CET 323 LAB

Dr. Park

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Class CET 323_01

Name Van Nguyen

LAB_08

Basic Op-Amp Circuits

Reading

Floyd, Electronic Devices, Ninth Edition, Chapter 13.

Key Objectives

Part 1 : Compare the input and output waveforms for comparator and Schmitt trigger circuits. Use an oscilloscope to plot the transfer curve for the circuits.

Part 3 : Construct and test integrator and differentiator circuits. Determine the response of these circuits to various waveform.

Part 1 : The Comparator

The Transfer Curve .

Figure 13-1 shows an inverting comparator circuit with a variable threshold determined by the potentiometer setting. Construct the circuit and set V_{REF} to near 0V. Set the function generator for a 3.0 V_{pp} triangle waveforms at 50 Hz and observe the input and output waveforms on a two-channel oscilloscope. Sketch the waveforms on Plot 13-1. Note the point where switching takes place. Be sure to label the axes on all plots with the voltage.

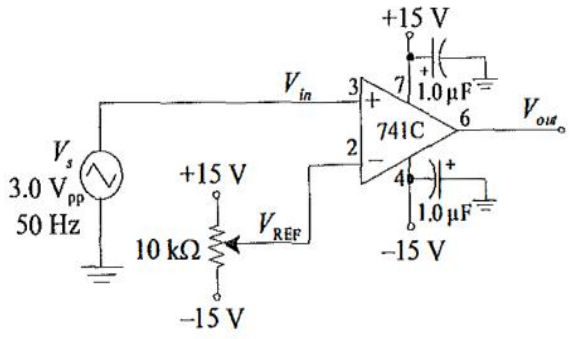


Figure 13-1

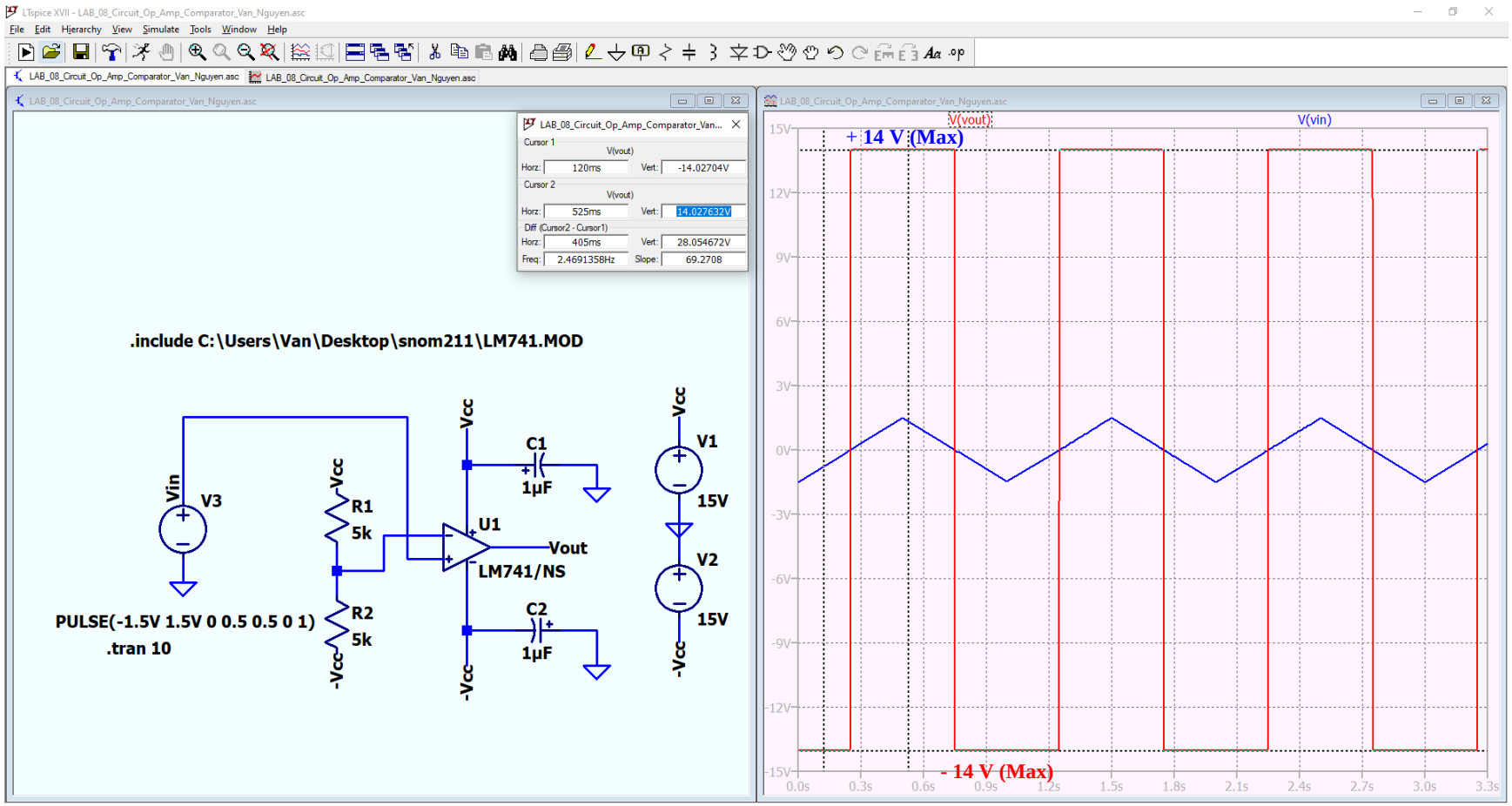
Part 3 : The Integrator.

