Prelab 2 | Joaquin Salas | 9/20/23 | UIN: 731000141

a) Supply Voltage - ±15V
b) Power Consumption - 1mV
c) Voltage Gain - 200k
d) Power Consumption - 2mW
e) Output resistance - 75Ω
f) Bandwidth - about 1MHz
g) Input resistance - 0.3MΩ at 25 celsius
h) Input offset current - 2nA
i) Slew rate - 0.5-V/μs

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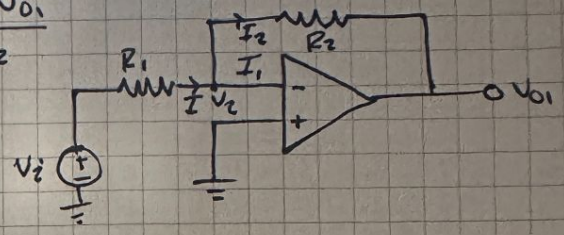
2. Voltage Gains for $\frac{V_{o1}}{V_i}$, $\frac{V_{o2}}{V_i}$, $\frac{V_{o3}}{V_i}$

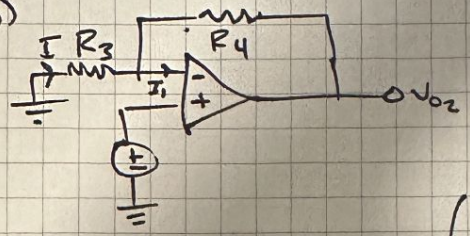
(a) $\frac{(0 - V_i)}{R_1} = \frac{0 - V_{o1}}{R_2}$

$\rightarrow \frac{V_i}{R_1} = \frac{-V_{o1}}{R_2}$

$\rightarrow \boxed{\frac{V_{o1}}{V_i} = -\frac{R_2}{R_1}}$



(b)

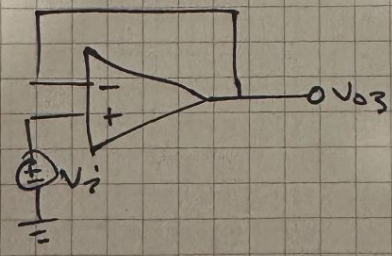


$\frac{0 - V_i}{R_3} = \frac{V_i - 0}{R_4}$

$-V_i \left[\frac{1}{R_3} + \frac{1}{R_4}\right] = \frac{-V_{o2}}{R_4}$

$\left(\frac{R_3 + R_4}{R_3}\right) = \frac{V_{o2}}{V_i} \Rightarrow \boxed{\frac{V_{o2}}{V_i} = 1 + \frac{R_4}{R_3}}$

(c)



