Transistor Amplifier Circuits

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Experiment 3.1.1:

This part of the experiment was done with the circuit below. Also the obtained DC operating point values can be seen below as well.

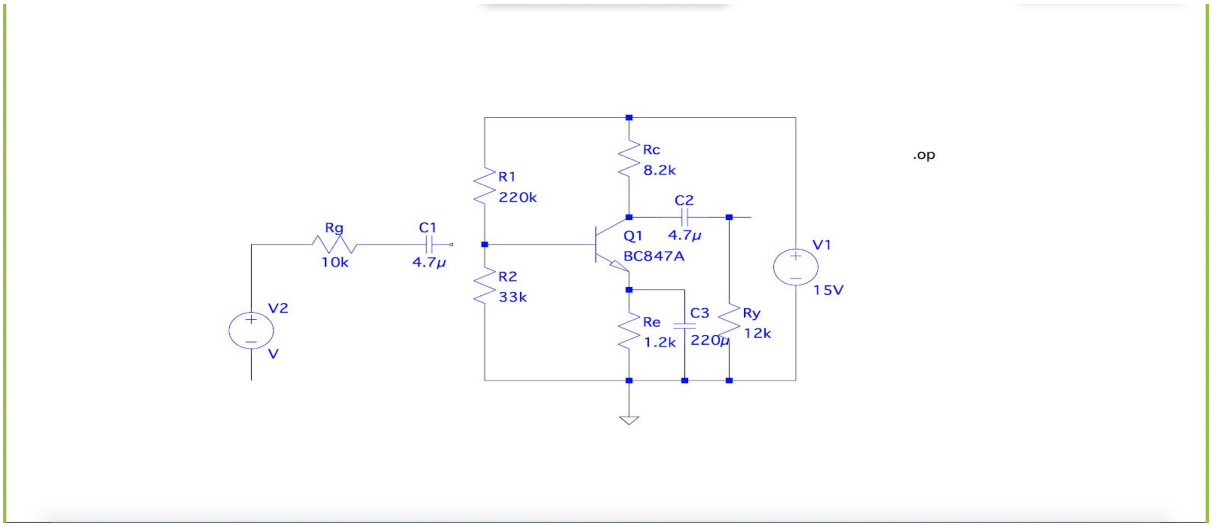
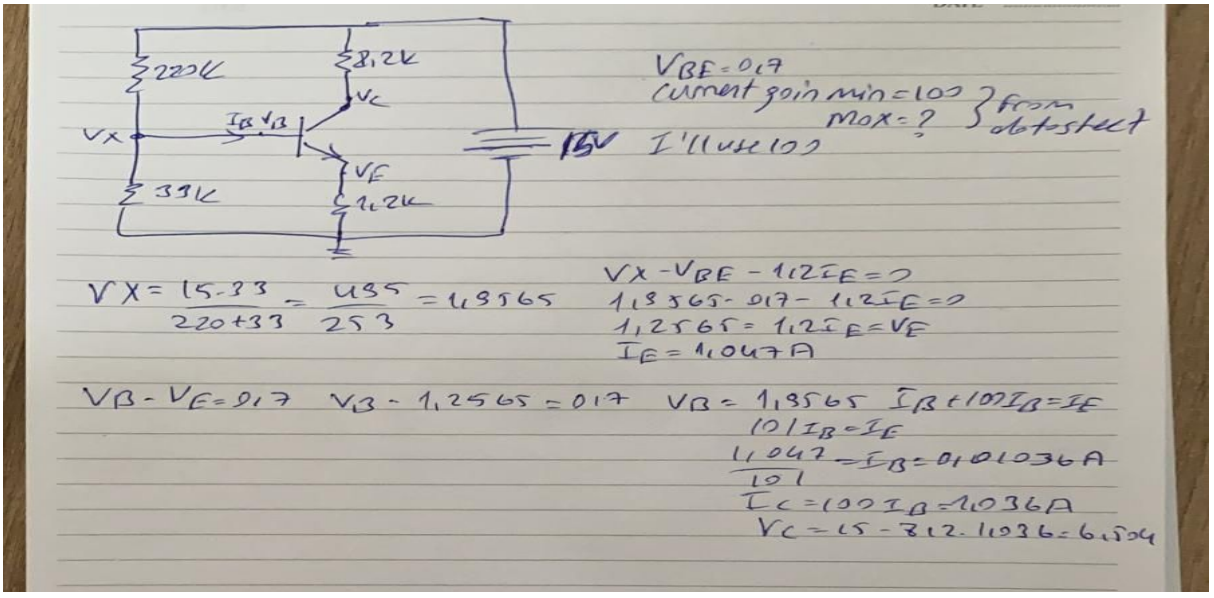
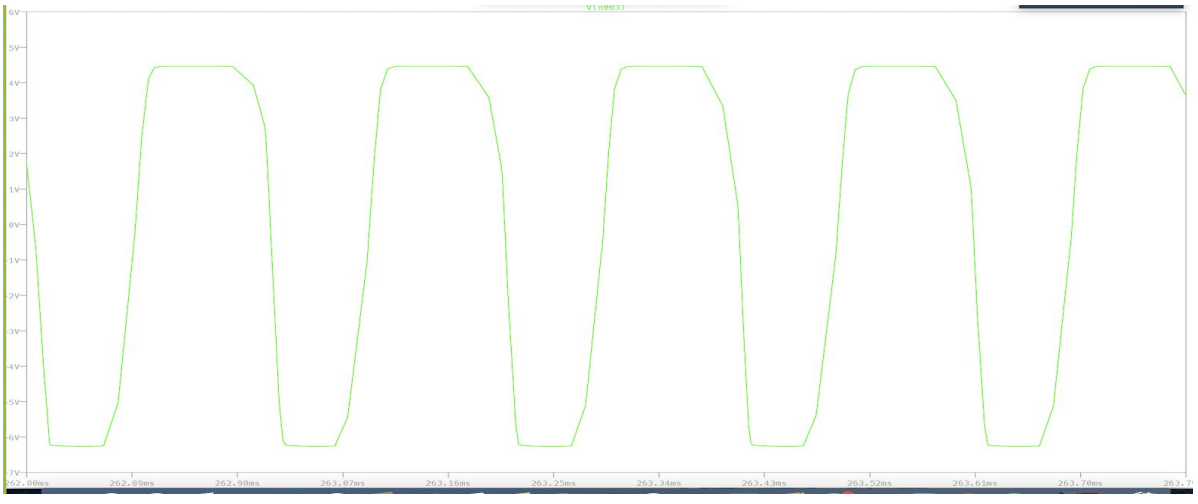


Table for part 3.1.1 can be seen below. Also the calculations are shown as well for the theoretical values.

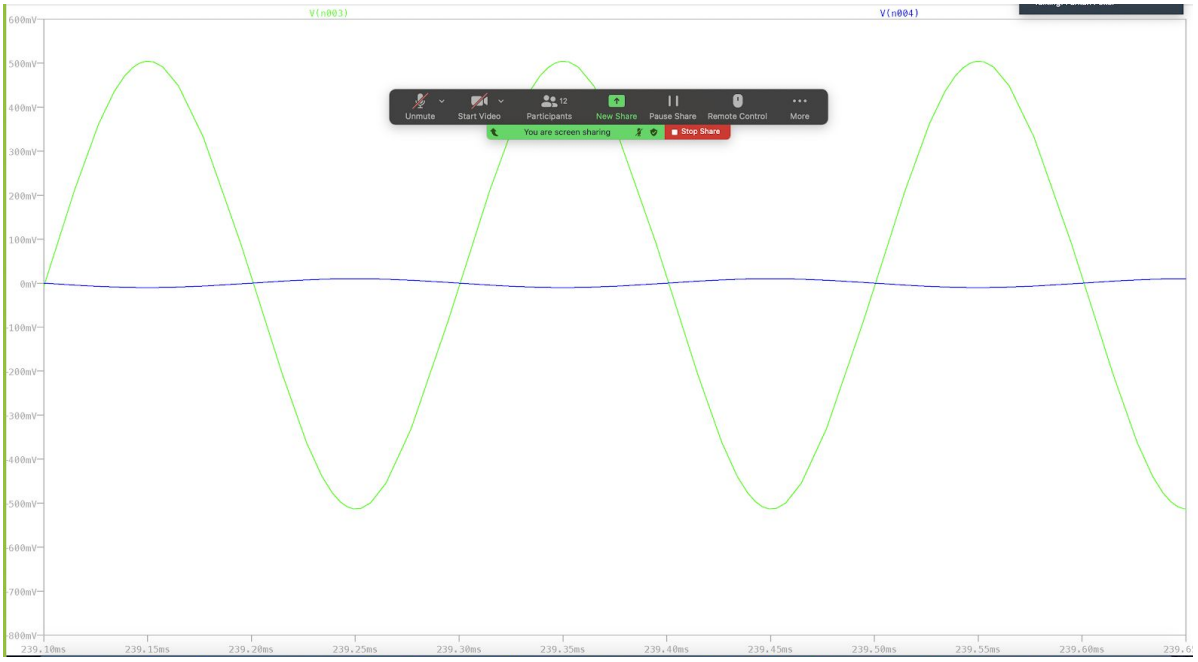
	Theoretical Value	Measured Value
V_C	6.504V	7.1398V
V_B	1.9565V	1.806V
V_E	1,2565V	1.156V
I_C	1.036	958.55491µA



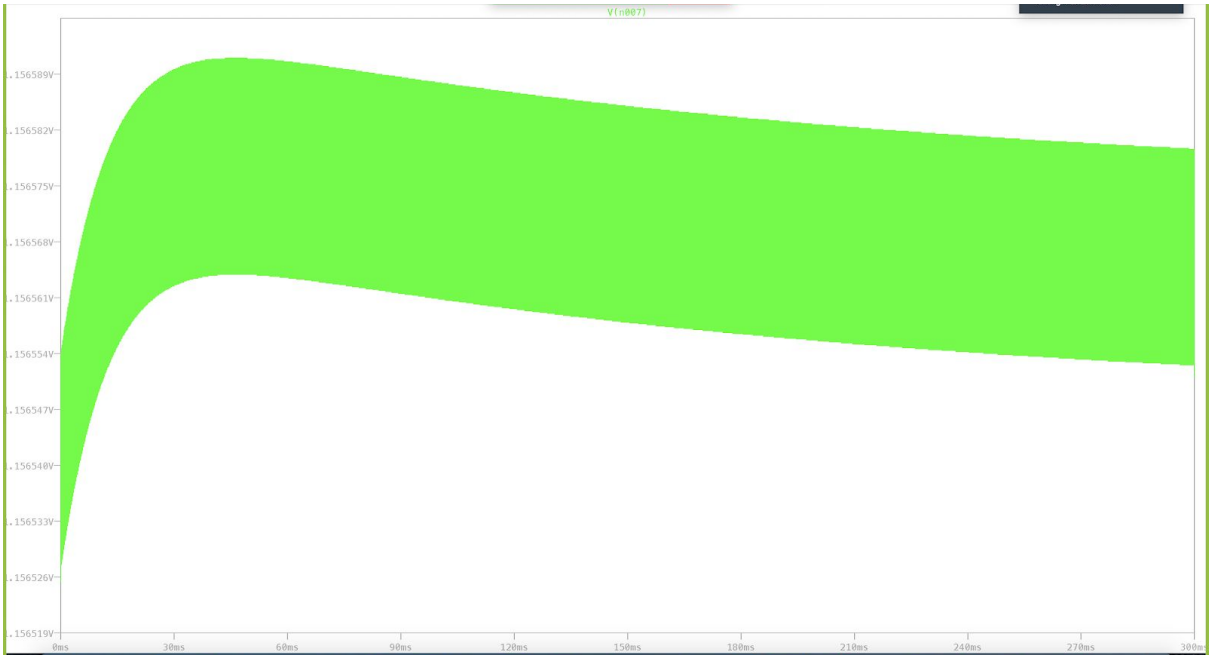
3.1.2: I tried clipping with many different values. 100-120 frequency values = no clipping. It started clipping when I tried 130. So I started putting values in between 120-130. The closest I got to clipping was 127 and 128. İt didn't clip at 127 but it did at 128 so 128 can be said to be the clipping value. A figure for a clipping wave is shown below as well. To note the clipping started with a symmetrical clip and continued that way.



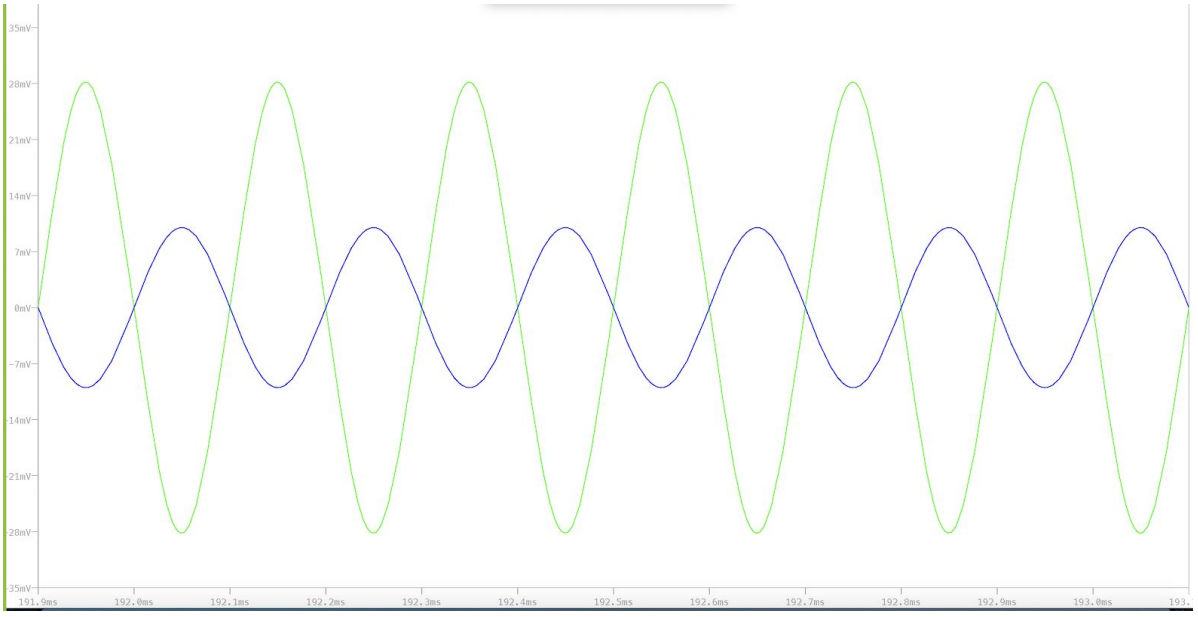
3.1.3:
Graph for output voltage/input voltage against time can be seen below. The blue line is the input voltage while the green line is the output voltage. (P.S. I didn't notice the zoom box while taking the picture so sorry about that.) The output voltage peak was 501,56mV while the input voltage peak was 9.93mV. So our gain was output/input = 50,509.



