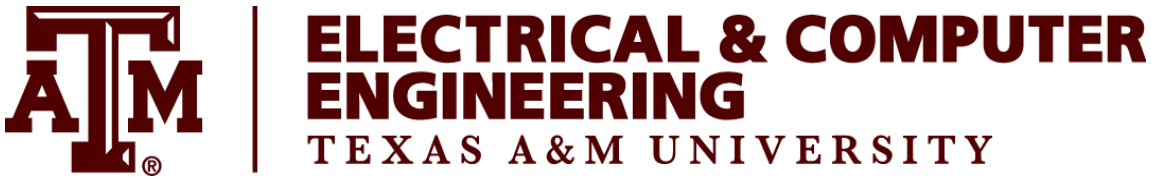

Post-Lab 3: Operational Amplifiers - Part 1

Kylan Lewis

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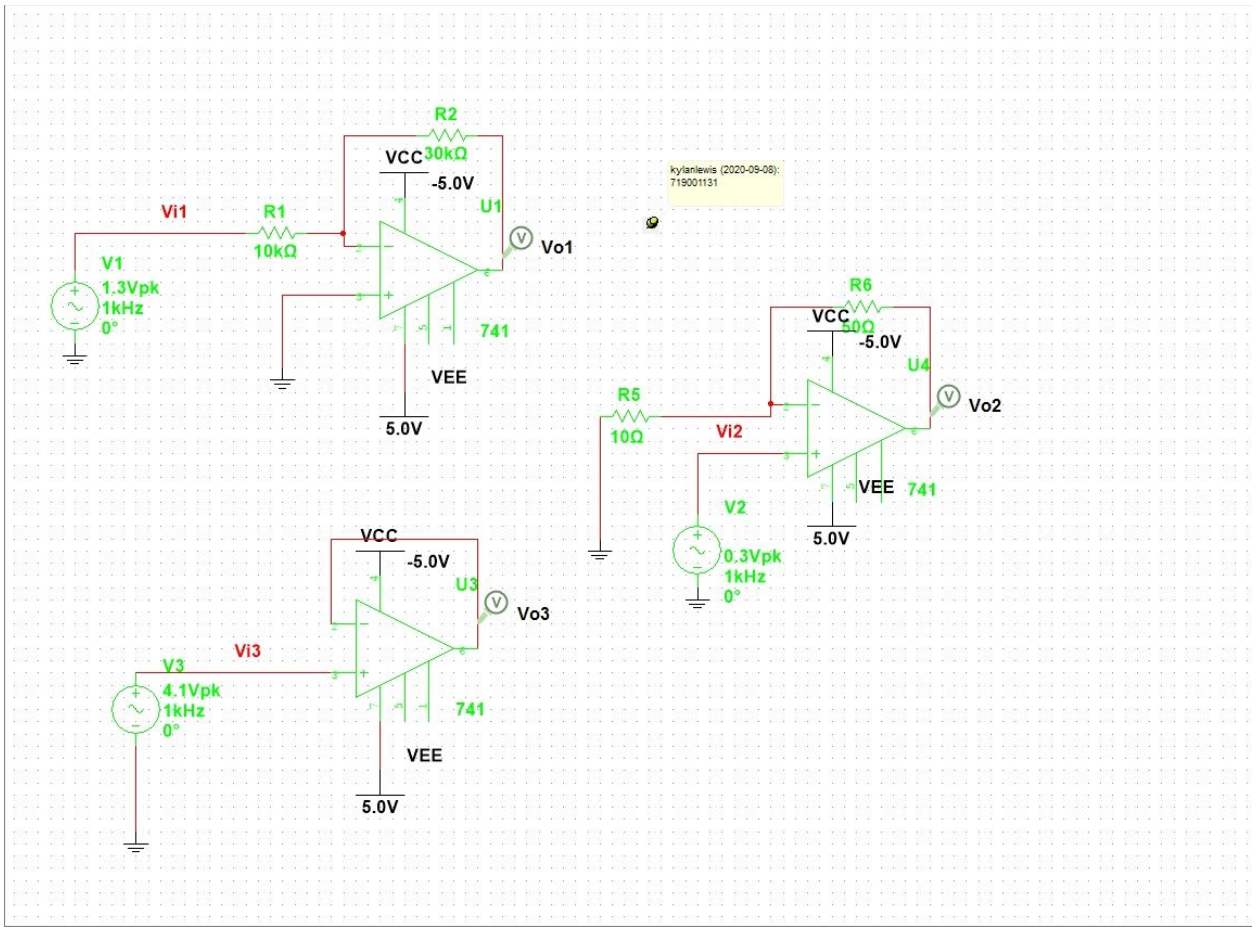
ECEN 325 -501