$\Rightarrow V_{o3} = V_1 = V_i$

$\boxed{\frac{V_{o3}}{V_i} = 1}$

3. If $R_1 = R_3 = 10k\Omega$, find R_2 and R_4. $\frac{V_{o1}}{V_i} = -3$ and $\frac{V_{o2}}{V_i} = 6$

(a) $R_1 = 10k\Omega$ $\quad \frac{V_{o1}}{V_i} = -3$

$-3 = \frac{-R_2}{10k}$

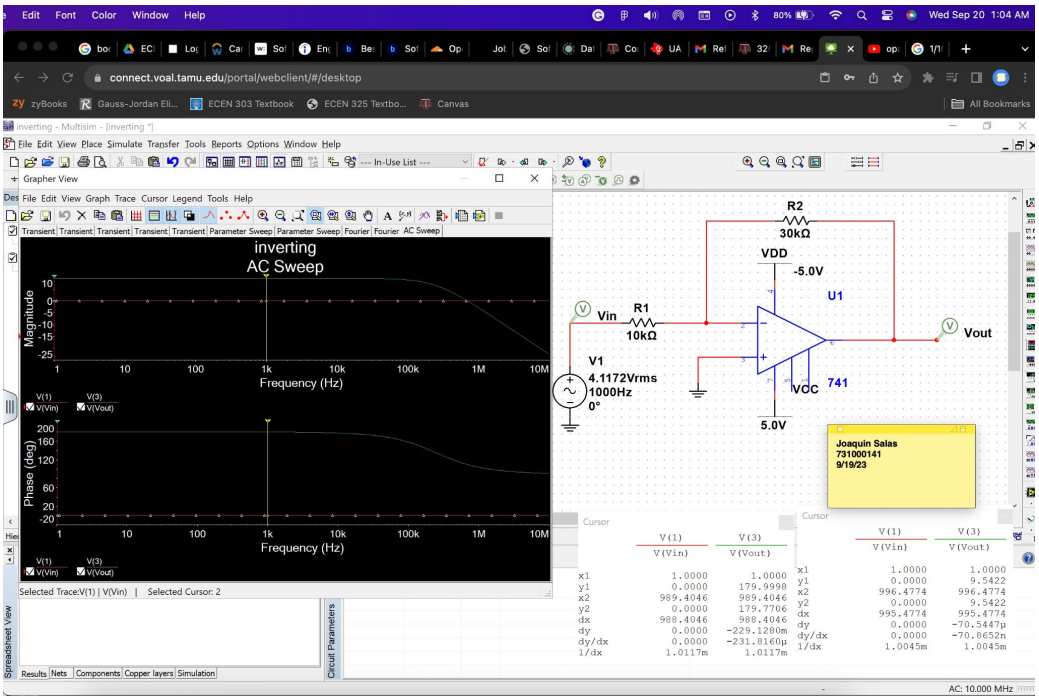
$\Rightarrow \boxed{R_2 = 30k\Omega}$

(b) $R_3 = 10k\Omega$ $\quad \frac{V_{o2}}{V_i} = 6$

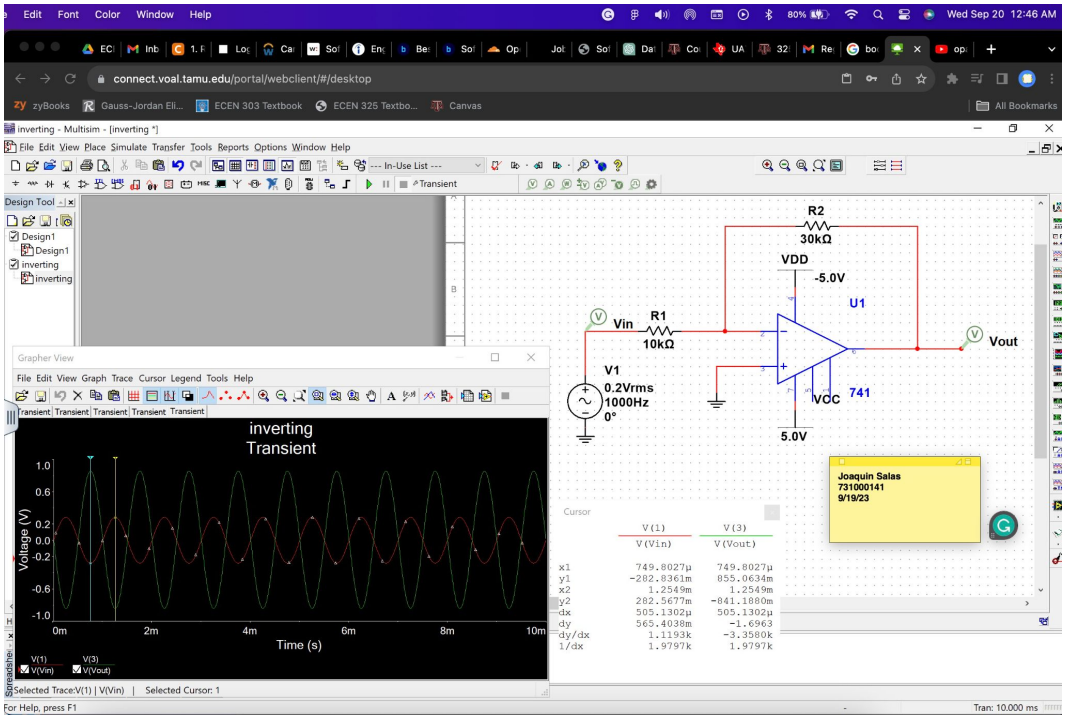
$6 = 1 + \frac{R_4}{10k} \Rightarrow \boxed{R_4 = 50k\Omega}$

Simulations:

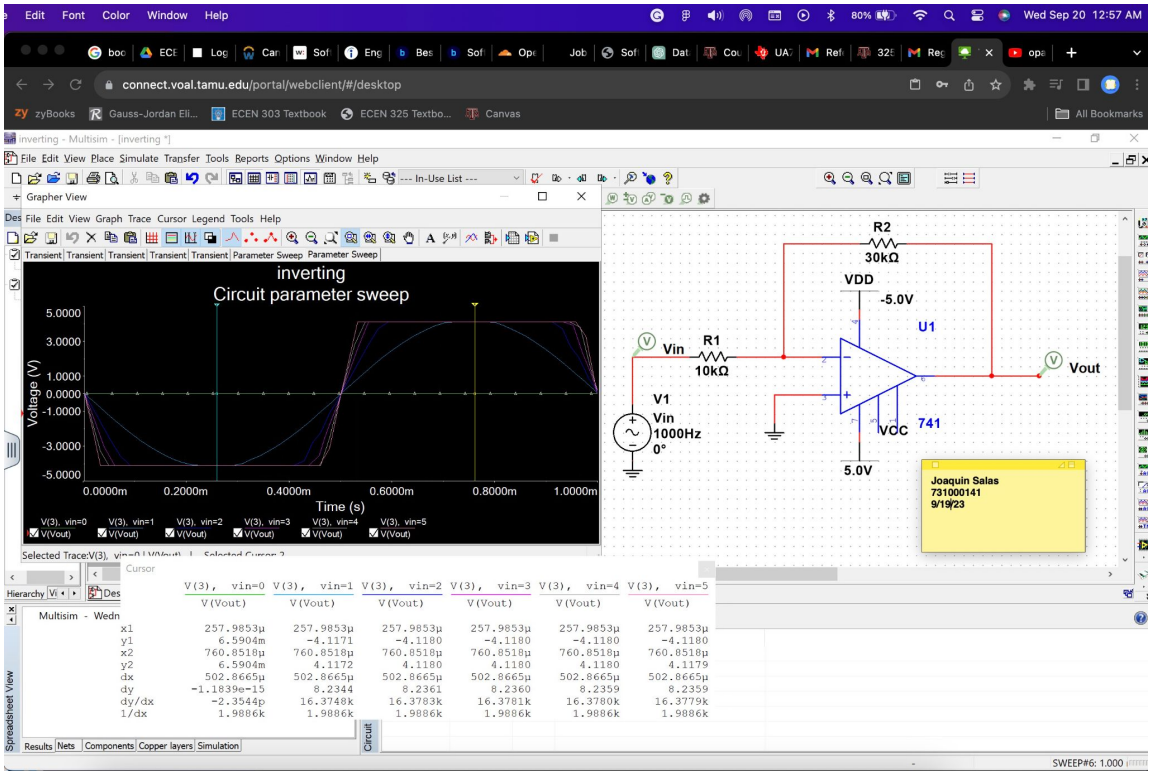
Inverting Op-Amp Bode Plot



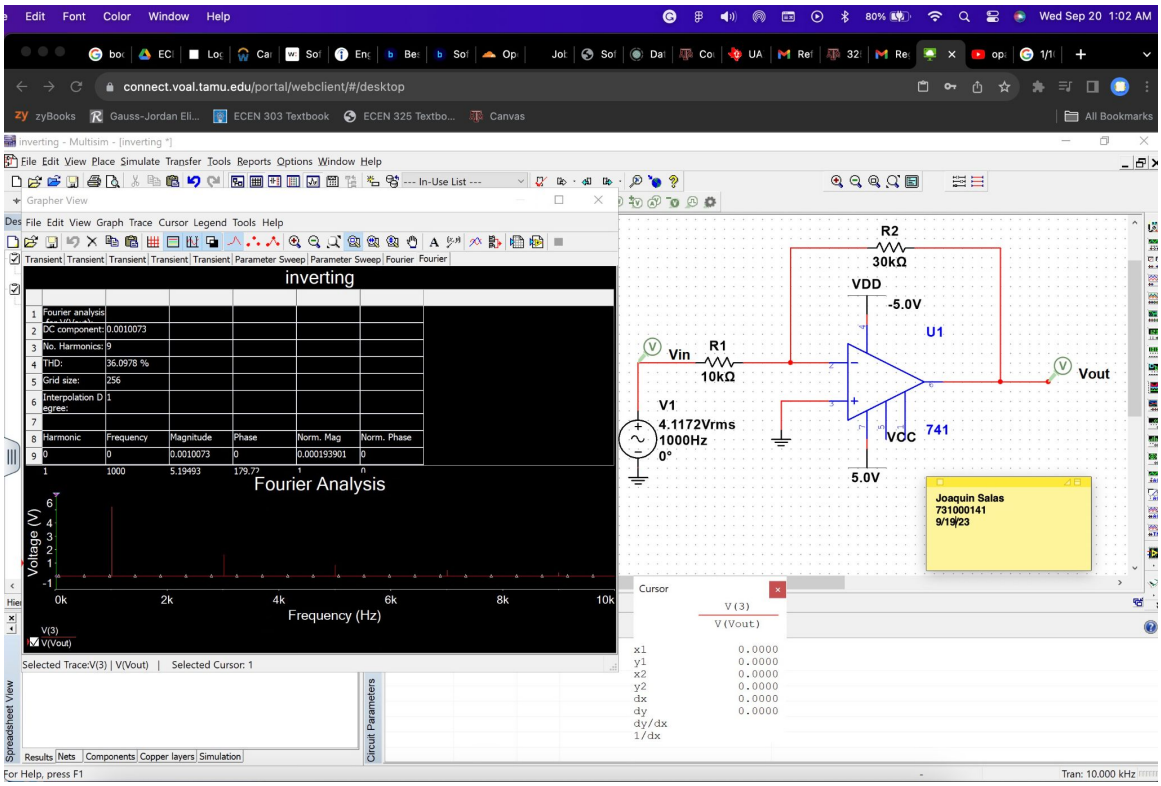
Inverting Op-Amp Transient Analysis



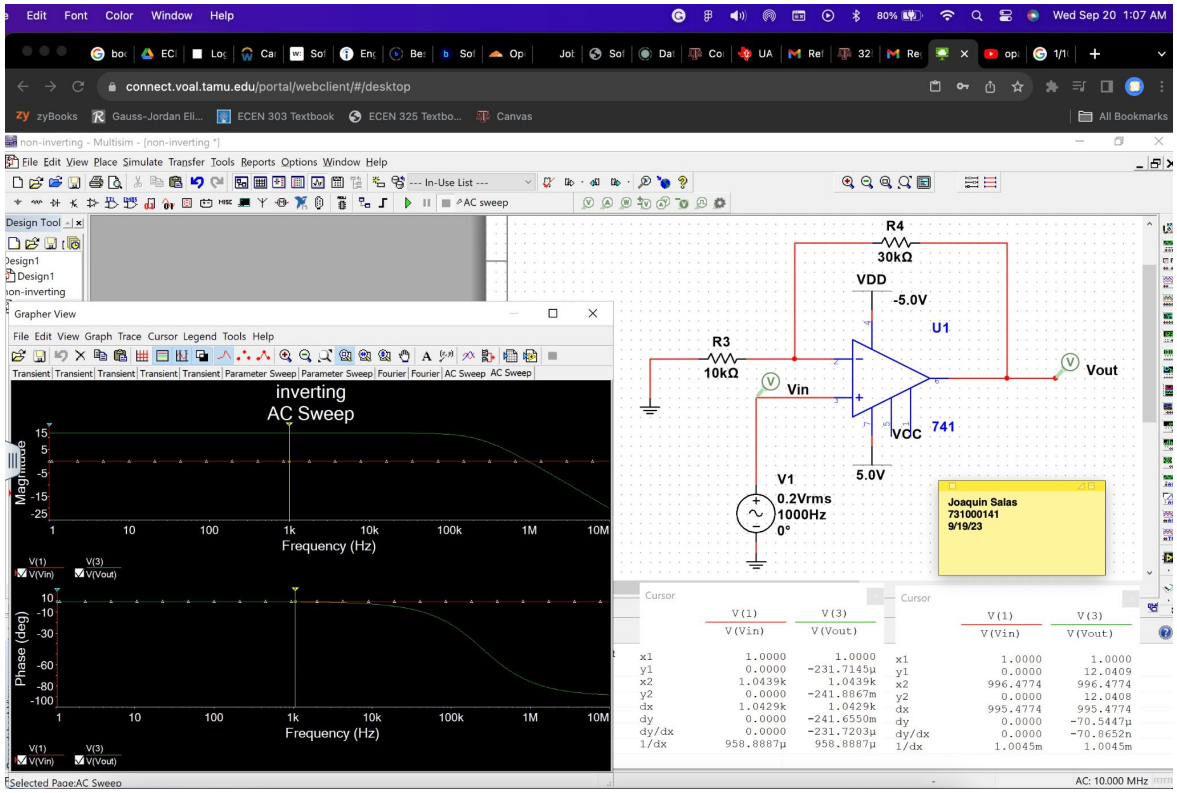
Inverting Op-Amp Parameter Sweep



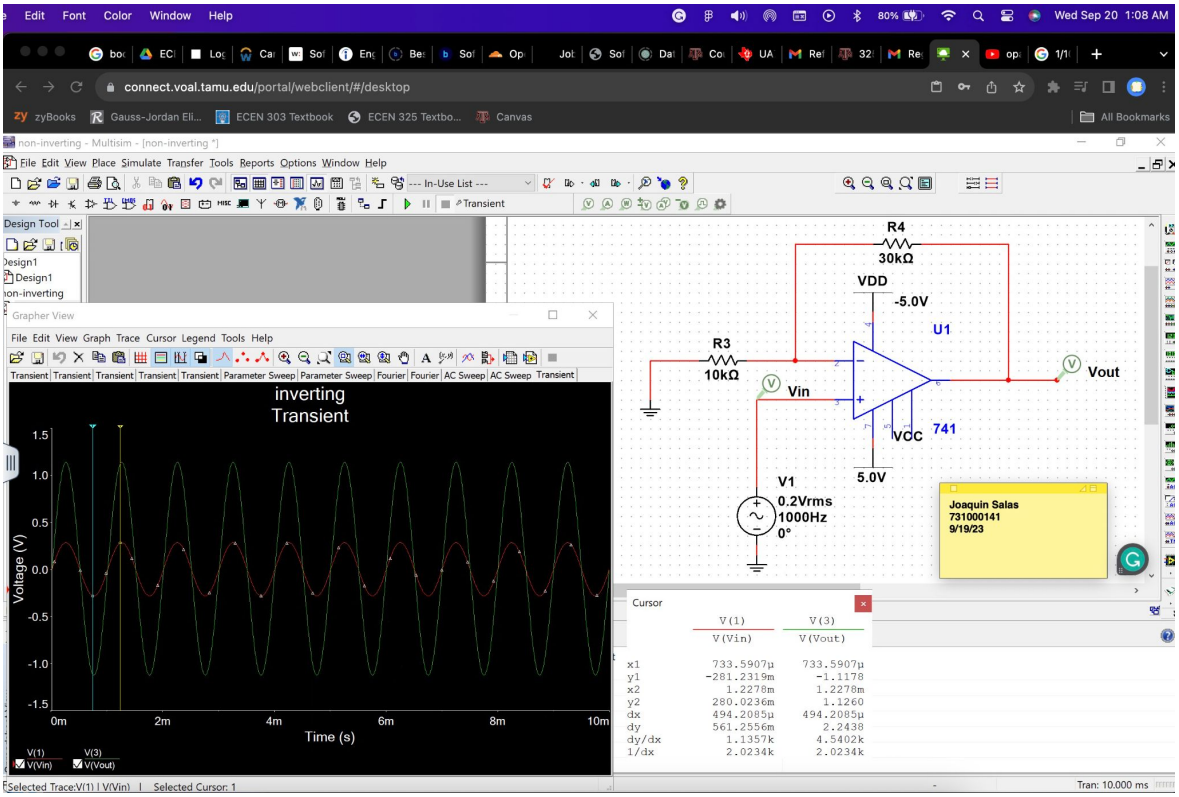