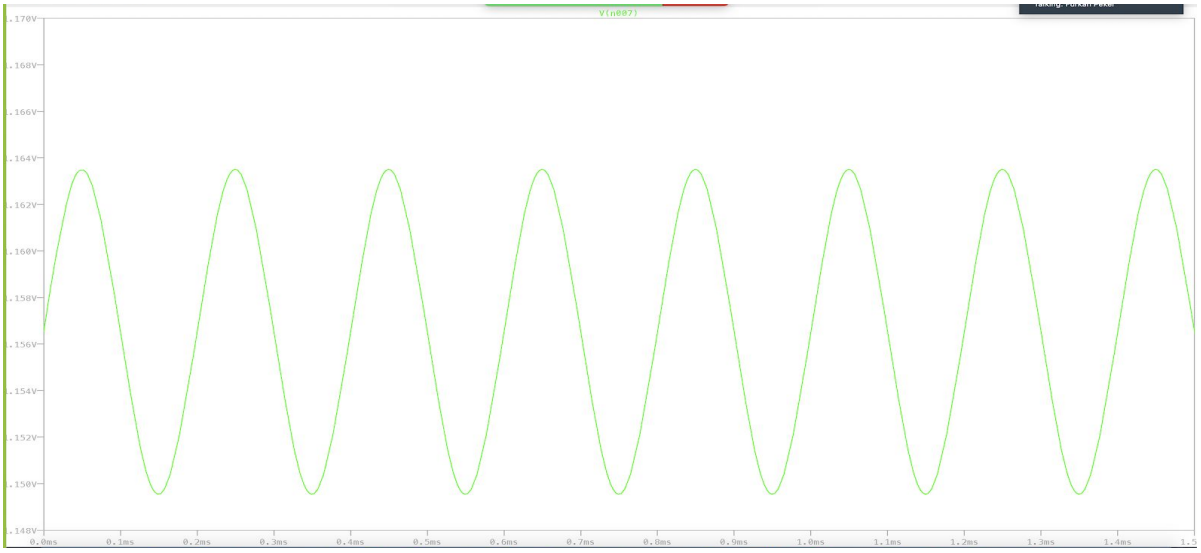
The emitter voltage against the time graph is below as well.



3.1.4: Graph for output voltage/input voltage against time after taking the capacitor out can be seen below.The blue line is again the input voltage while the green line is the output voltage. This time the peak voltage four output is 28,04mV while the peak voltage for input doesn't change. Out gain is output/input = 2,82376.

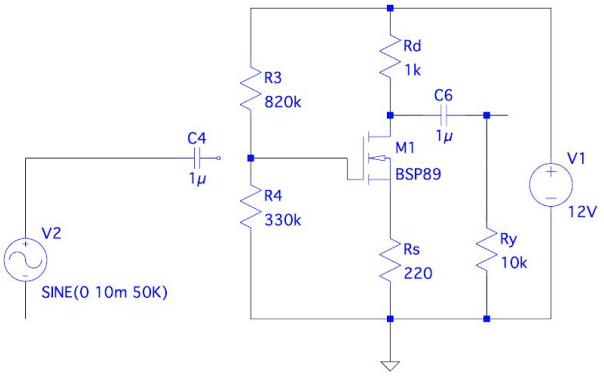


Also the emitter voltage against the time graph is below as well. This is for when the capacitor was taken out.



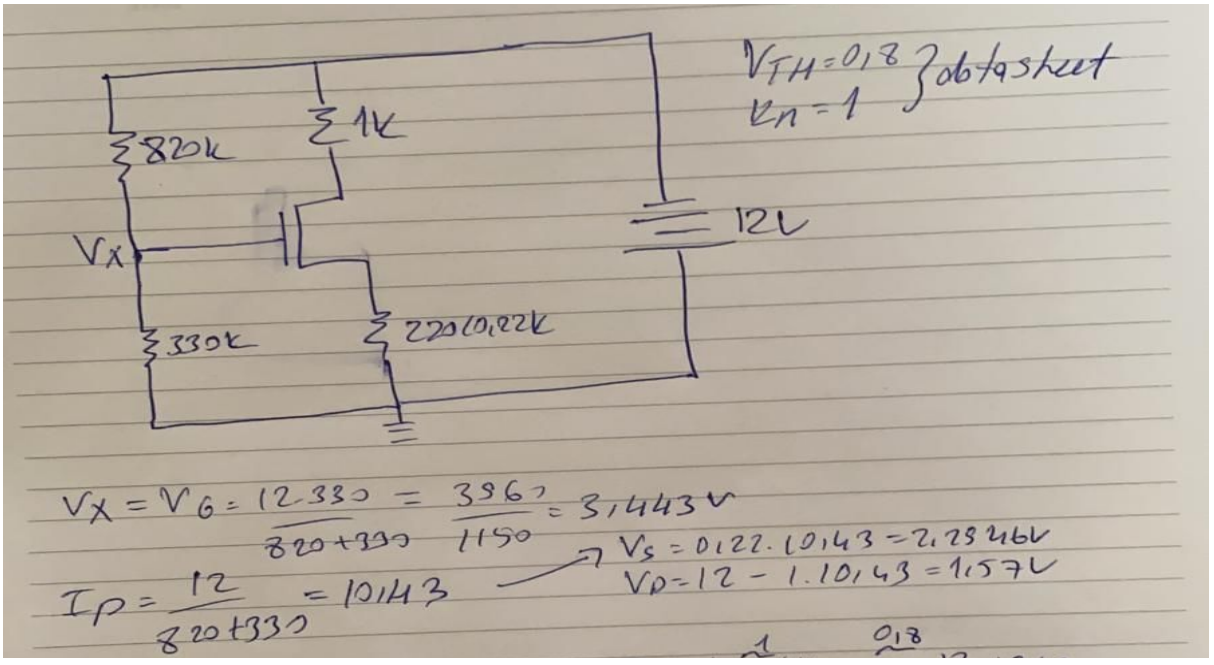
3.1.5:
The bypass capacitor (the capacitor removed from the circuit) shorts AC signals to the ground bypassing the noise from AC on the DC signal. This makes a much cleaner and pure DC signal. When this capacitor is removed, a degeneration will happen in the signal and this will cause the voltage gain to be a lot lower than it would normally be. This can easily be seen in the calculations made for the voltage gain in the last two parts of the experiment as well.

3.2.1:
This part of the experiment was done with the circuit below. Also the obtained DC operating point values can be seen below in the table as well with my calculations for the theoretical values.



.tran 0.2

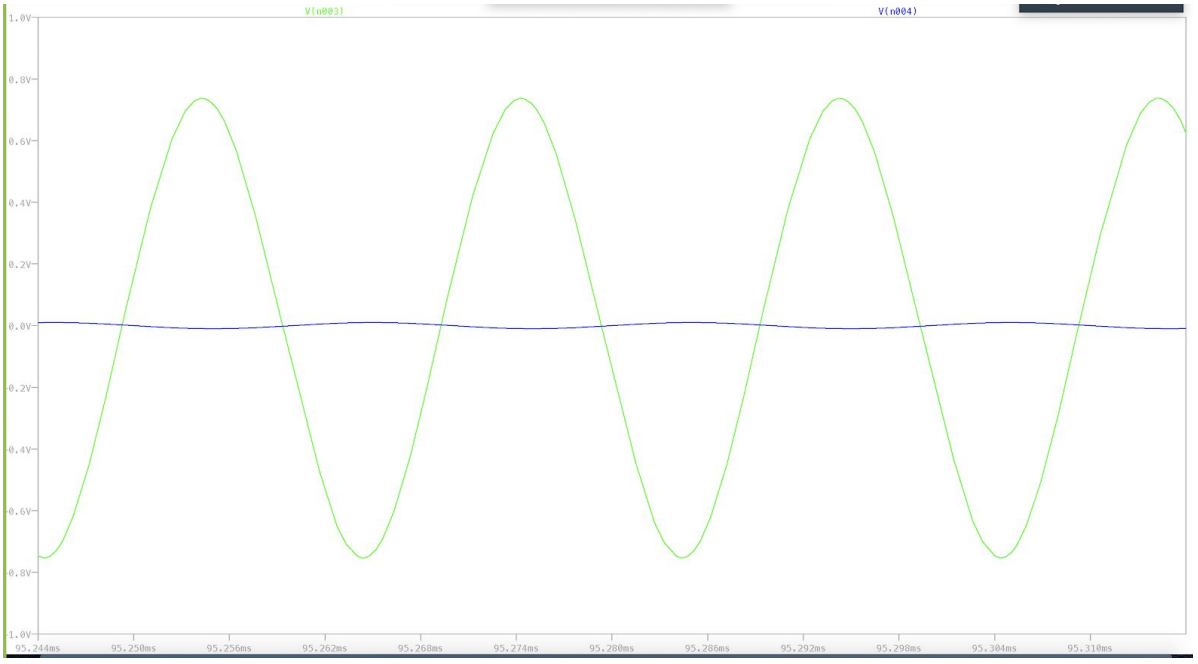
	Theoretical Value	Measured Value
V_d	1,57V	4.1525841V
V_g	3,443V	3.4434783V
V_s	2,2946V	1.7264315V
I_d	10,43mA	7.8474162mA



