EE 342: Electronics II
Simulation Project

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Problem 1:

Through hand calculation, R1 was found to be 6.9 K. Using Multisim, through trial and error, R1 was found to be 7225 ohms. This resulted in Vo to be 0.032 V, which is within the range of the given specification.

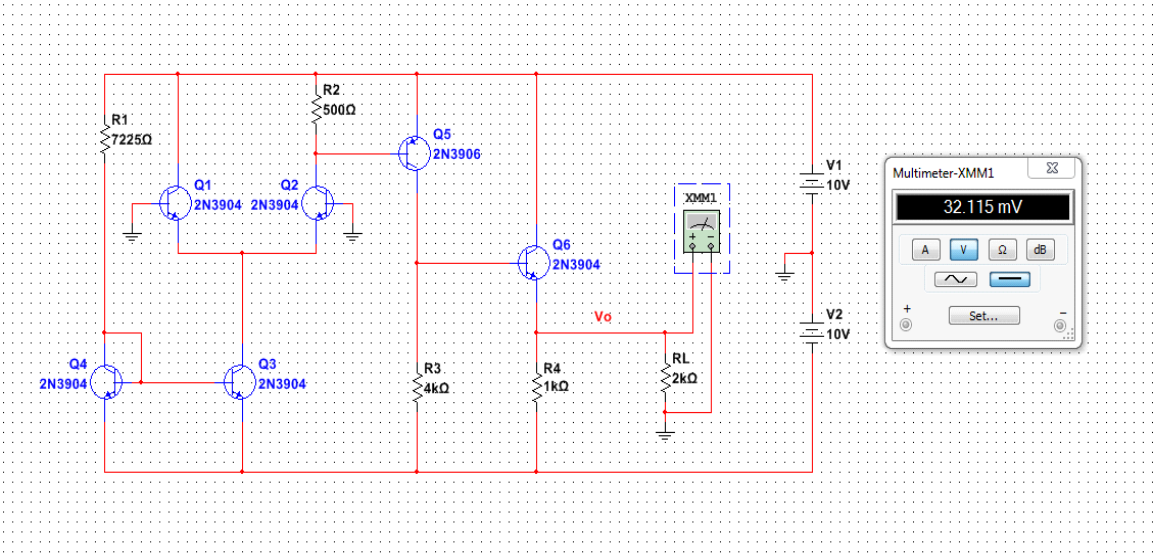


Figure 1. Finding the value of R1

Problem 2:

The DC transfer function was plotted below. The gain is estimated to be 1800 v/v.

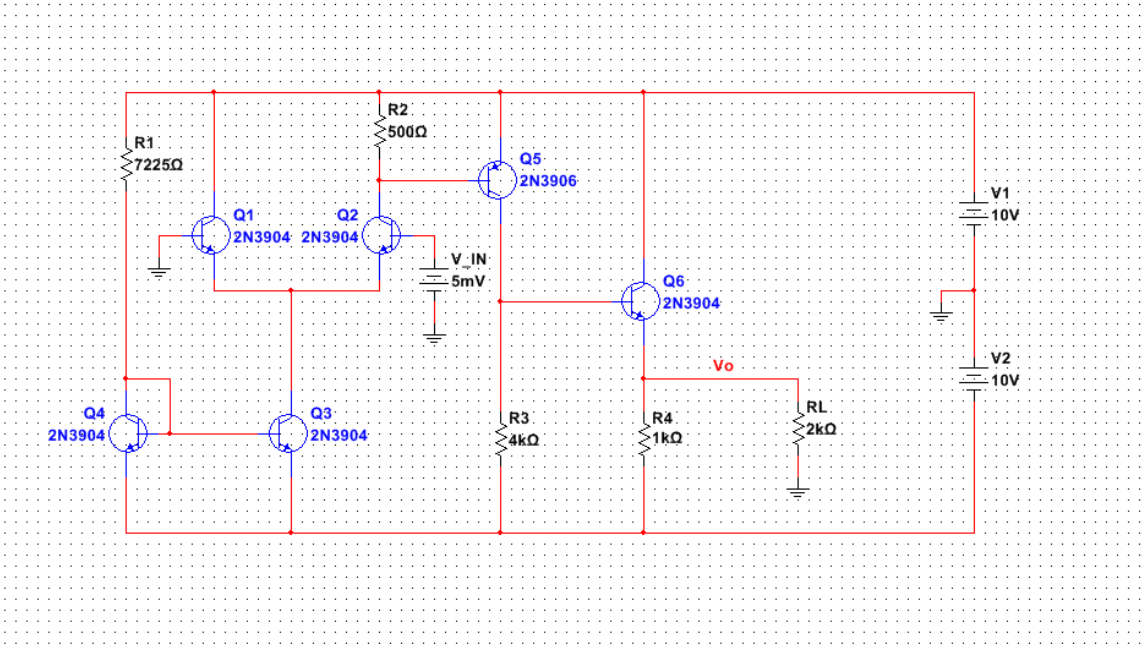


Figure 2. Finding the gain of the Op-Amp

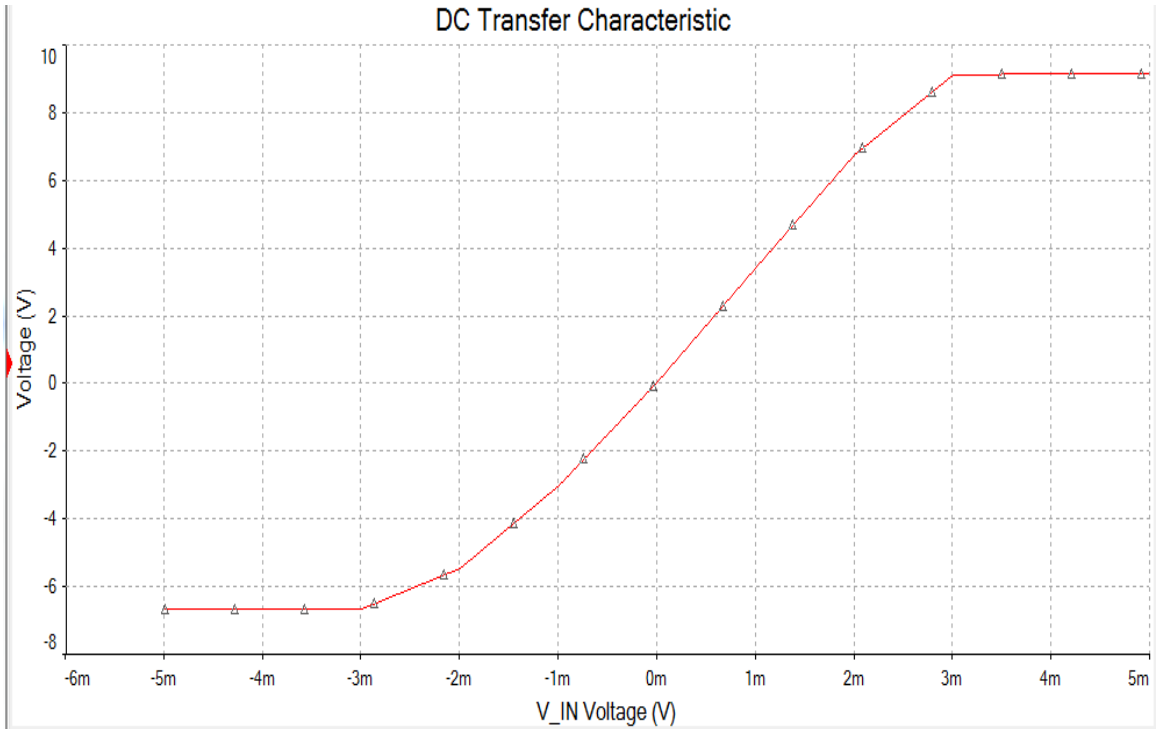


Figure 3. Plotting Vo vs. Vin

Problem 3: The open loop gain and the phase as a function of frequency was plotted below.