Inverting Op-Amp Fourier Analysis



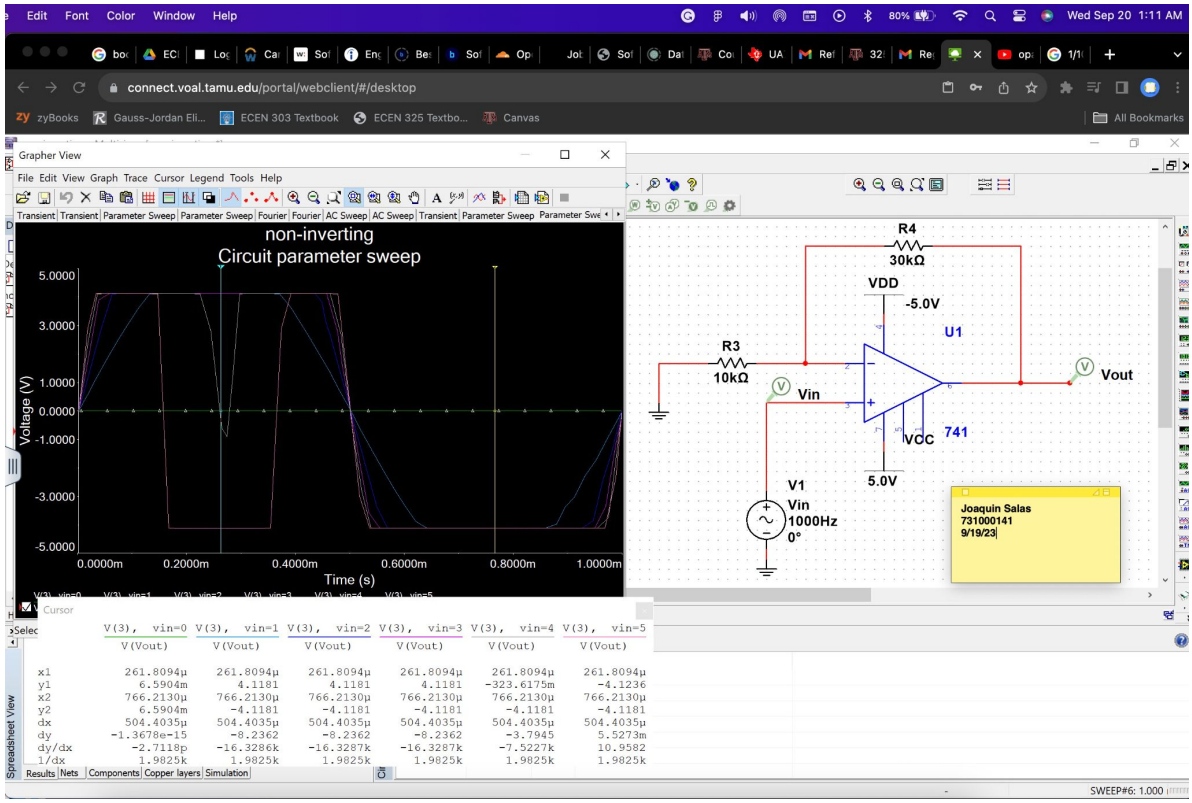
Non-Inverting Op-Amp Bode Plot



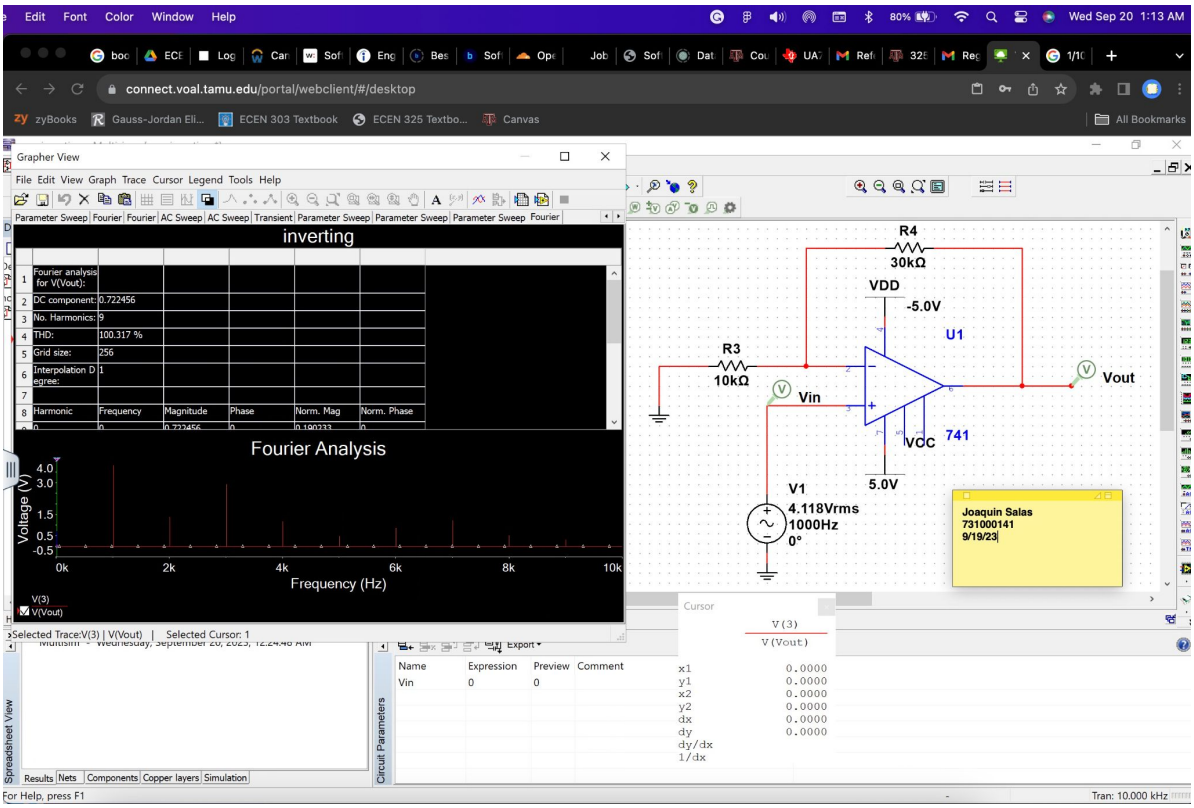
Non-Inverting Op-Amp Transient Analysis



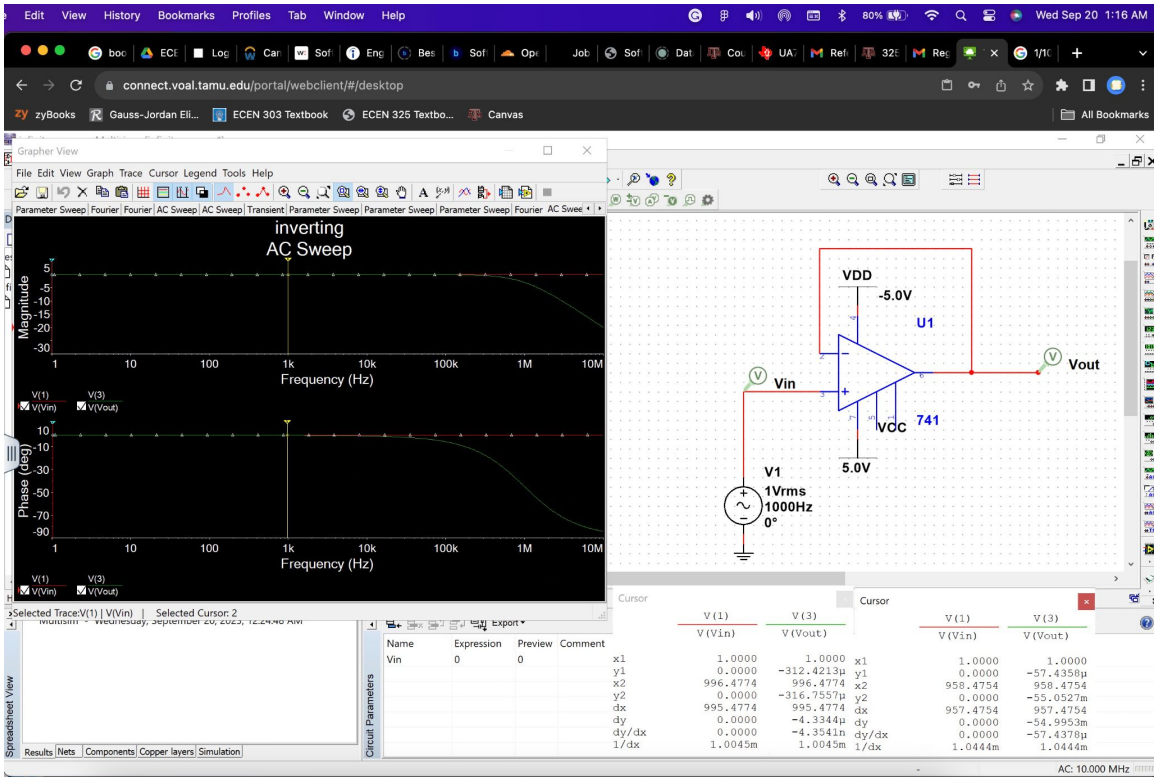
Non-Inverting Op-Amp Parameter Sweep