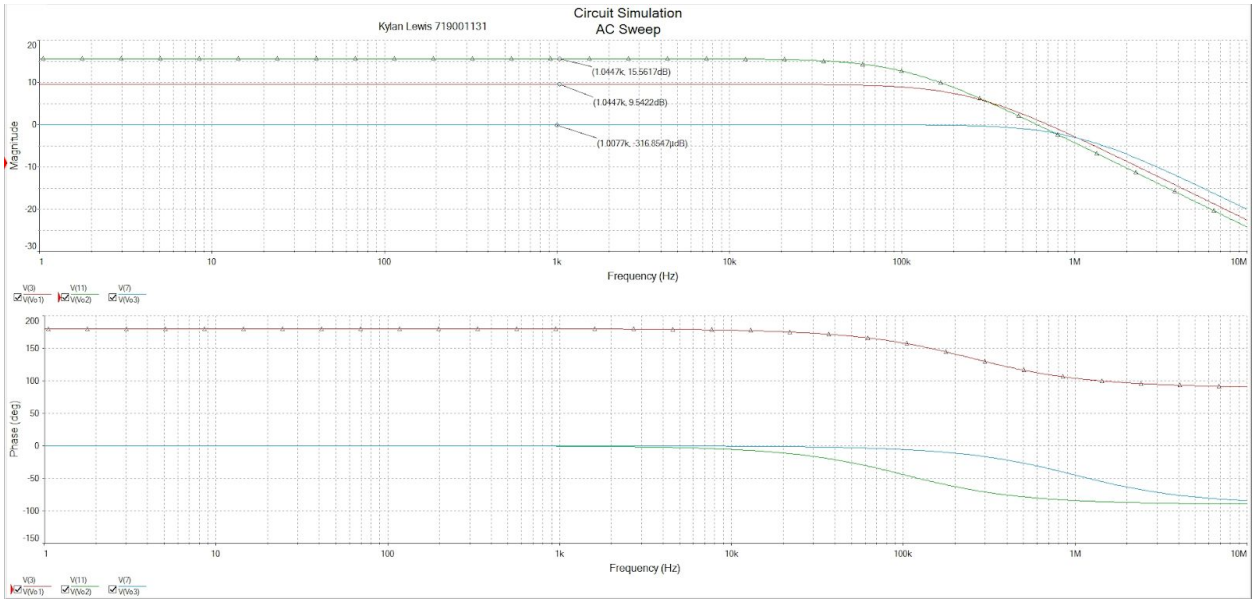
TA: Jian Shao

Date: 9/9/2020

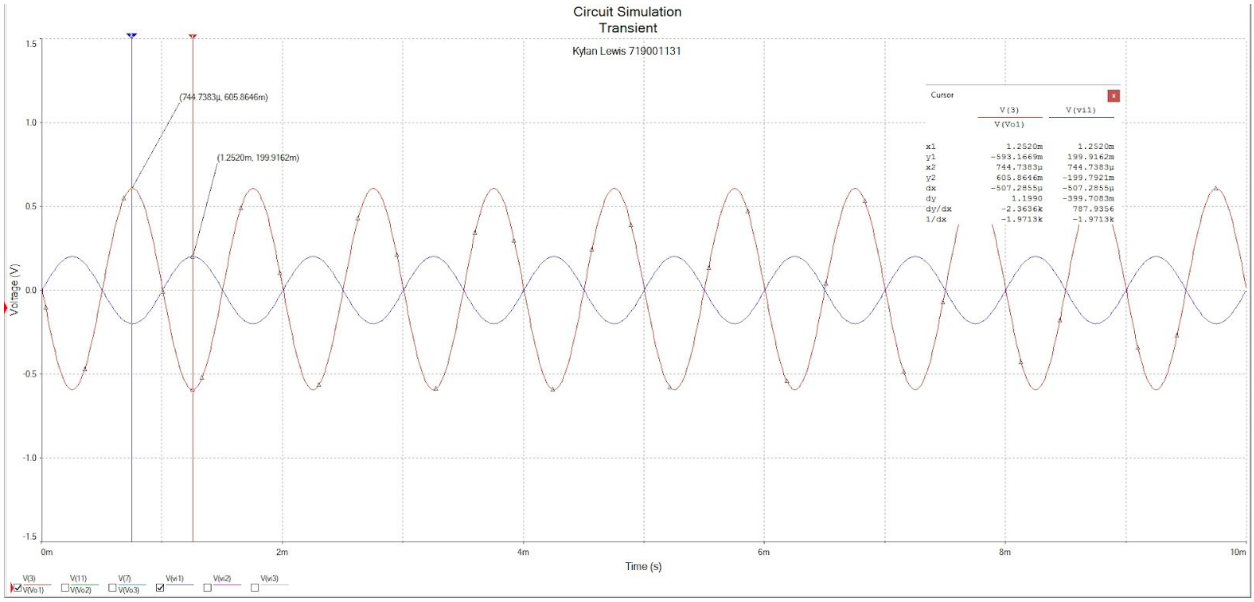
Simulations:

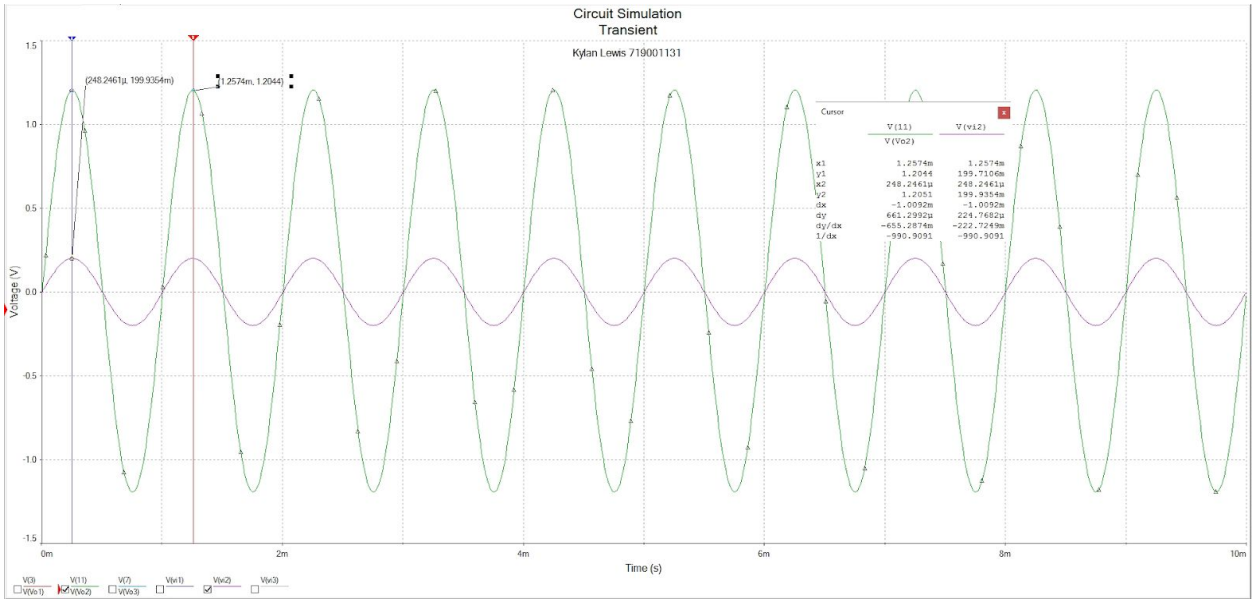


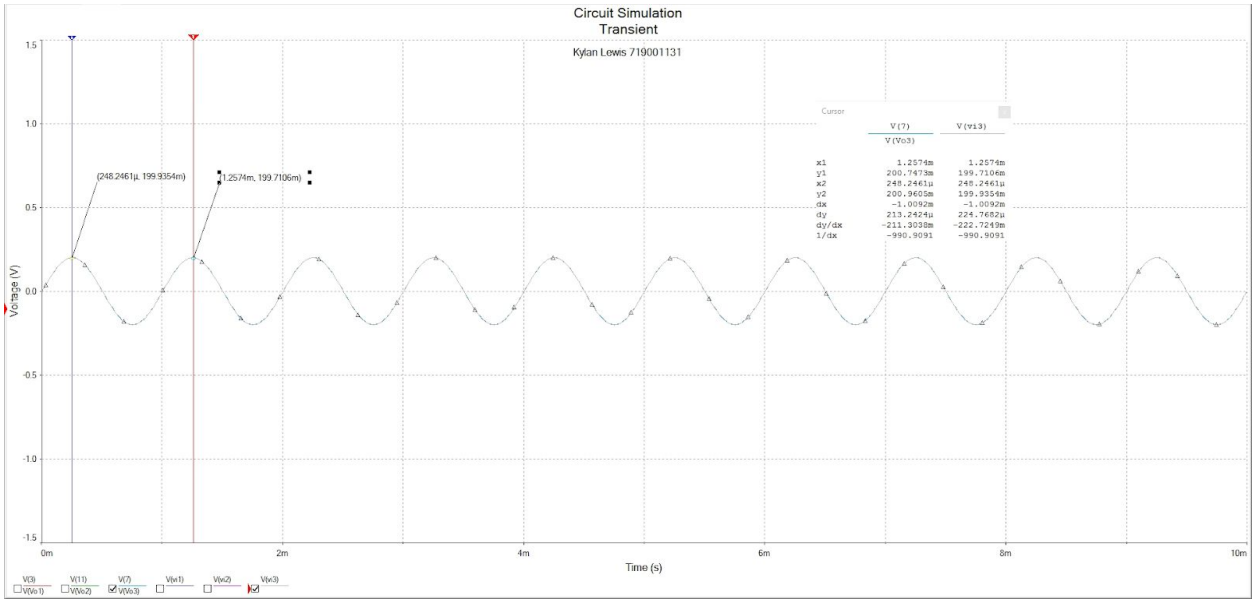
1. Bode Plot using AC simulation (gain measured @ 1 kHz)



