

EEC 100 Lab 2-Inverting op-amp and potentiometer

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10/14/29

(1) Objective: Learn how to use an inverting op-amp and control the gain using a negative feedback loop and a potentiometer.

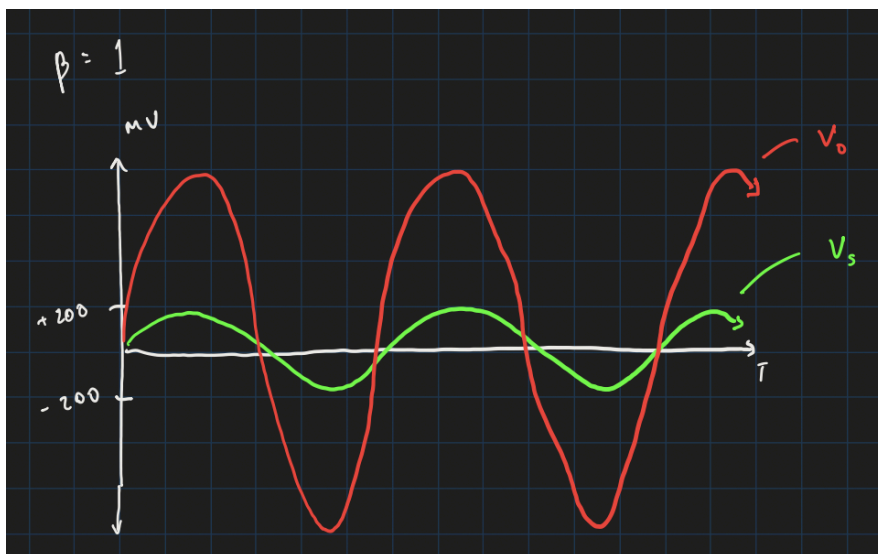
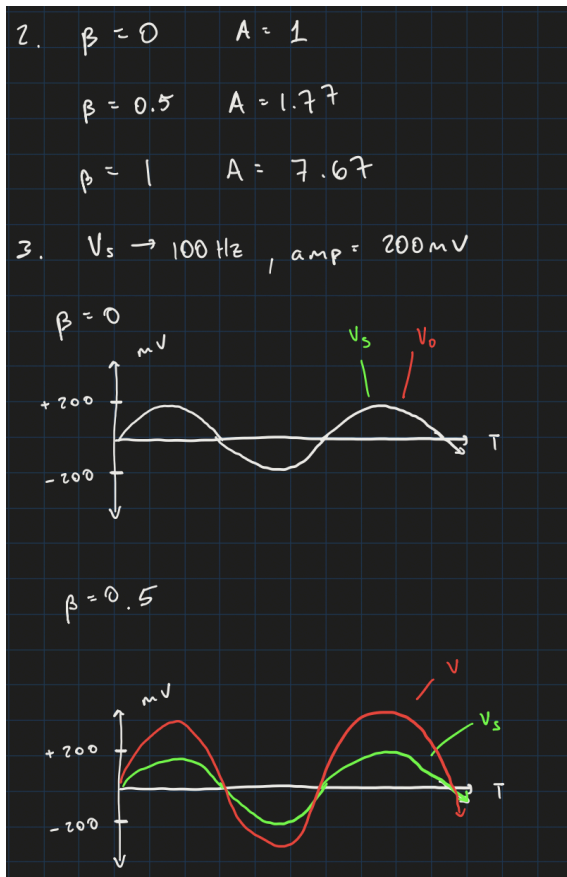
(2) Prelab:

Prelab

1.
$$V_o = \left(\frac{V_s}{(1-\beta)R_1 + R_2} \right) \beta R_1 + V_s$$

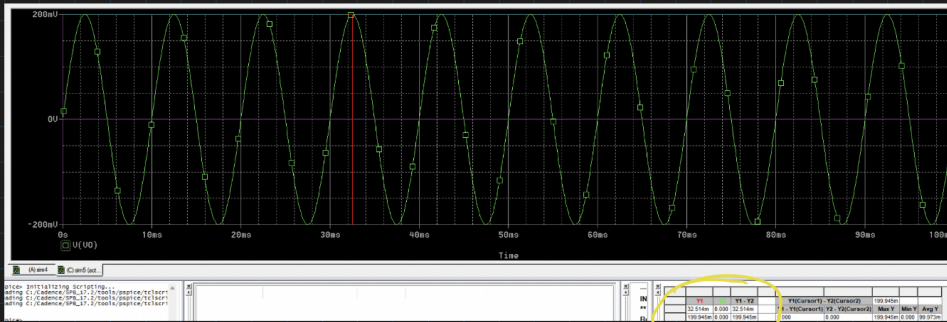
$$V_o = \frac{V_s \beta R_1}{(1-\beta)R_1 + R_2} + V_s$$