In this step, you will test the effects of the comparator on a sinusoidal wave input and add an integrating circuit to the output of the comparator. Connect the circuit shown in Figure 13-8 with a 1.0 V_{pp} sine wave input at 1. kHz as illustrated. Check that there is no DC offset . Observe the waveforms from the comparator (point A) and from the integrator (point B). Adjust R_2 so that the waveform at B is centered about zero volts. Sketch the observed waveform in the correct time relationship on Plot 13-9. Show the voltages and time on your plot.

1)- **The Comparator,**

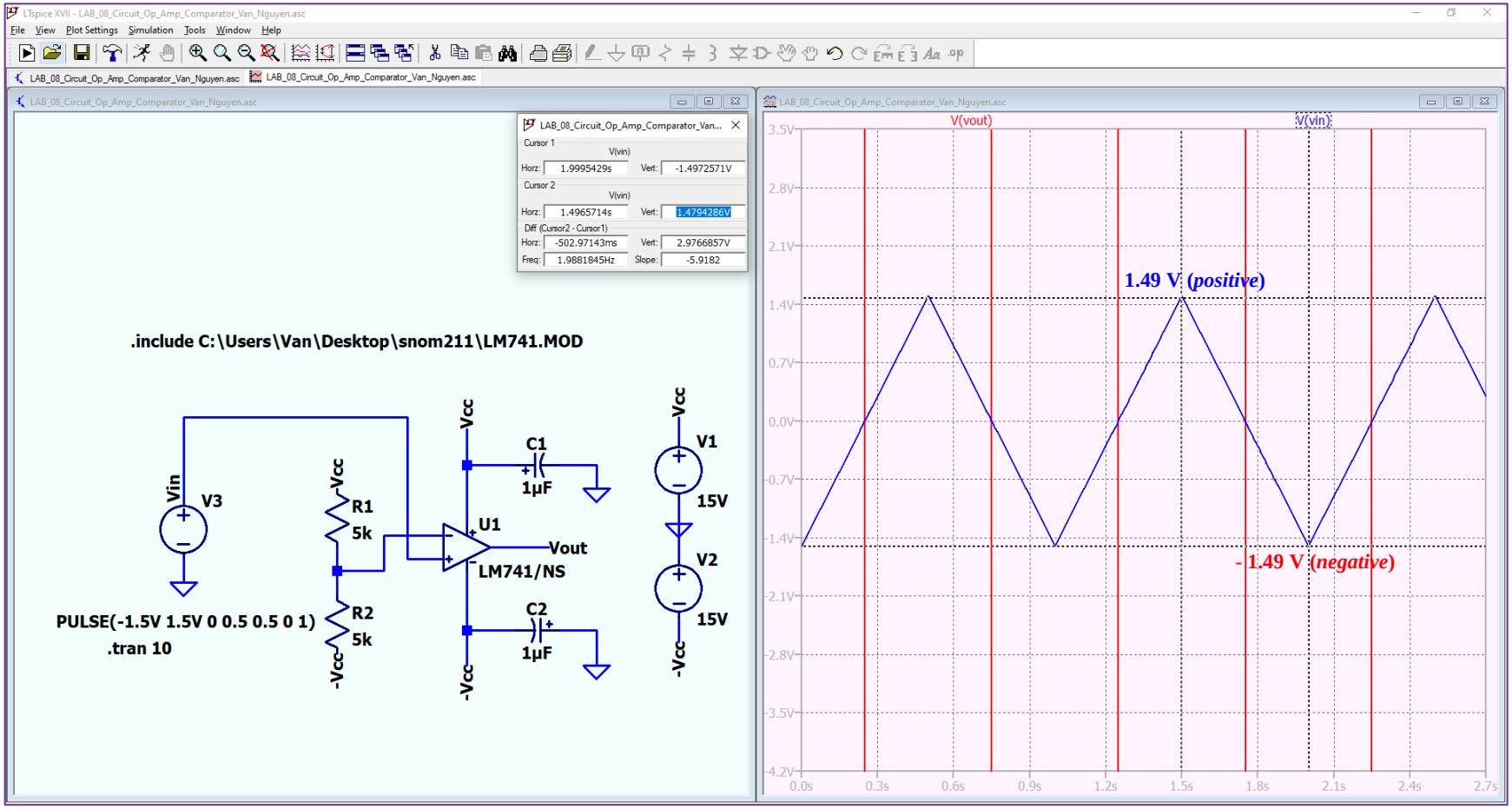
Measuring the Output

The output is a ***square sine wave*** reaches maximum positive (+ 14 V) and maximum negative (-14 V)