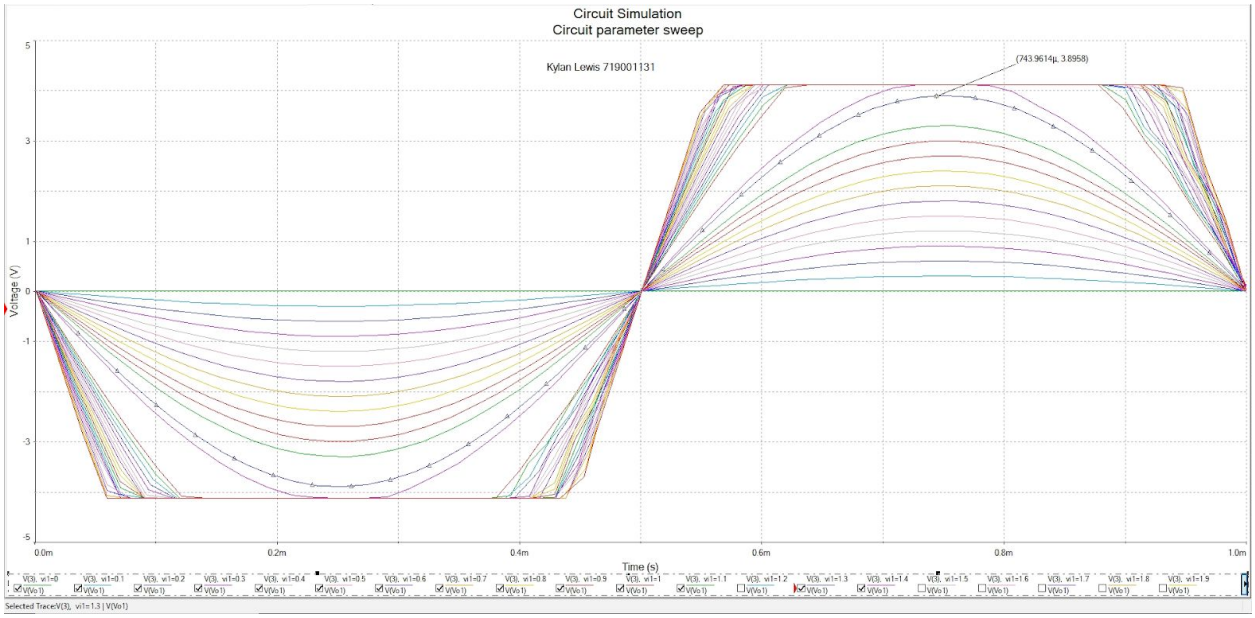
2. $V_i(t) = 0.2sin(2\pi 1000t)$ using Transient