$$\frac{V_o}{V_s} = \frac{\beta R_1}{(1-\beta)R_1 + R_2} + 1$$

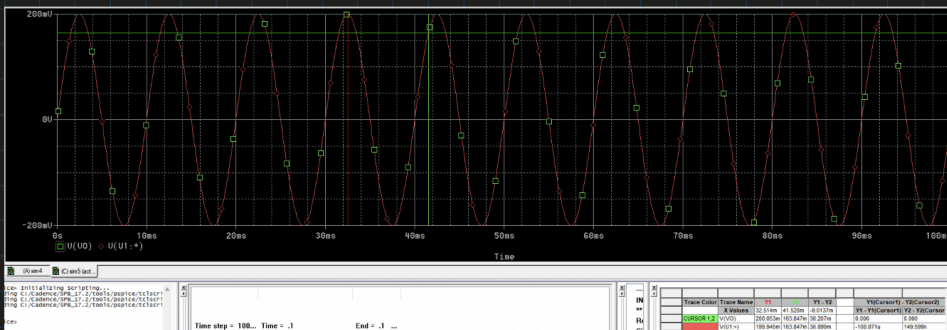


(3) Simulation:

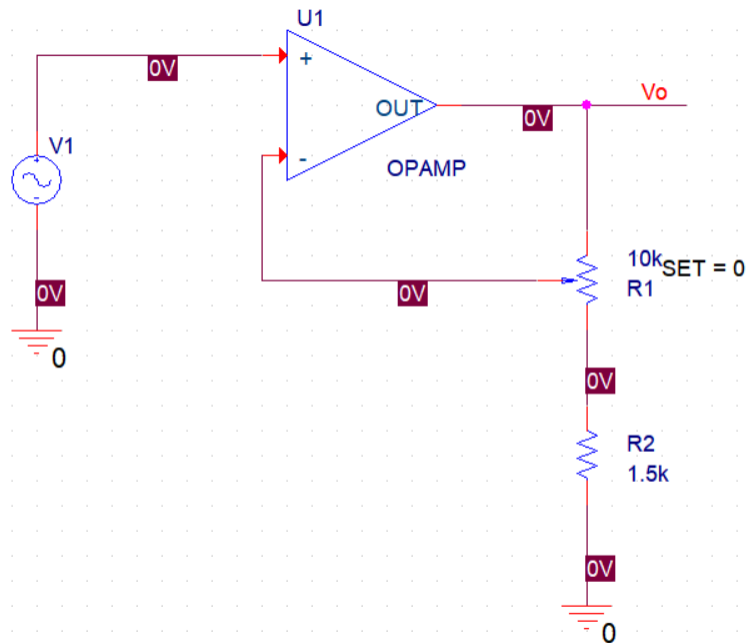
Simulation

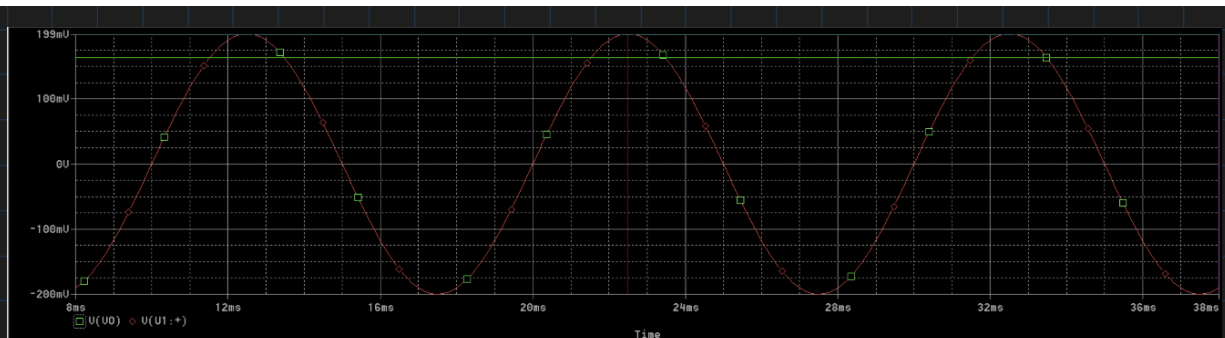


$$V_{max} = 200\text{mV}$$

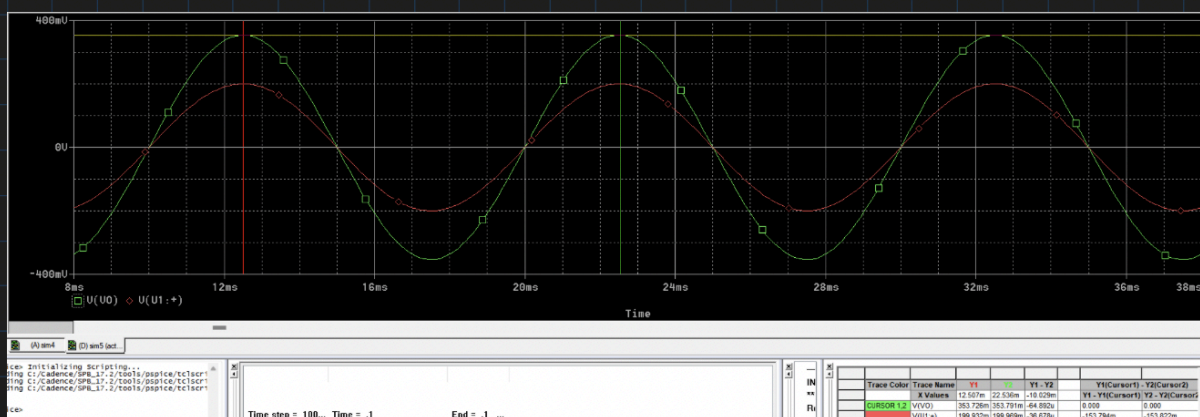


VOFF = 0
VAMPL = 200mV
FREQ = 100
AC = 1

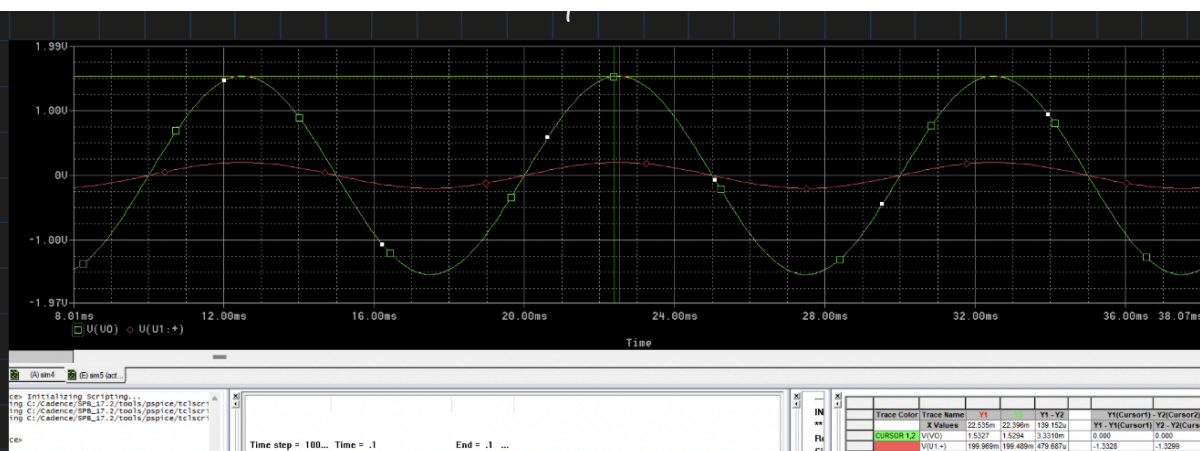




$$A = 1, \quad \beta = 0$$



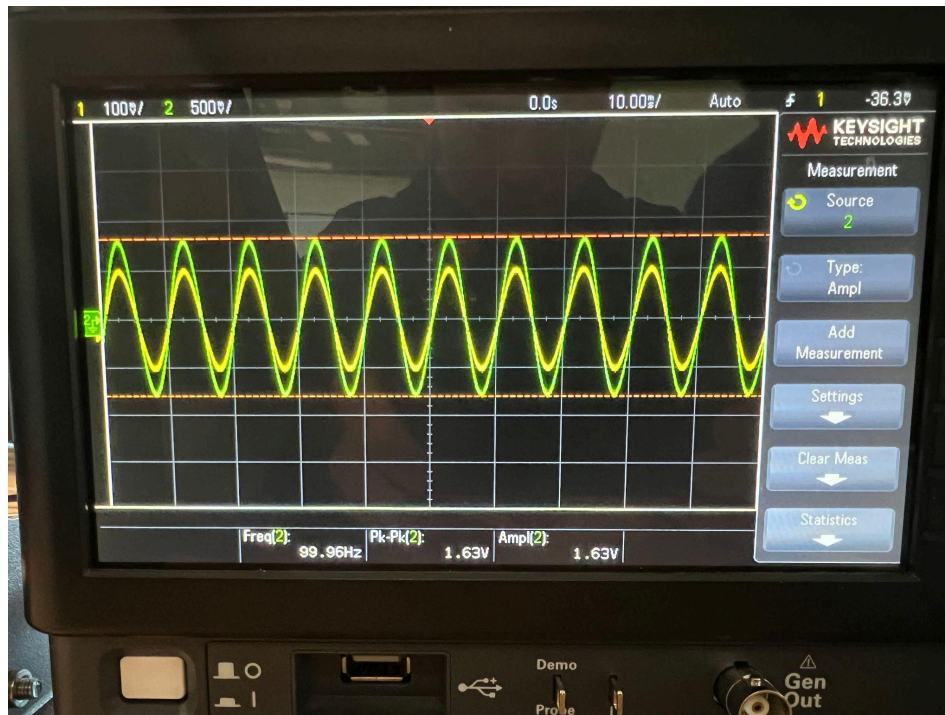
$$A = 1.75, \quad \beta = 0.5$$



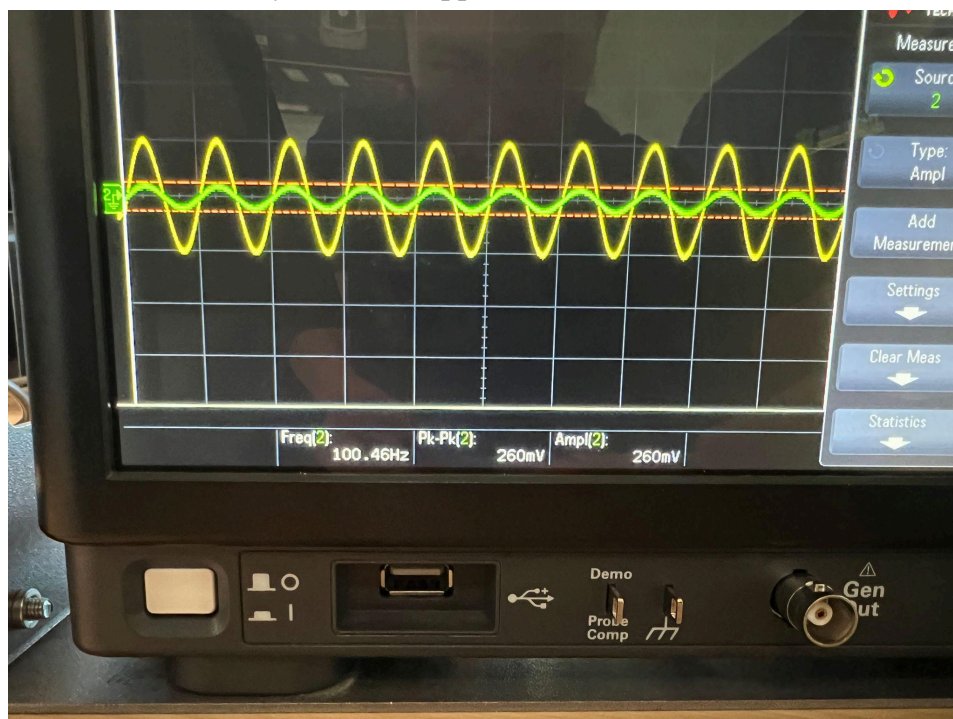
$$A = 7.5, \quad \beta = 1$$

(4) Experiment:

Potentiometer = fully turned



Potentiometer = fully turned in opposite direction