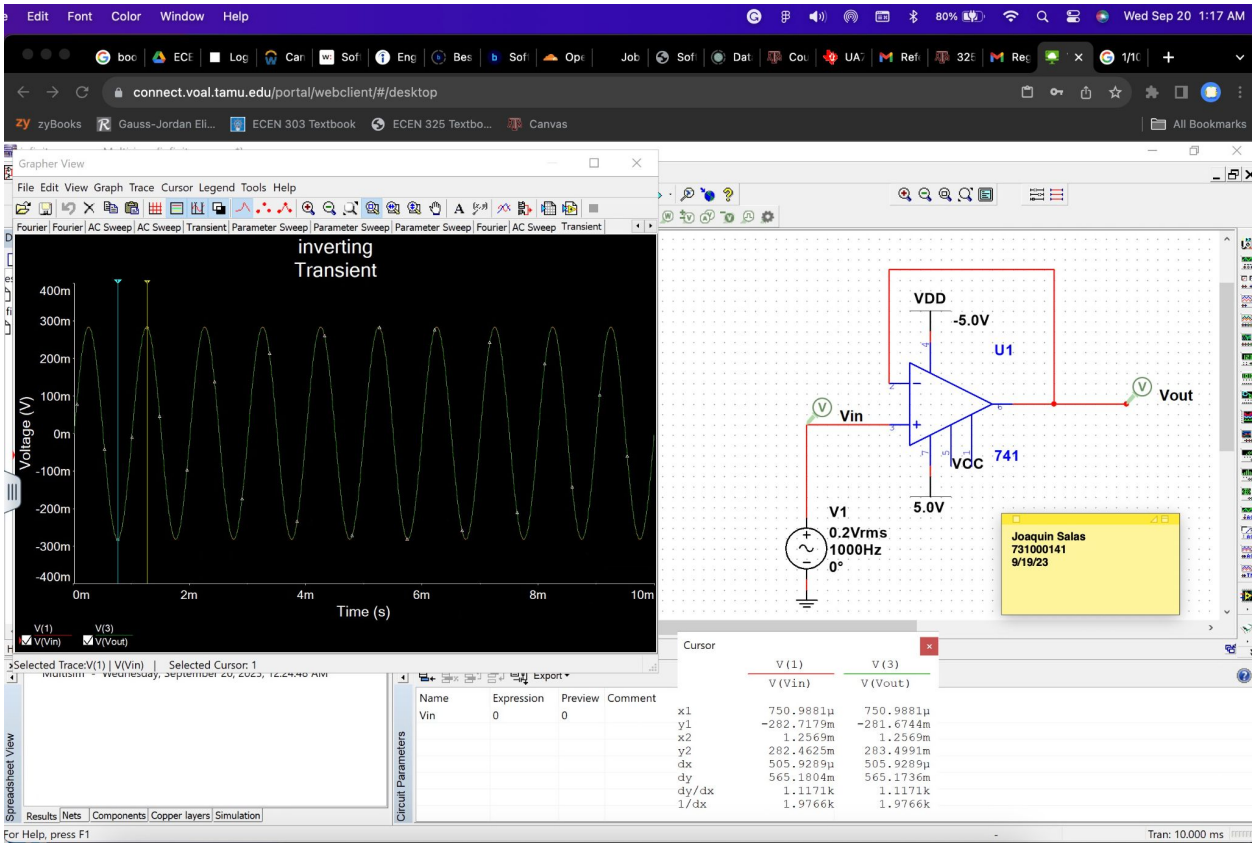
Non-Inverting Op-Amp Fourier Analysis



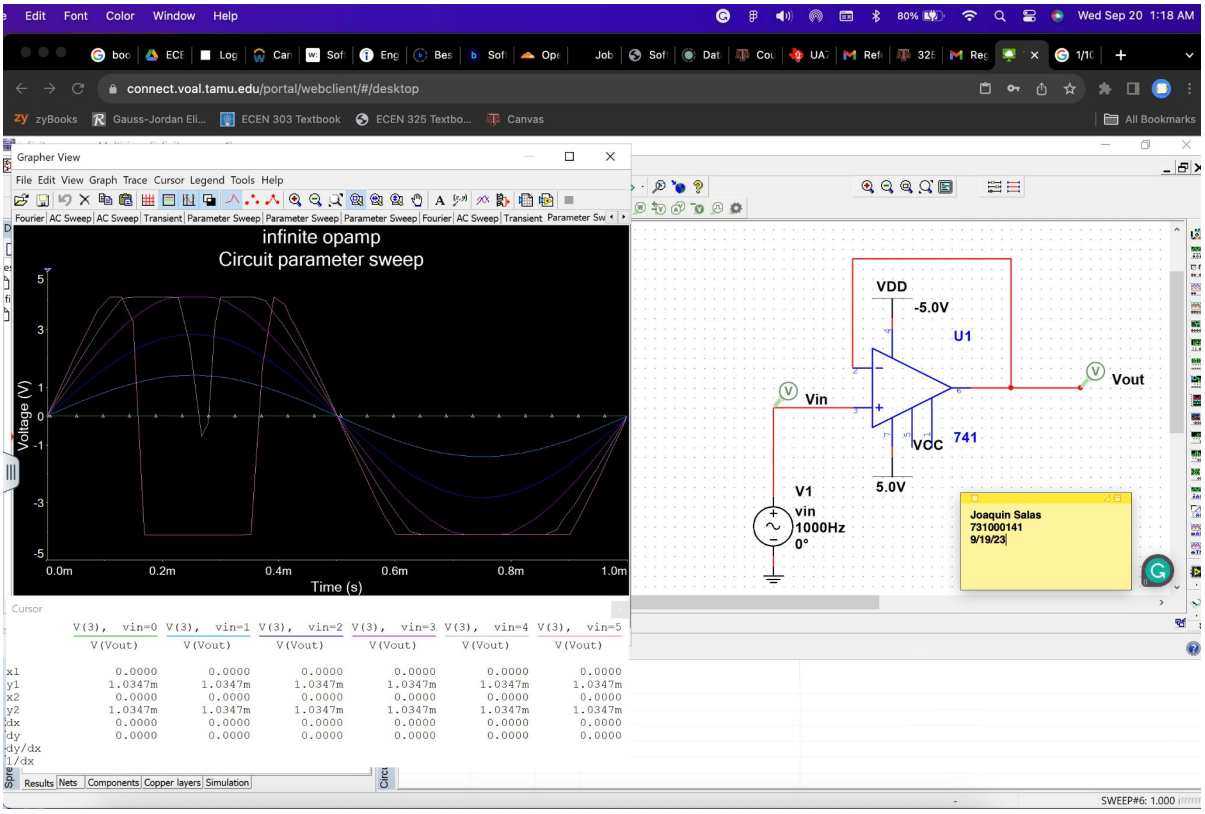
Voltage Follower Op-Amp Bode Plot



Voltage Follower Op-Amp Transient Analysis



Voltage Follower Op-Amp Parameter Sweep



Voltage Follower Op-Amp Fourier Analysis