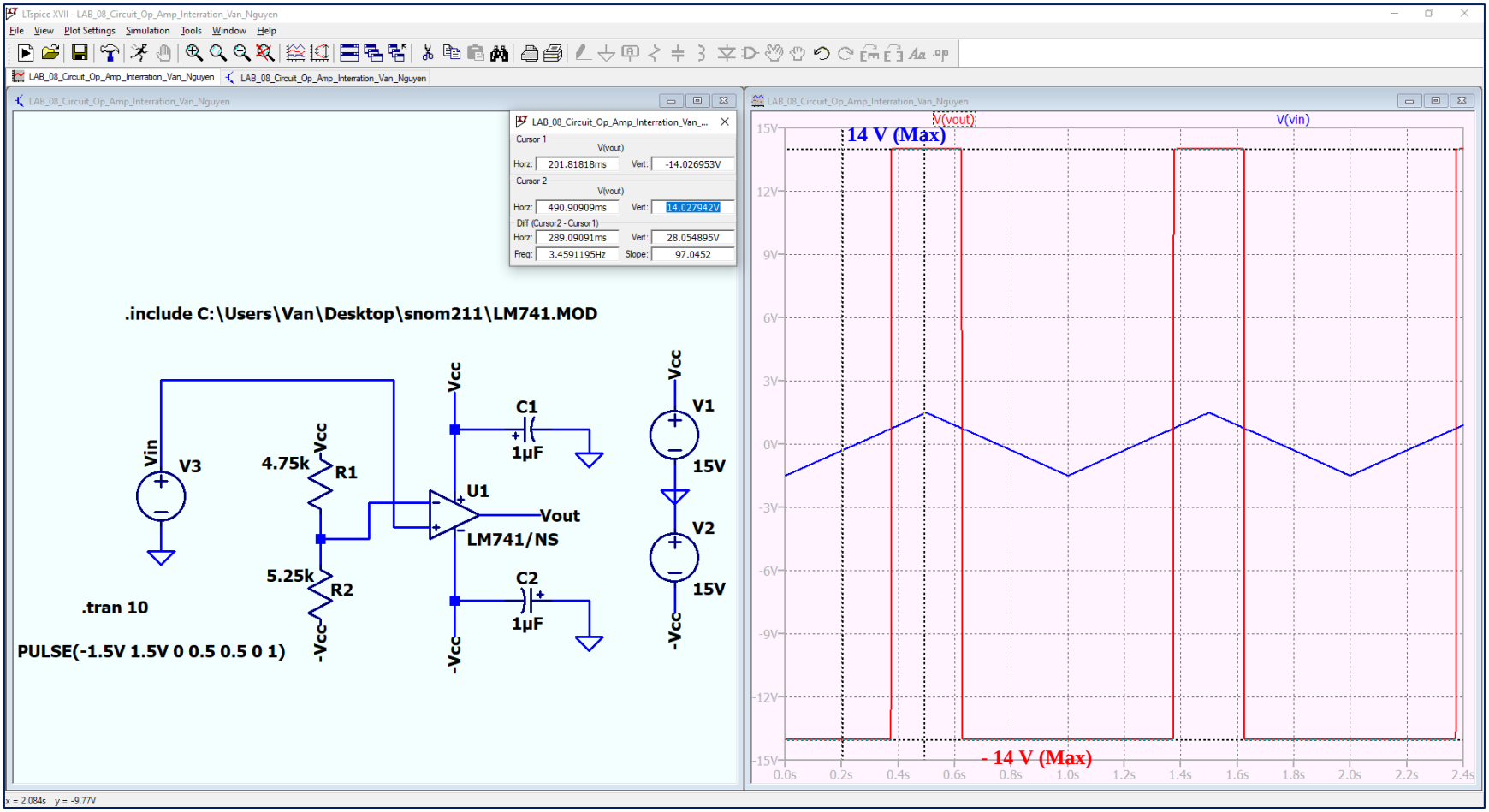
Measuring the Input

The input has shape pointed sine wave reaches maximum positive of **1.49 V**, and maximum negative **- 1.49 V**