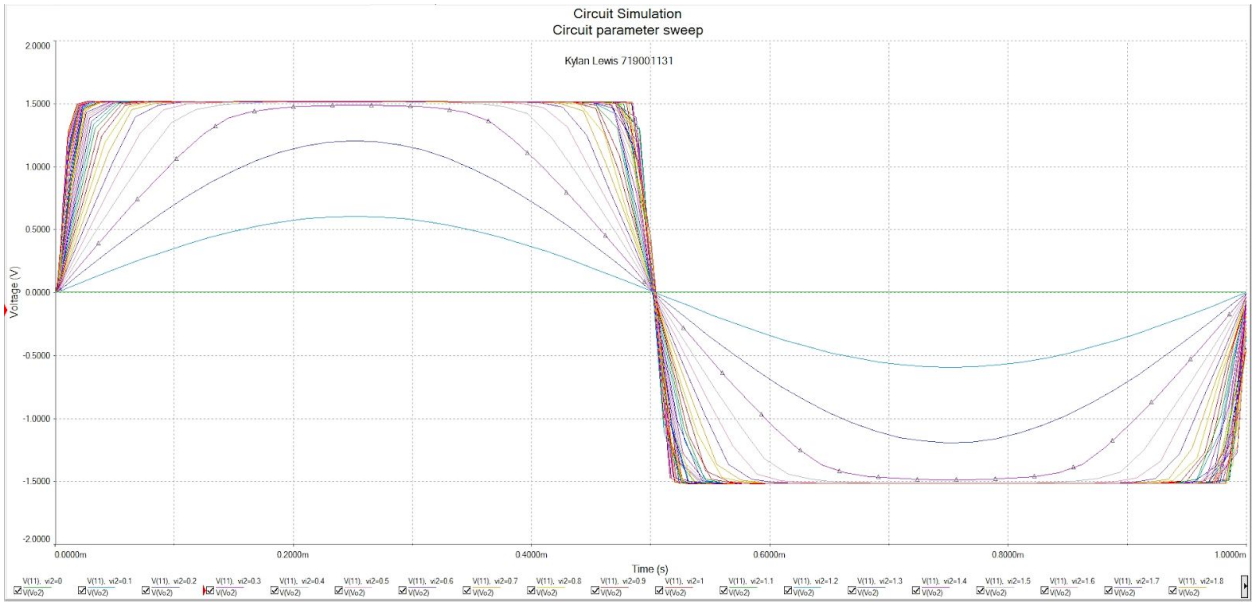


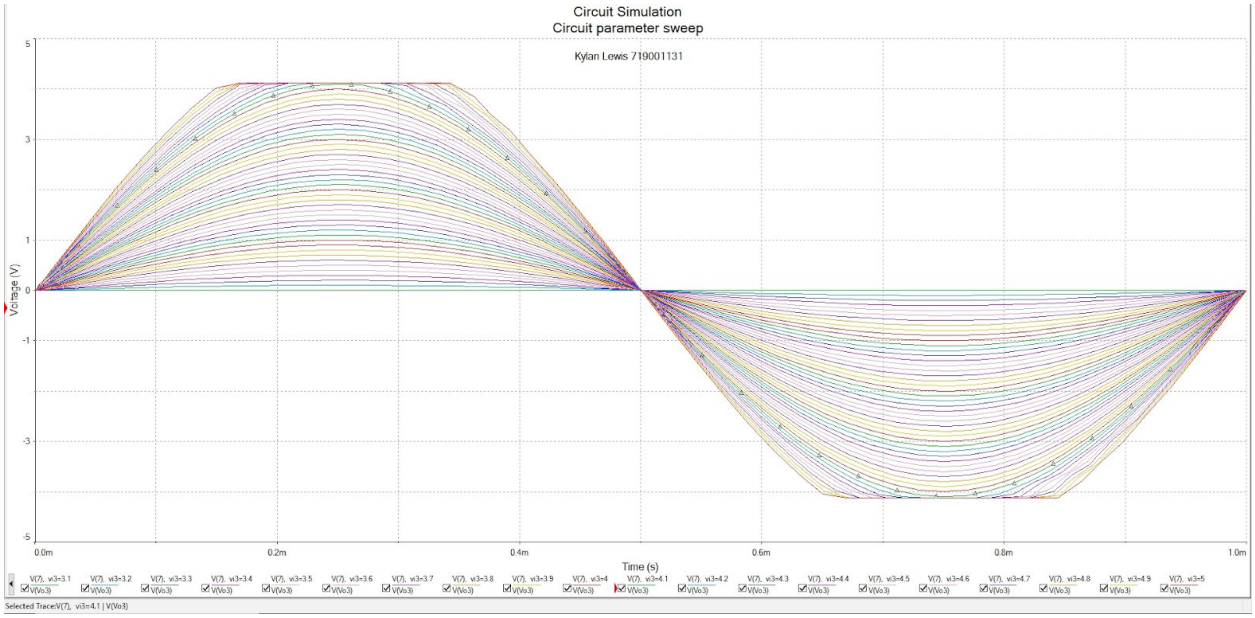




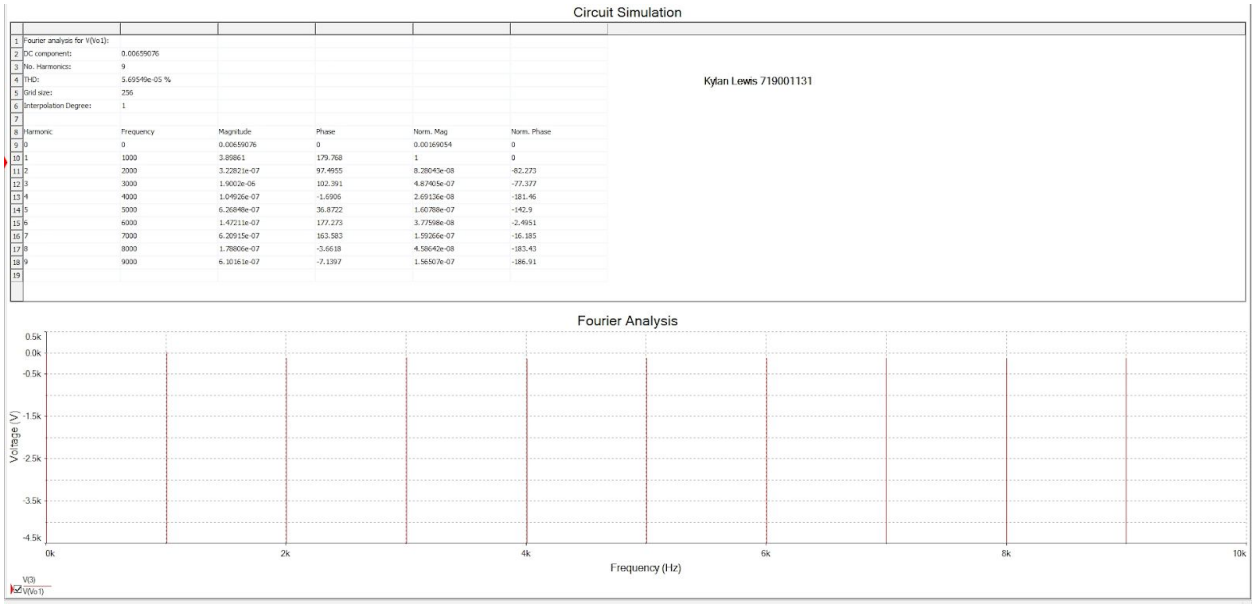
3. Sweep from 0 to 5V at 1kHz using Transient


