Op-amp Frequency Compensation

Uncompensated Op Amp

1. Build the basic operational amplifier circuit shown below.
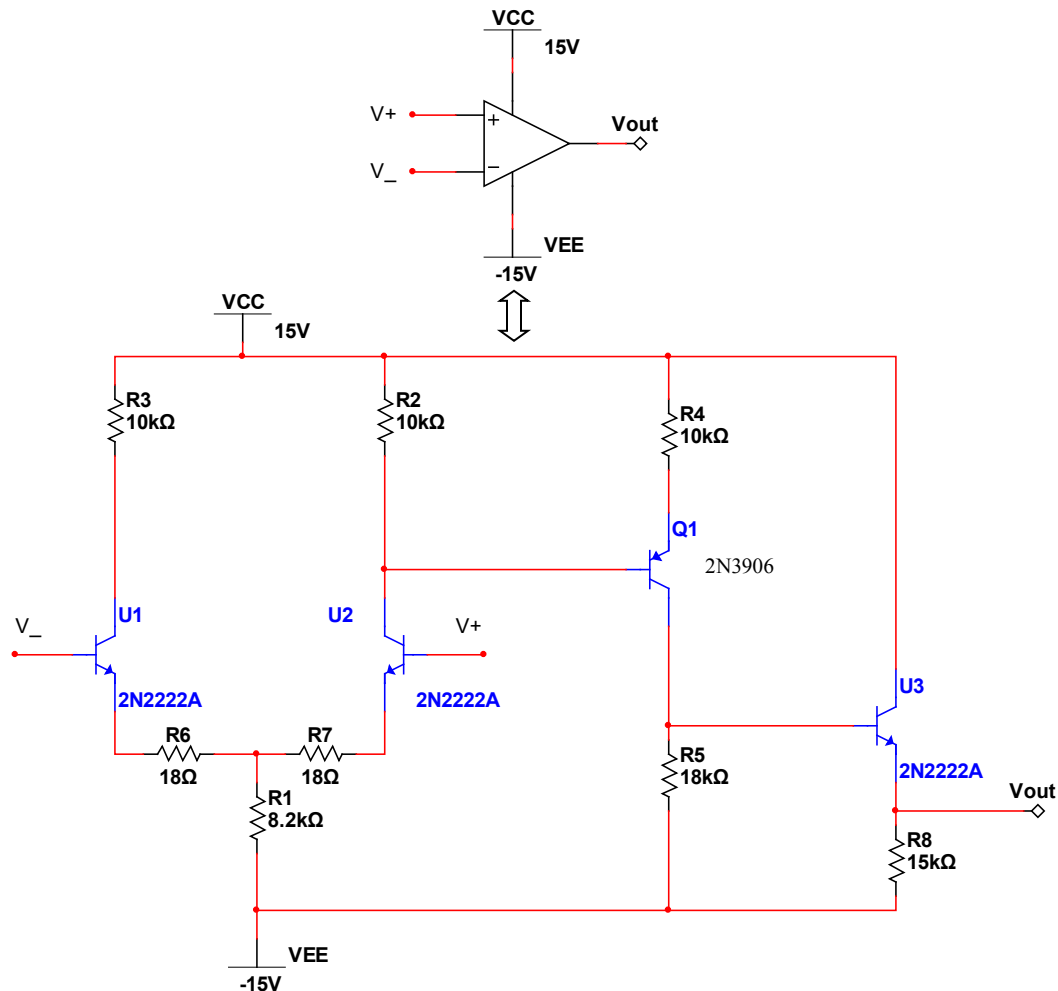
The Bode plot for this basic op-amp is shown below. Will this circuit be stable if it is configured as a voltage follower? Explain.

2. Configure the op-amp as a voltage follower and drive the input with a ± 1 V peak 50 kHz square wave. Monitor the output on the oscilloscope and comment on the observed results.

3. Configure the op-amp as a non-inverting amplifier with a gain of 101 and drive the input with a ± 20 mV peak 50 kHz square wave. Monitor the output on the oscilloscope and comment on the observed results.
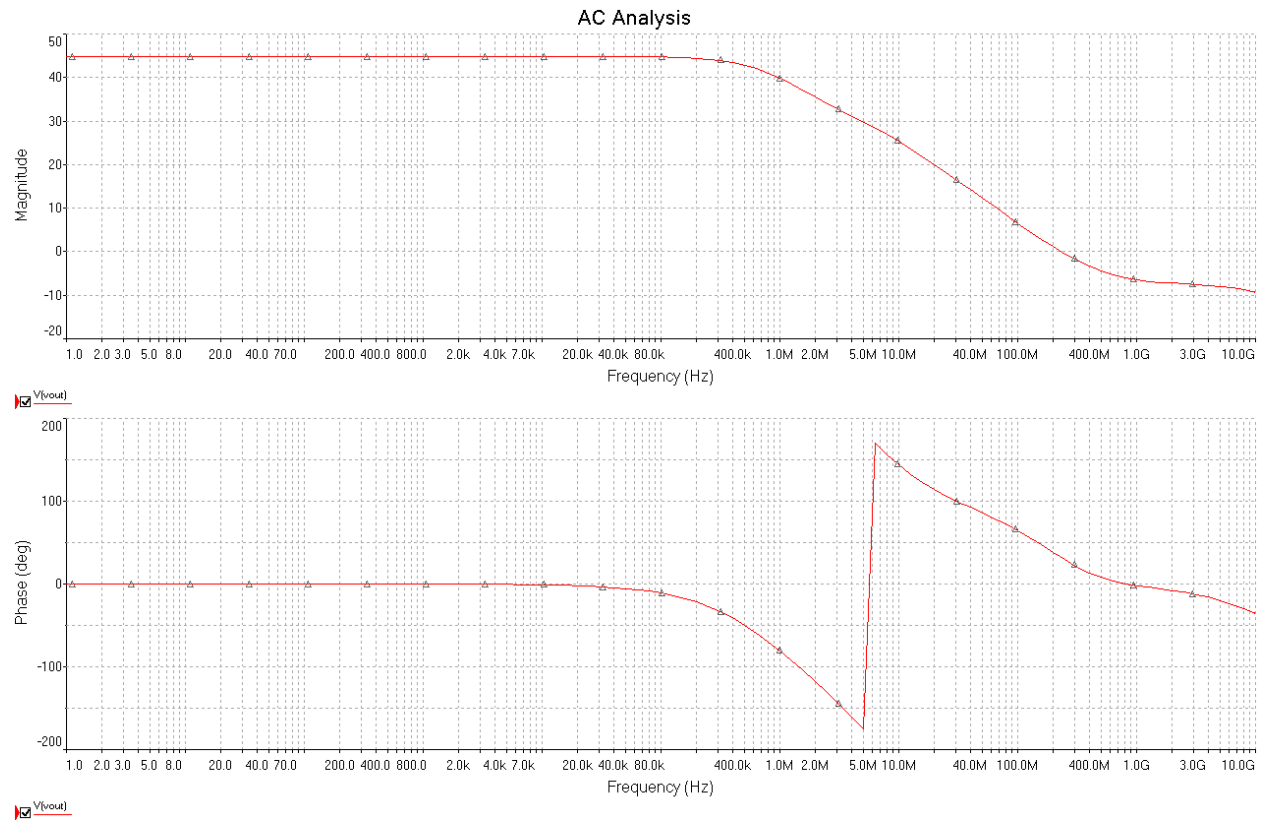
Figure 2: Frequency response of uncompensated op amp.

Compensated Op Amp

4. Modify your basic op-amp by adding a 100 Ω resistor and a 0.01μF capacitor as shown below. The Bode plot for the modified op-amp is also shown below. Will this circuit be stable if it is configured as a voltage follower? Explain.

5. Configure the modified op-amp as a voltage follower and drive the input with a ±1 V peak 500 Hz square wave. Monitor the output on the oscilloscope and comment on the observed results. What happens if you use a 50 kHz square wave like you did for part 2? Explain.
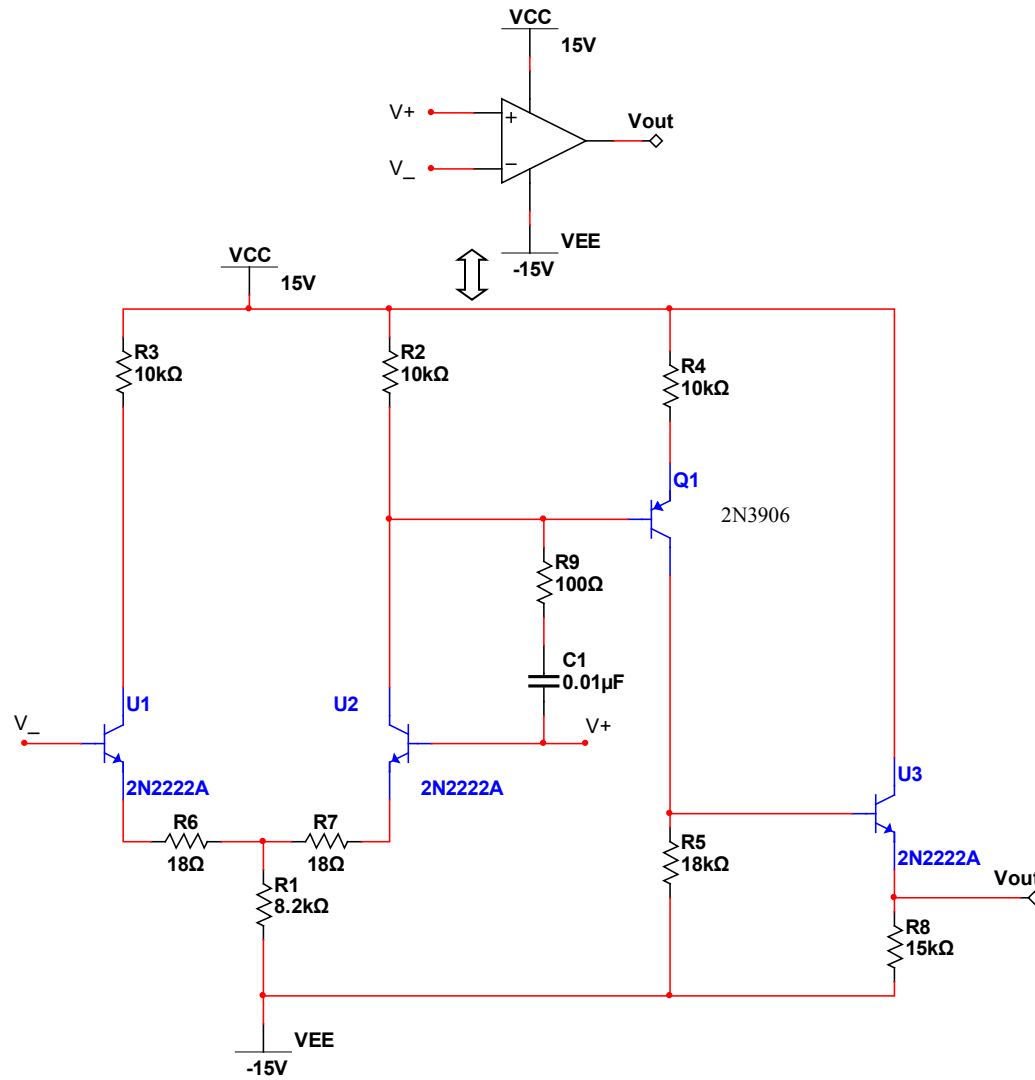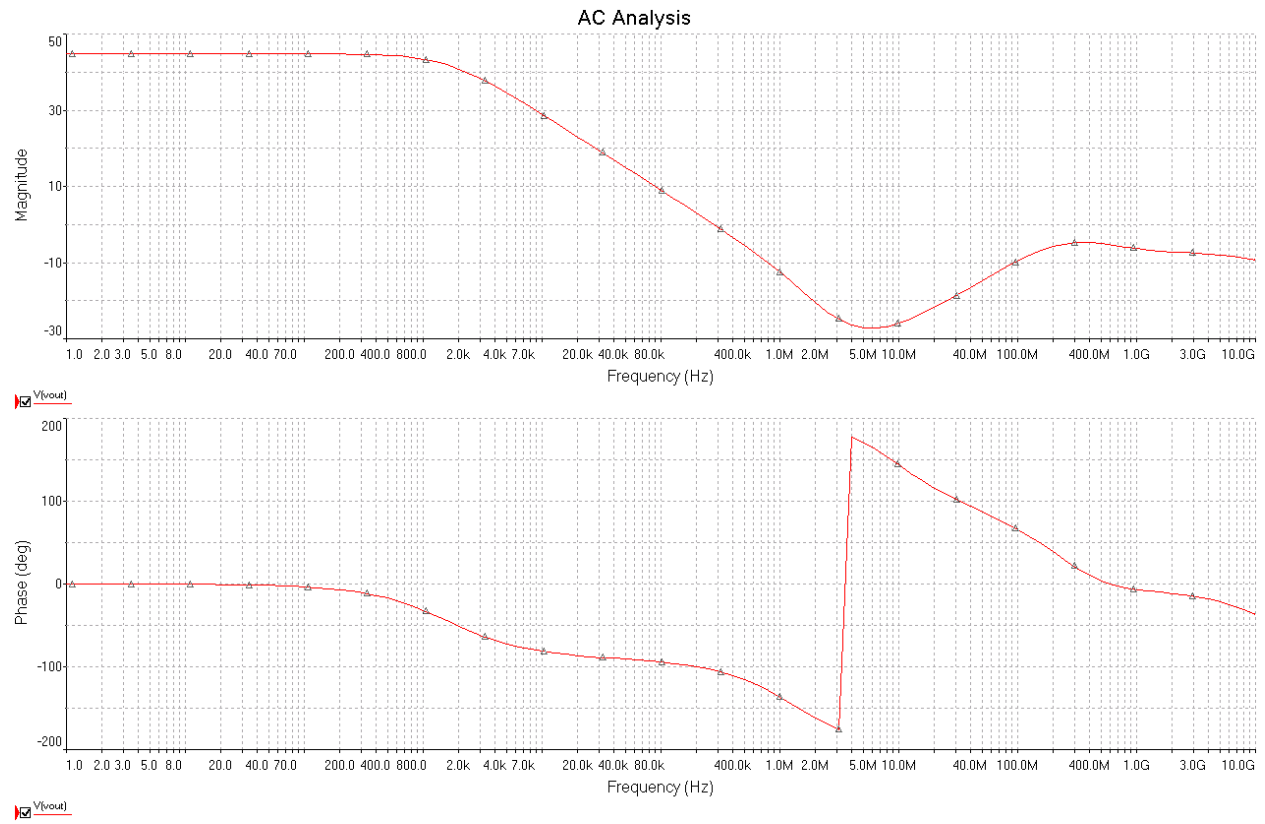
Figure 3: Compensated op amp.

Figure 4: Frequency response of compensated op amp.