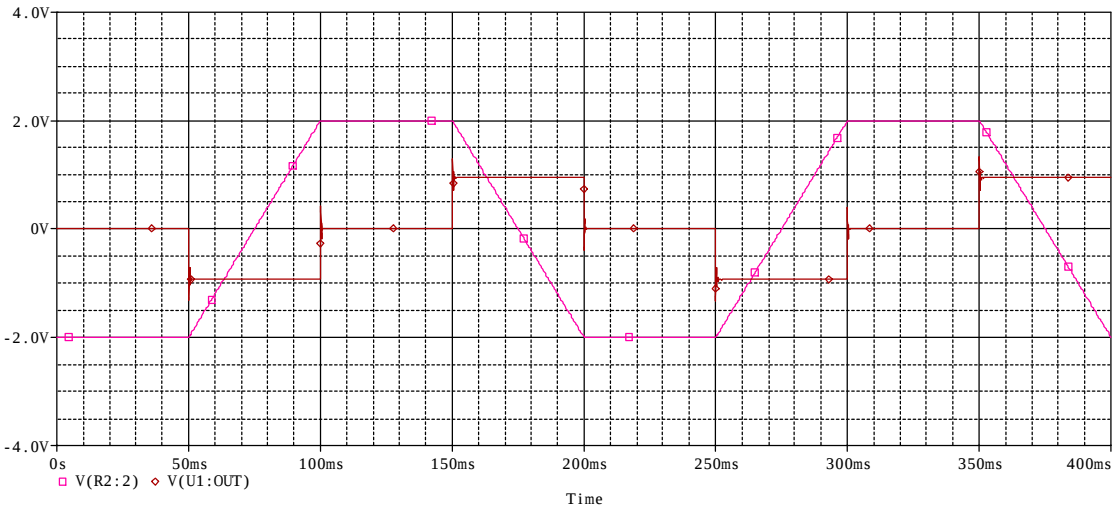


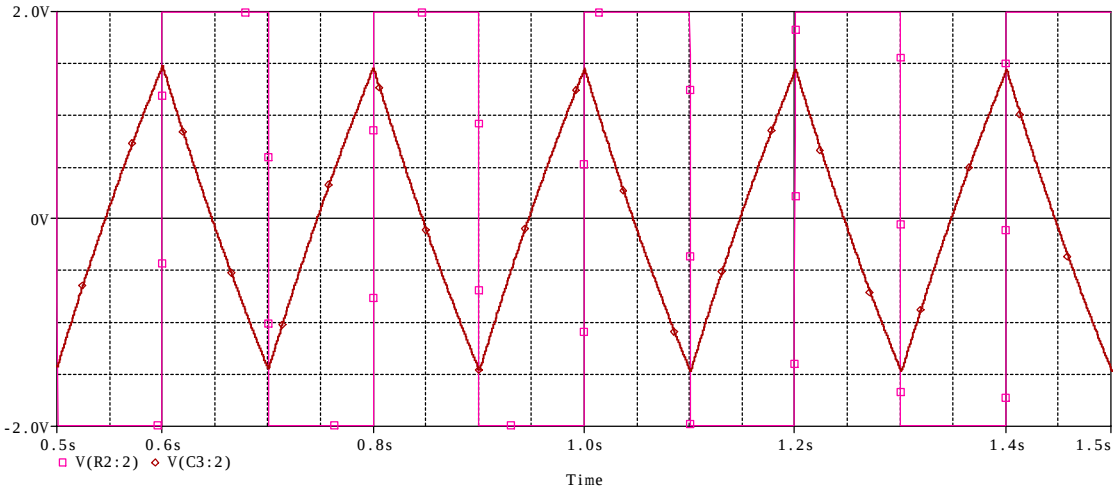


4. Op-Amp Configuration

The following circuit is simulated using PSpice. One of the two probe plots shown below shows the correct voltages at V_{in} and V_{out} in this circuit. Which one is the correct plot?
The input in the top plot is a trapezoidal wave; in the bottom plot it is a square wave.







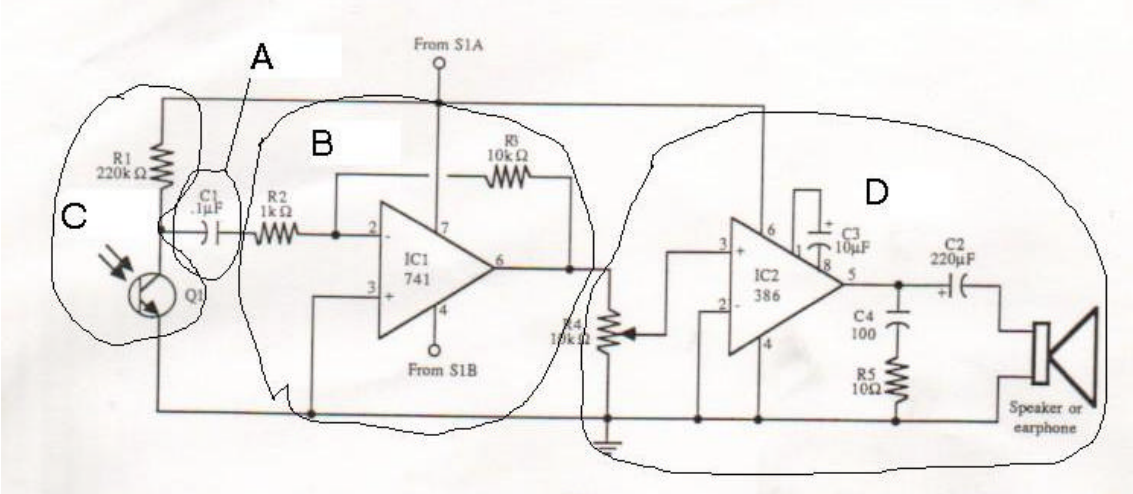
What kind of op-amp configuration is this circuit?

What relationship is supposed to exist between the two voltages that are plotted, if the circuit is working more-or-less in an ideal sense?

Show, using the information in the plot, that the circuit is working reasonably correctly.

5. Circuit Functionality

Shown below is a circuit from the second project. You will notice that there are four loops drawn around parts of this circuit. You are to identify the function inside each loop by drawing a line between the loop letter and the list of possible functions.



	Audio Amplifier
Loop A	Light Detector
Loop B	Low-Pass Filter
Loop C	Rectifier
Loop D	Inverting Amplifier/Preamplifier
	DC Blocking Capacitor