The image shows a Keysight oscilloscope screen with the following details:

- Top Bar:** 1 100% / 2 500% | 0.0s | 10.00s/ | Auto | # 1 | -36.39
- Waveform:** A green trace showing a periodic waveform with a peak-to-peak amplitude of 420mV and a frequency of 99.70Hz. A yellow trace is also visible, showing a similar periodic waveform.
- Measurement Panel (Right):**
 - Source: 2
 - Type: Ampl
 - Add Measurement
 - Settings
 - Clear Meas
 - Statistics
- Bottom Bar:**
 - Freq[2]: 99.70Hz
 - PK-PK[2]: 420mV
 - Ampl[2]: 420mV
- Physical Controls (Bottom):**
 - Buttons: Run/Stop, Single, Setup, Preset, Help.
 - Ports: USB, Probe Comp, Gen Out.

My prelab calculations and PSpice simulations agreed with each other, verifying my calculations. When we tested in lab however, the values were slightly different, due to the inherent tolerance differences in each of the resistor values-leading to the actual output voltage being slightly off from its ideal counterpart.










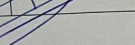
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Department of Electrical and Computer Engineering

EEC 100

Circuits II

Fall 2024

Lab Number 2

Student Name	Pre-Lab	Simulation	Experiment	Total	T.A. Signature	Date
Daniel Narkuch						7/10/24
Justin Hsu						10/10/24

T.A. Comments: