EEE 202-CIRCUIT THEORY
SOFTWARE LAB 3
Experimental Work

a) Effect of Positive Feedback and non-ideality of the amplifier:

Ideal op-amp with negative feedback: Enter the circuit shown in Figure 1. Do a bias point analysis and a transient analysis and observe the current and voltage at the output for both analyses.

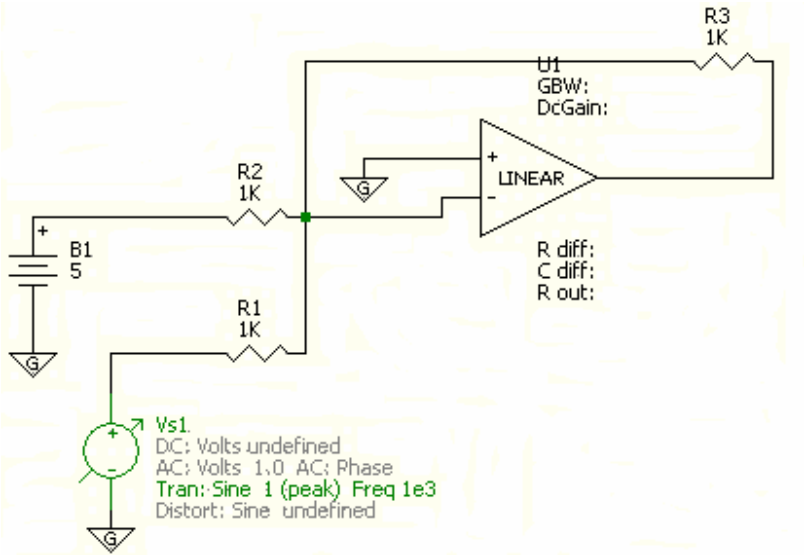

Figure 1: Ideal op-amp with negative feedback

Ideal op-amp with positive feedback: Enter the circuit shown in Figure 2. Do a bias point analysis and a transient analysis and observe the current and voltage at the output for both analyses.

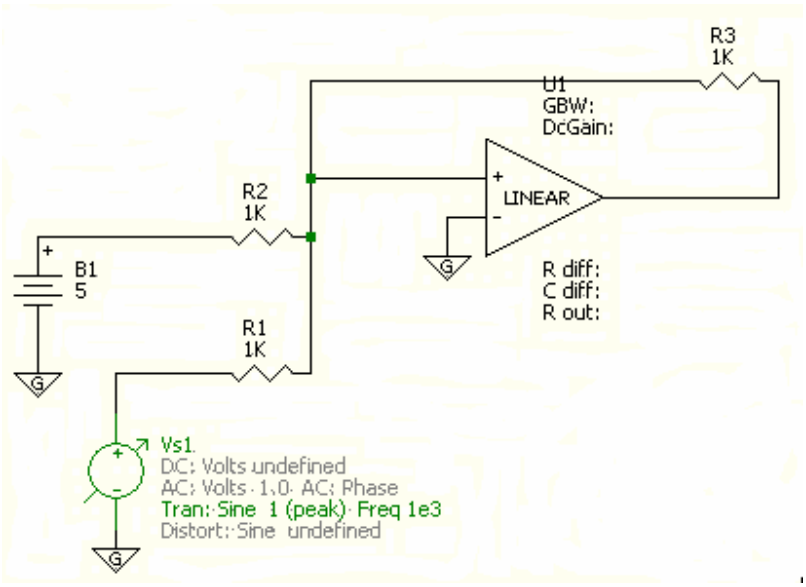

Figure 2: Ideal op-amp with positive feedback

Note down your observations. Is the result the same as you had expected?

Non-ideal op-amp with negative feedback: Enter the circuit shown in Figure 3. Do a bias point analysis and a transient analysis and observe the current and voltage at the output for both analyses. Note that, this time, you are using a non-ideal op-amp, LF 155.

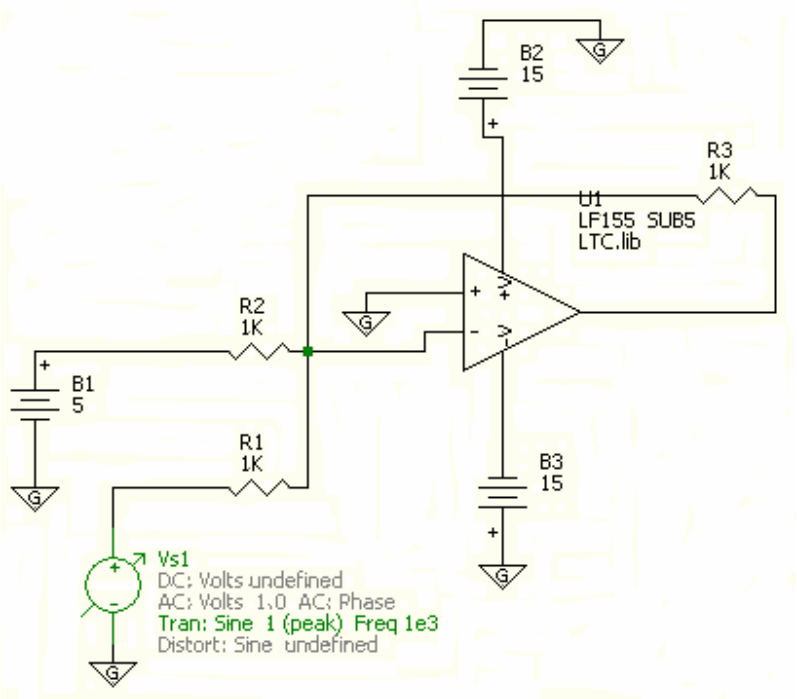

Figure 3: Non-ideal op-amp with negative feedback

Non-ideal op-amp with positive feedback: Enter the circuit shown in Figure 4. Do a bias point analysis and a transient analysis and observe the current and voltage at the output for both analyses. Note that, this time, you are using a non-ideal op-amp, LF 155.

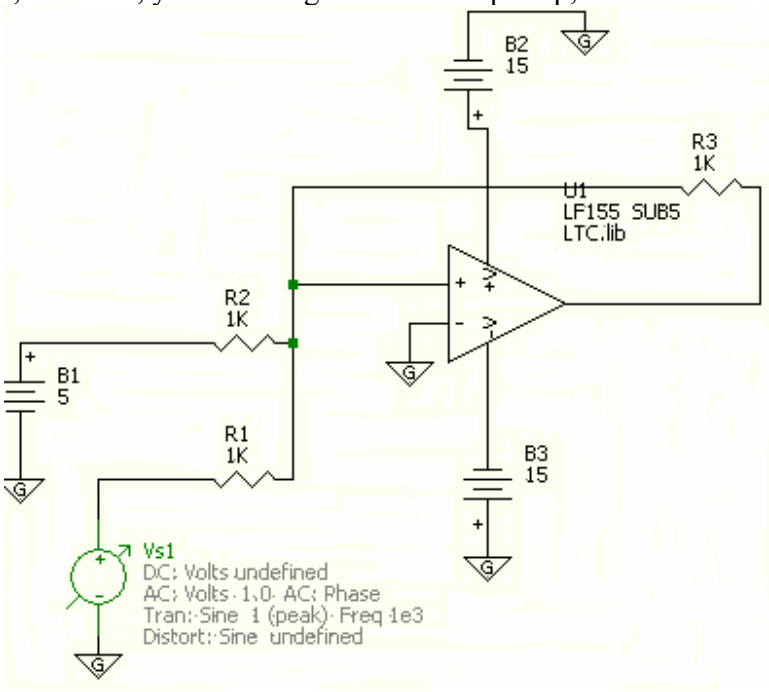

Figure 4: Non-ideal op-amp with positive feedback

What difference do you see in the output? Comment on your understanding of these experiments in your report.

b) Effect of the op-amp's input resistance, output resistance and gain in the choice of R:

Enter the circuit shown in Figure 5. Do a bias point analysis and observe the current and voltage at the output. Then change all the resistance values from 1kΩ to the following values and note down the bias point value of output voltage and current in each case. Use "show higher resolution" option for each case.

(i) 1Ω

(ii) 10Ω

(iii) 100Ω

(iv) 1kΩ

(v) 10kΩ

(vi) 100kΩ

(vii) 1MΩ

(viii) 10MΩ

Comment on your observations and your understanding of the results.

Repeat the same experiment on the circuit in Figure 1.

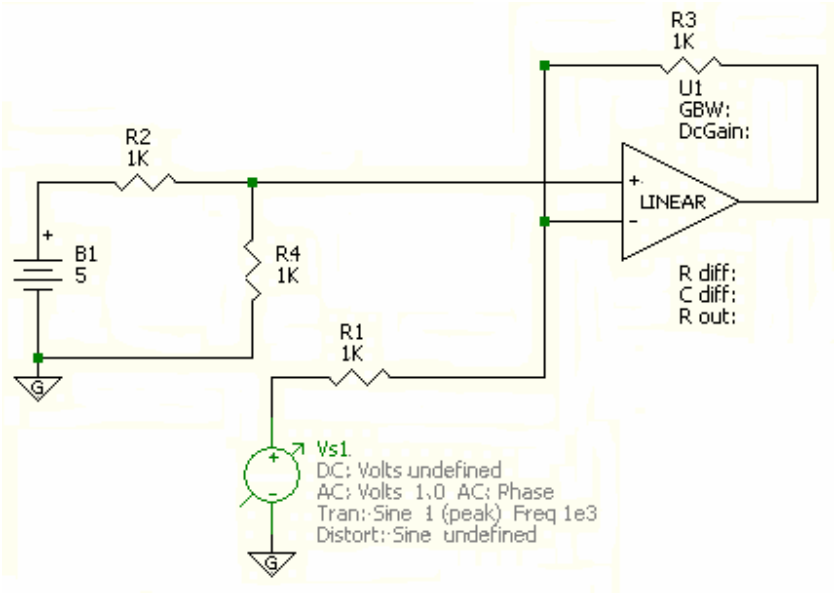

Figure 5: Subtractor with ideal op-amp

c) Circuit Design:

Design a circuit using **only one Op-Amp** and resistors which can compute V_{out}=aV1+bV2-cV3, where V1, V2, and V3 are arbitrary inputs and a,b,c are the coefficients determined by the last three digits of your ID number. If any of your last 3 digits is zero, add one to it. For example, if your ID number is 20404370, your design should compute: 3V1+7V2-V3. **Show your work.** Verify your design with arbitrary DC inputs by simulating bias-point analysis. Take the printout of your circuit with the bias values displayed on it.