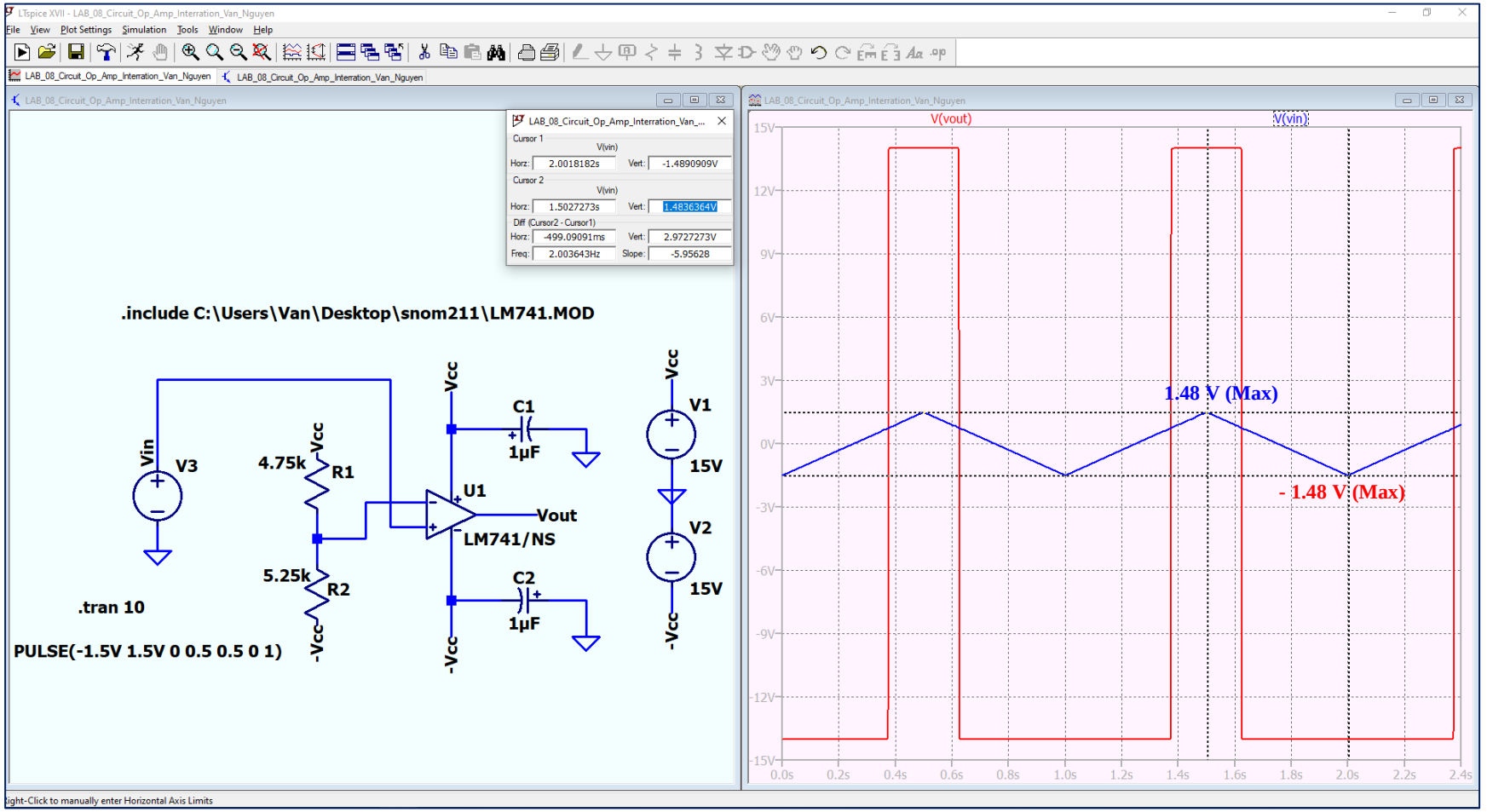
1)- **The integrator,**

- **Measuring the Output:** The output is a ***square sine wave*** reaches maximum positive (+ 14 V) and maximum negative (-14 V)