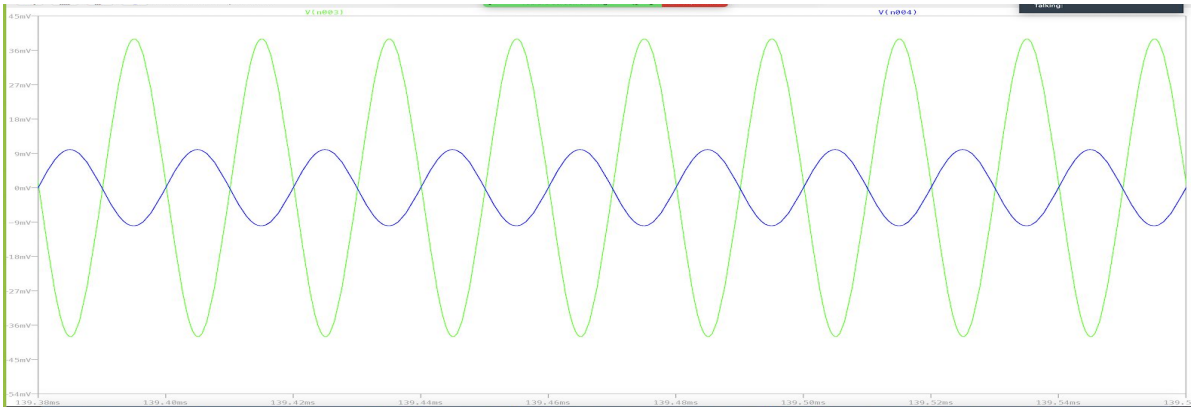
3.2.2:
I tried clipping with different values for this part of the experiment as well. I started by trying 10-25 which resulted in no clipping. After trying 35 it started clipping but only in the negative direction. So I started trying values between 25-35. I tried clipping with many different

values. 100-120 frequency values = no clipping. 30 and 31 didn't clip while 33 did. I lastly tried 32 which also clipped so the closest value to clipping I got was 32. Also to note that none of these clippings were symmetrical. All of them clipped on the negative side of the graph. Also this time i am not adding a picture as well because it is basically the same picture adding in part 3.1.2 of the experiment. Only difference is the clipping is done only on the negative side.

3.2.3:
Graph for output voltage/input voltage against time can be seen below. The blue line is the input voltage while the green line is the output voltage.
The output voltage peak was 755mv while the input voltage peak was 9.93mv. So our gain was output/input = 76,03222.



3.2.4:
Graph for output voltage/input voltage against time for when the capacitor was removed can be seen below. The blue line is the input voltage while the green line is the output voltage.
The output voltage peak was 38.926mv while the input voltage peak didn't change. So our gain was output/input = 3,92004.



3.2.5:
Basically the same thing discussed in 3.1.5 applies. When the capacitor is removed, the signal is degenerated making the gain a lot lower than when the capacitor was included in the circuit. This also can be seen comparing the calculations on 3.2.3 and 3.2.4.