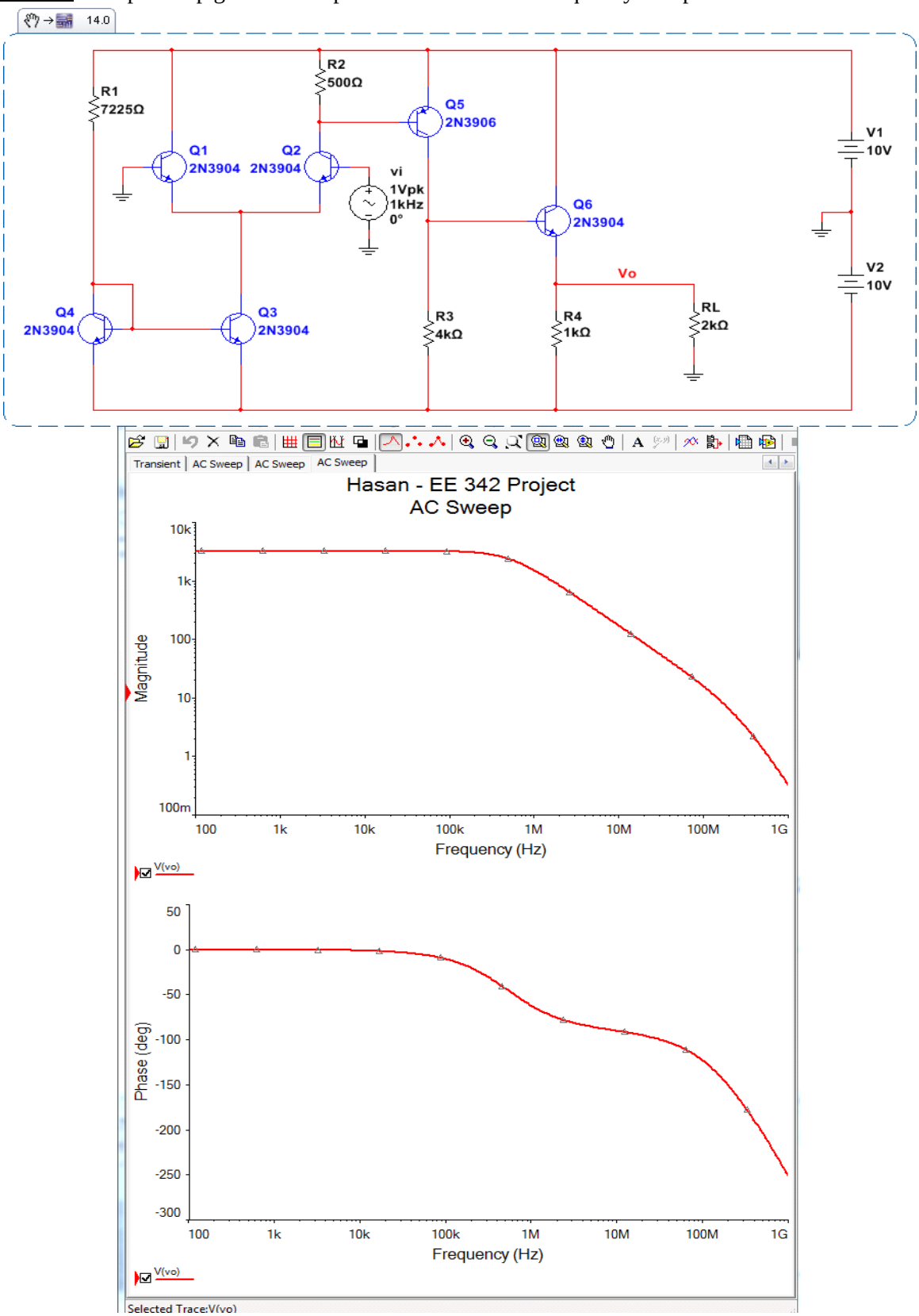
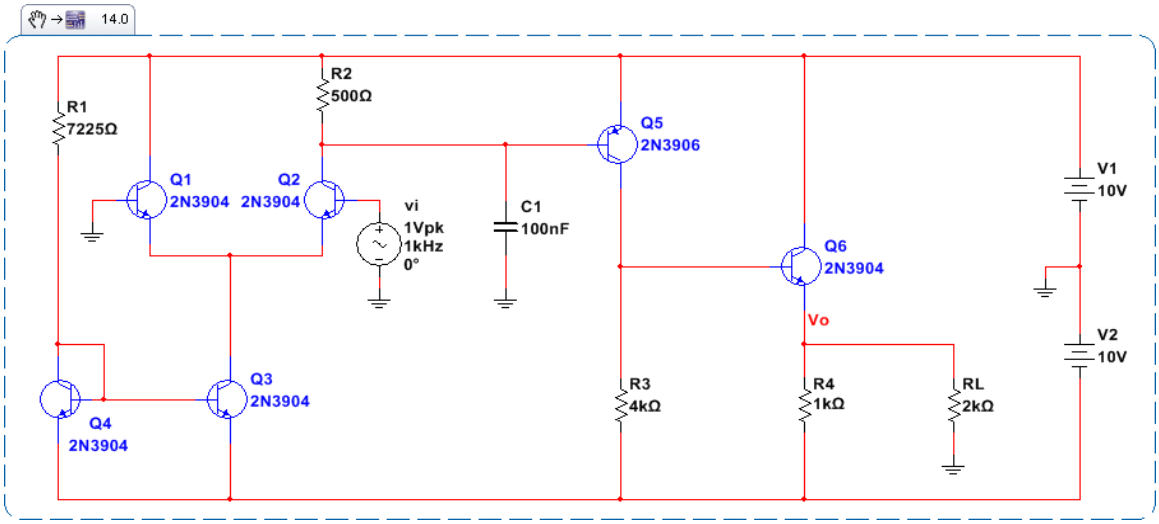


Figure 4. Plotting the open loop gain and the phase as a function of frequency

Problem 4: Stabilizing the Op-Amp using a compensating capacitor



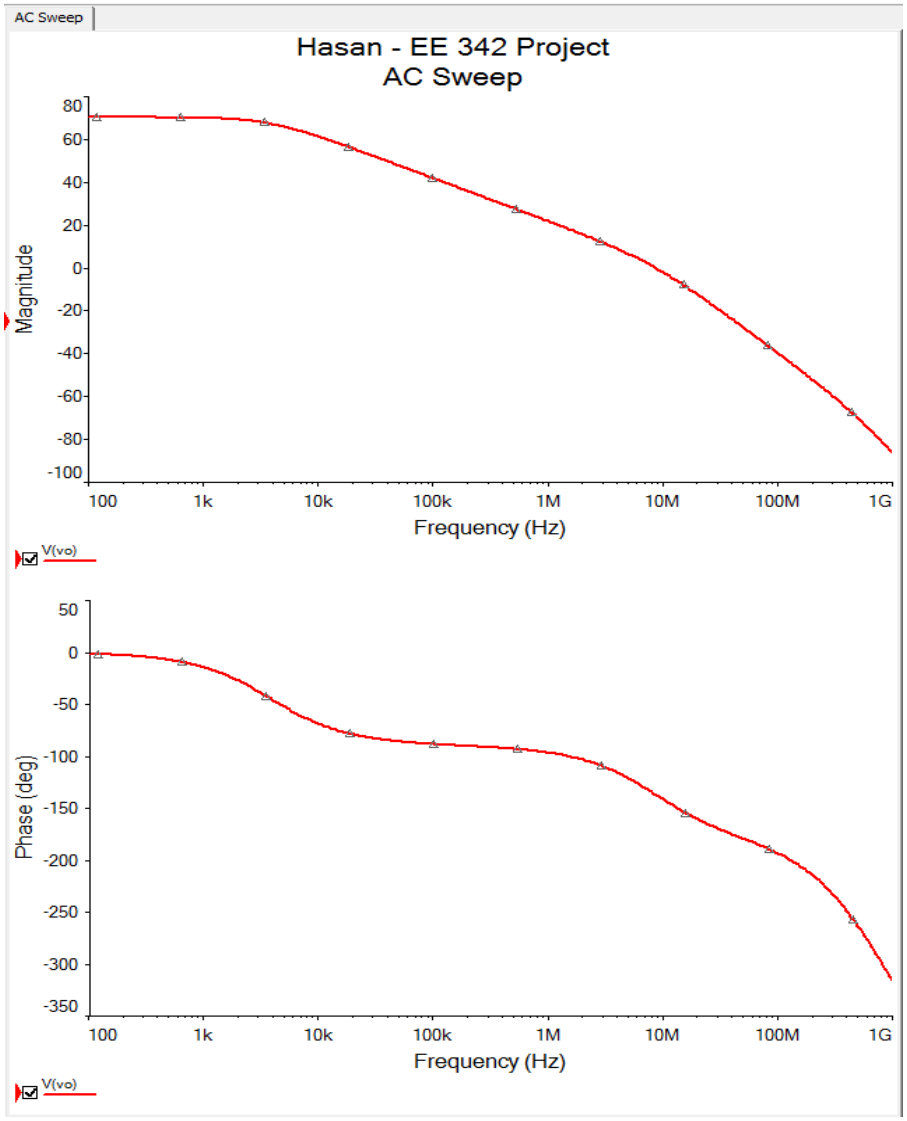
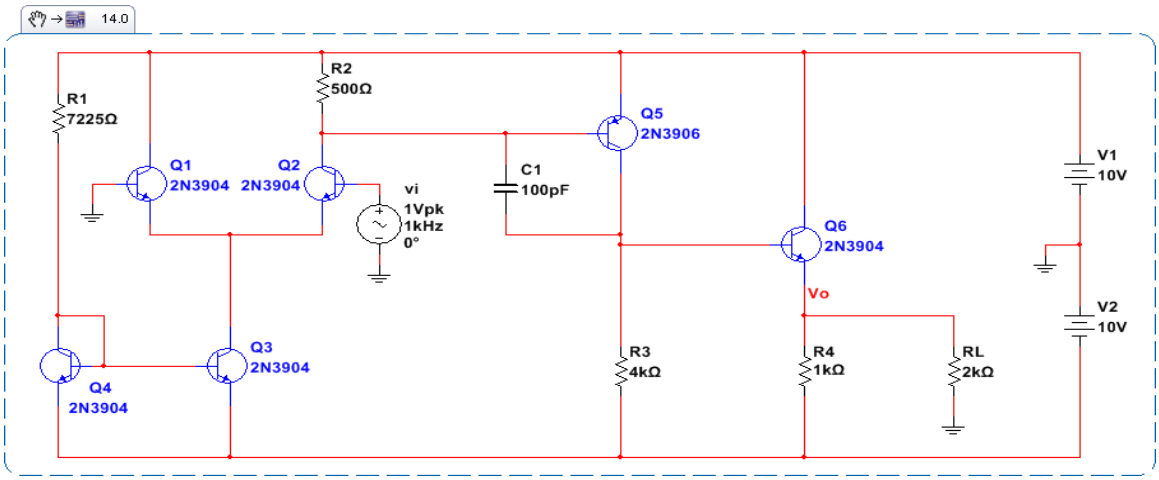


Figure 5: Moving the second pole using compensating capacitor

Problem 4 (continued): Stabilizing the Op-Amp using a Miller's capacitor



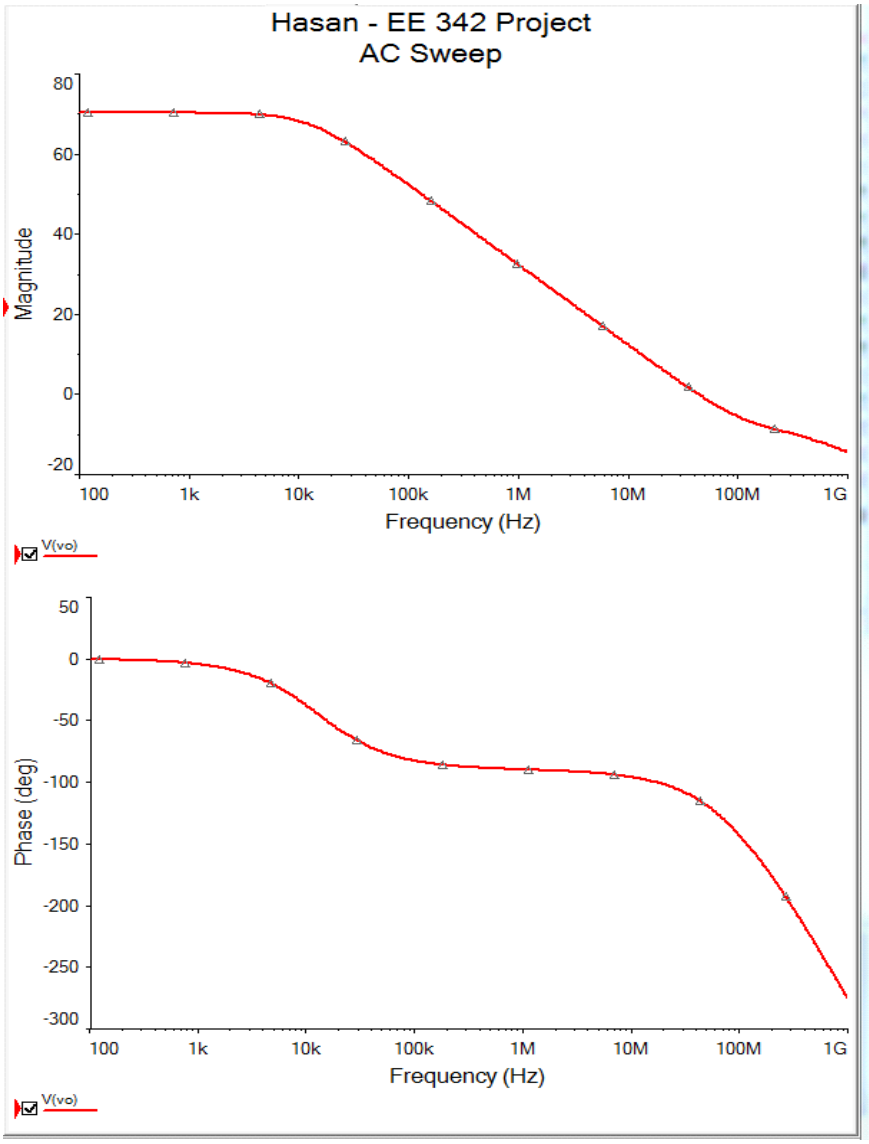


Figure 6: Moving the second pole using Miller's capacitor

Problem 5: Transient analysis of the frequency compensated Op-Amp

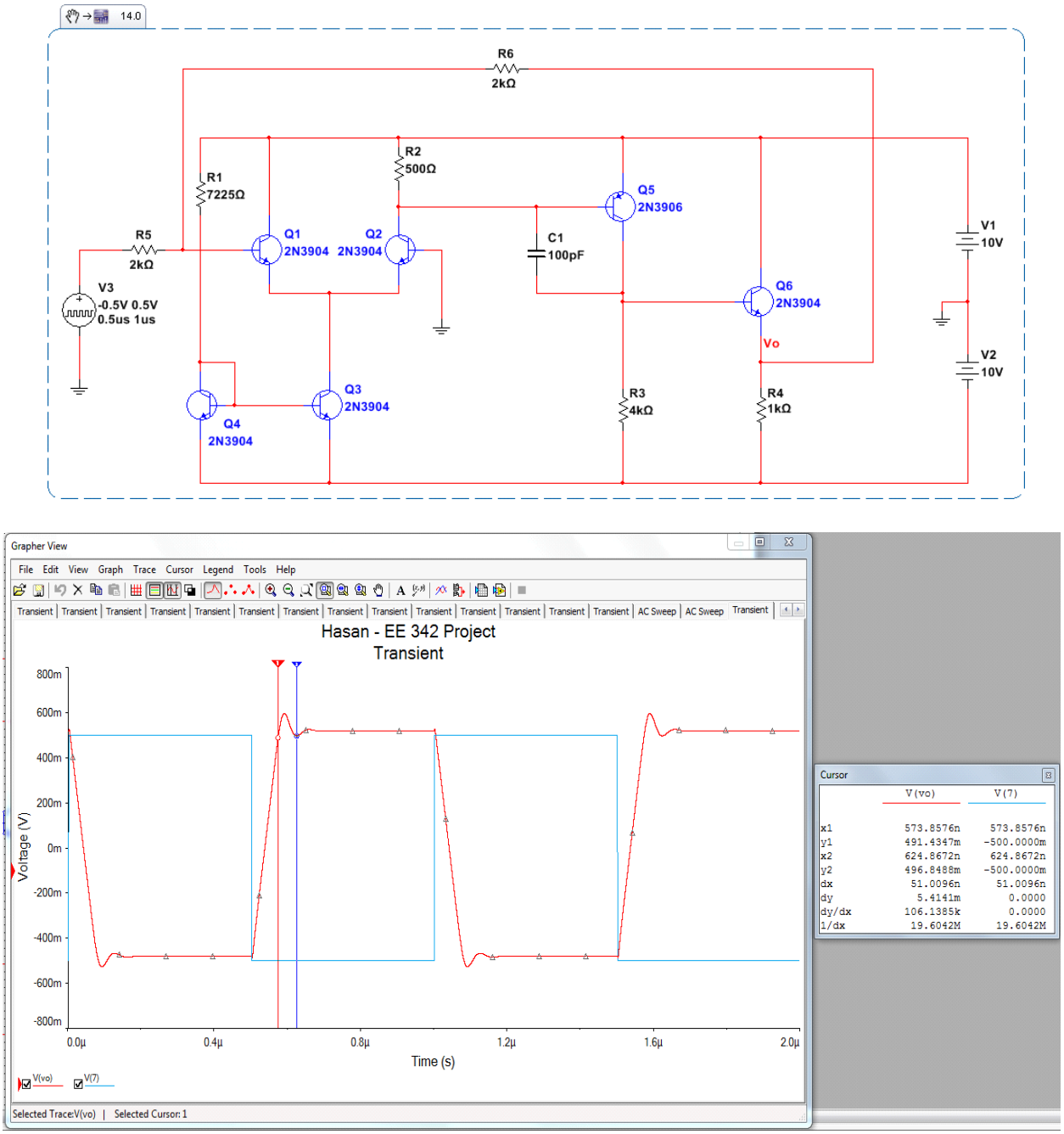


Figure 7: Transient Analysis of the Op-Amp

Calculations:

Rise Time ~ 41.76 ns
Fall Time ~ 37.12 ns
Ringing Frequency ~ 1/51 ns = 19.6 MHz

Problem 6: AC simulation of the Op-Amp

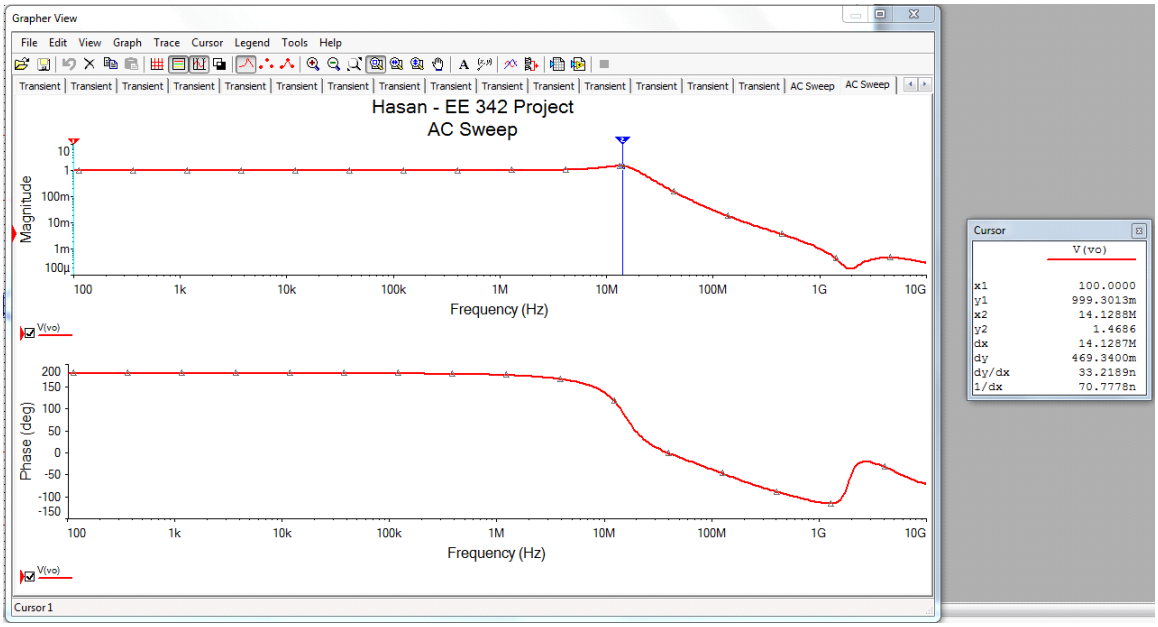


Figure 8: AC simulation of the Op-Amp

Finding:

Yes, peaking was observed in the response of the Op-Amp. The peaking frequency was estimated to be around 14 MHz. This is very close to the observed ringing frequency of 19.6 MHz.