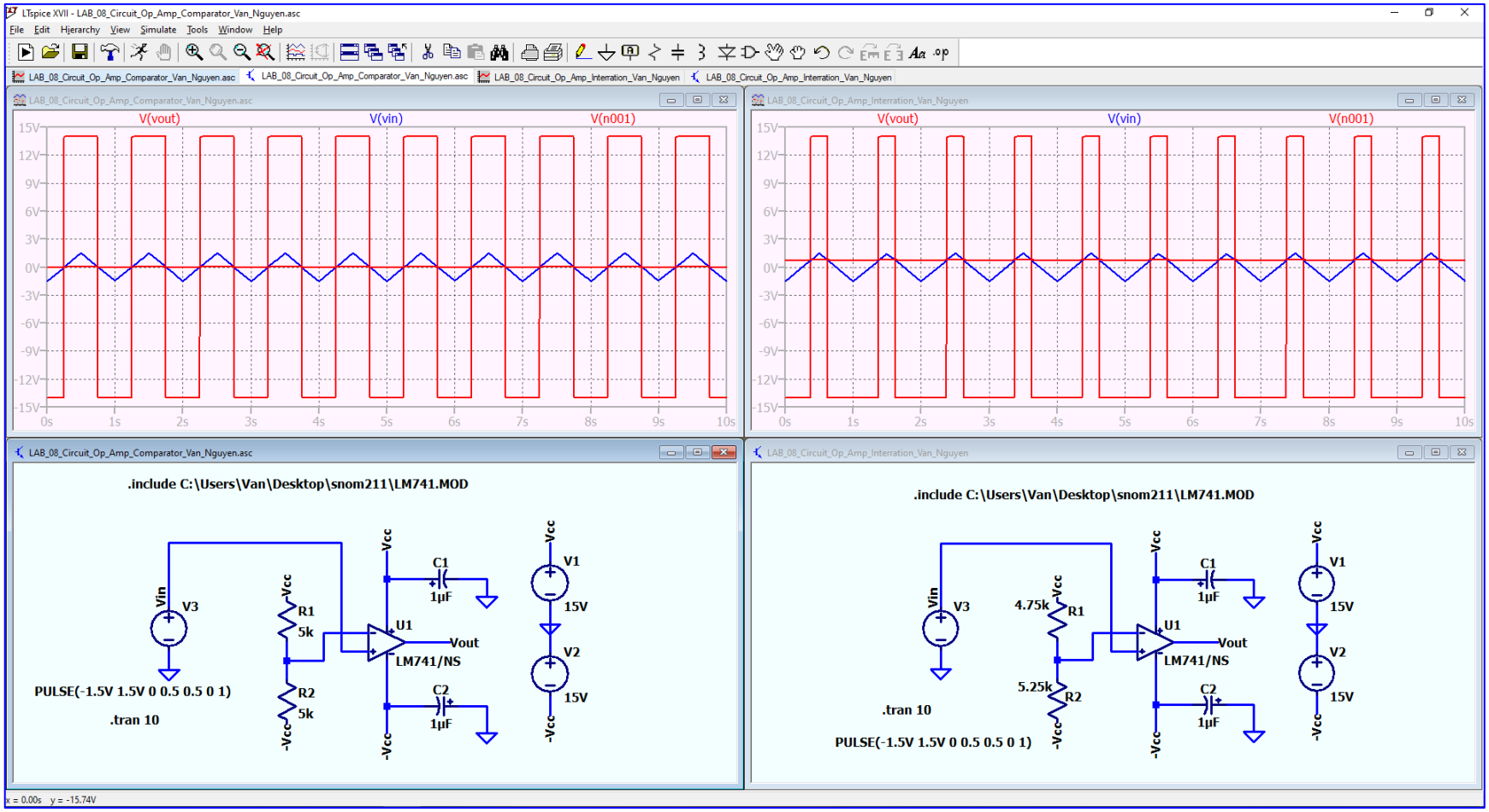


Measuring the Input

The input has shape pointed sine wave reaches maximum positive of **1.48 V**, and maximum negative **- 1.48 V**



❖ Observe and analyze, the Circuit Op-Amp Comparator, and Circuit and Op-Amp Integrator.



The Comparator:

A comparator is a specialized op-amp circuit that compares two input voltages and produces an output that is always at either one of two states, indicating the greater or less than relationship between the inputs.

- **The output** (***square sine wave***) that is always at either one of two states.
- The output is at its maximum positive level (**+ 14 V**) or its maximum negative level, (-14 V).
- **The input** (***pointed sine wave***) reaches maximum positive of (1.49 V), and maximum negative (- 1.49 V).

The result of a sinusoidal input voltage applied to the noninverting input of the zero-level detector.

* When the sine wave crosses 0, the amplifier is driven to its opposite,
* When the sine wave crosse 0, the amplifier is driven to its opposite state and the output goes to its maximum negative level.

The integrator: The maximum positive level and maximum negative level of output and input the same comparator. But.

* When the input voltage exceeds the reference voltage(straight line), the output goes to its maximum positive voltage,
* When each time the input goes below level the reference voltage the output switches back to its -14 V level.