Circuit Simulation
Circuit parameter sweep
Kylan Lewis 719001131
(743.9614µ, 3.8958)
Voltage (V)
Time (s)
5
3
1
0
-1
-3
-5
0.0m
0.2m
0.4m
0.6m
0.8m
1.0m

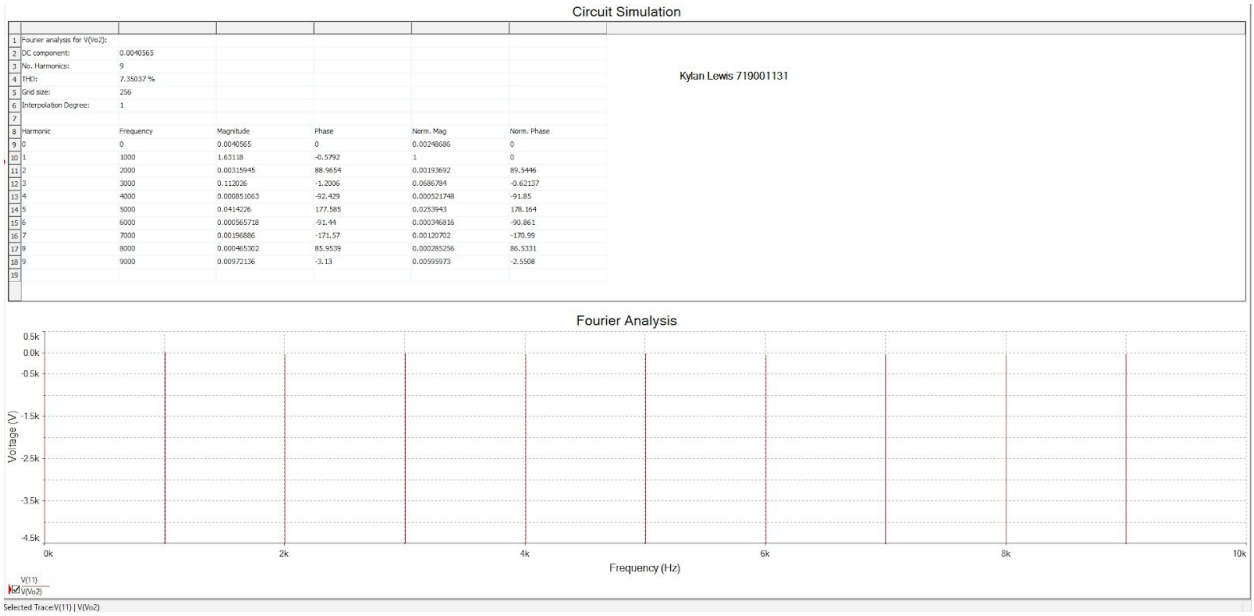

Circuit Simulation
Circuit parameter sweep
Kylan Lewis 719001131
Voltage (V)
Time (s)
2.0000
1.5000
1.0000
0.5000
0.0000
-0.5000
-1.0000
-1.5000
-2.0000
0.0000m
0.2000m
0.4000m
0.6000m
0.8000m
1.0000m

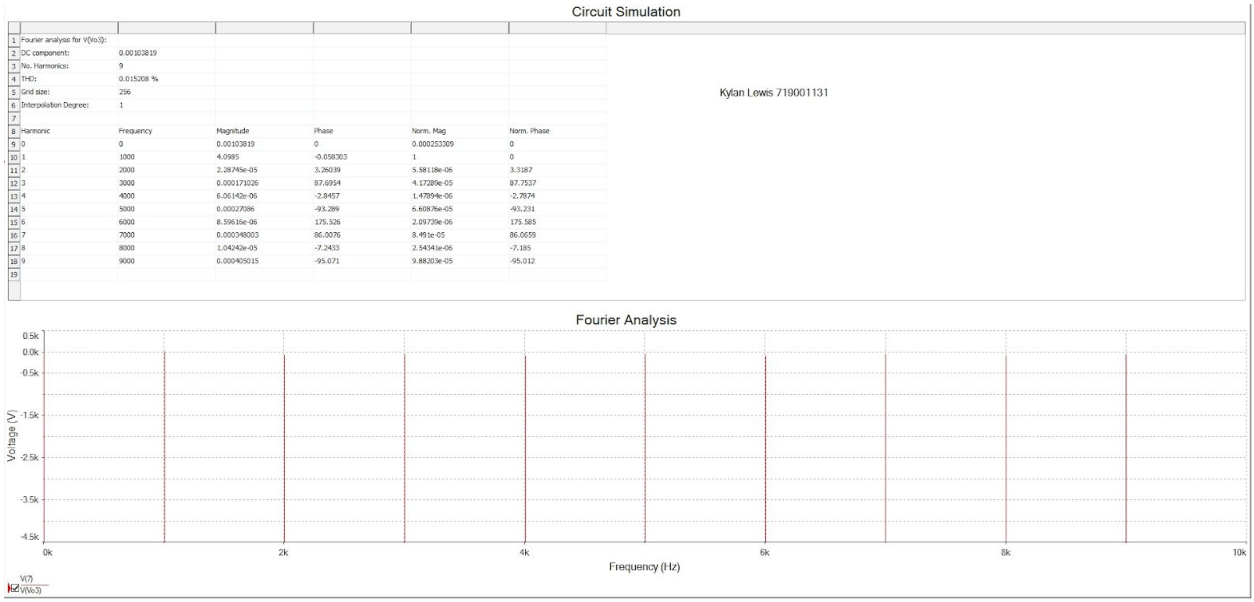


4. $V_i(t) = V_{i1\,max} sin(2\pi 1000t)$ using Fourier simulation



Fourier analysis for V(Vo1):					
DC component:	0.00659076				
No. Harmonics:	9				
THD:	5.69549e-05 %				
Grid size:	256				
Interpolation Degree:	1				
Harmonic	Frequency	Magnitude	Phase	Norm. Mag	Norm. Phase
0	0	0.00659076	0	0.00169054	0
1	1000	3.89861	179.768	1	0
2	2000	3.22821e-07	97.4955	8.28045e-08	-82.273
3	3000	1.9002e-06	102.391	4.87405e-07	-77.377
4	4000	1.04926e-07	-1.6906	2.69136e-08	-181.46
5	5000	6.26848e-07	36.8722	1.60788e-07	-142.9
6	6000	1.47211e-07	177.273	3.77598e-08	-2.4951
7	7000	6.20915e-07	163.583	1.59266e-07	-16.185
8	8000	1.78806e-07	-3.6618	4.58642e-08	-183.43
9	9000	6.1016e-07	-7.1397	1.56507e-07	-186.91





TA Question:

Why did the student in the video use 200mV for amplitude when he plotted the Bode plot with a network analyzer?

The student chooses to use 200mV for the input amplitude when using the network analyzer because the maximum input amplitude is 0.5V. Anything over this would produce clipping and saturate the OpAmp. Also, he chooses the relatively small value 200mV which is the only option under 500mV and guarantees the amplifier Bode plot is linear.