PROJECT REPORT GUIDELINES

The Executive Summary

The first page of the report is the executive summary. An executive summary contains the vital information found in the rest of the report. It contains a brief statement of the objective of the project, summarizes the results, and gives a conclusion. Most of the results in this report might be presented in a table comparing the design specifications and your circuit performance. The executive summary should fit on one page.

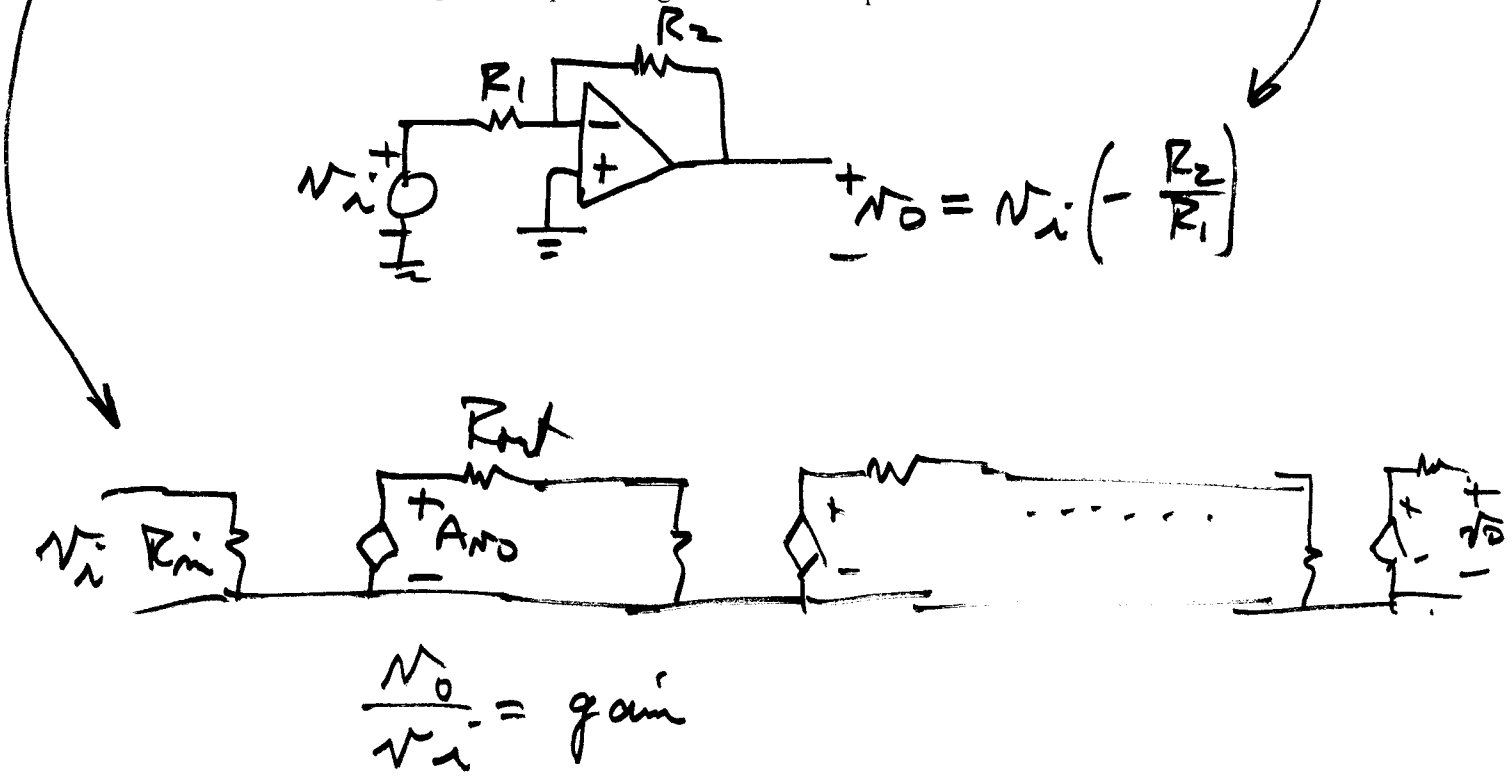
The Rest of the Report

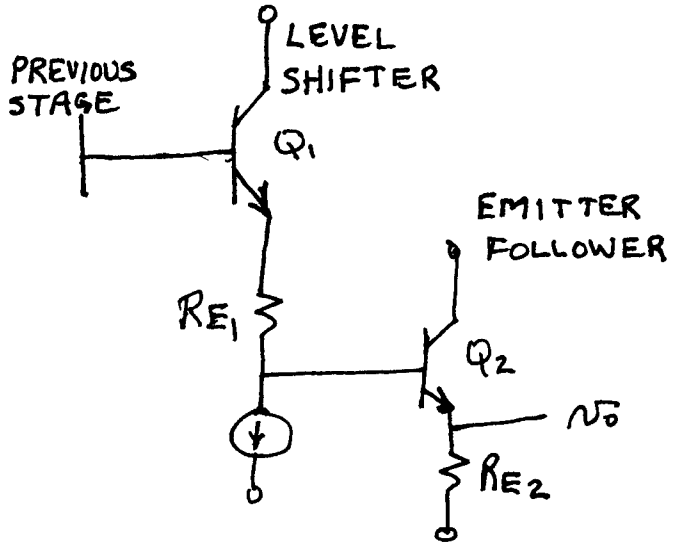
Show the circuit diagram, and identify which input terminal is inverting and which one is noninverting.

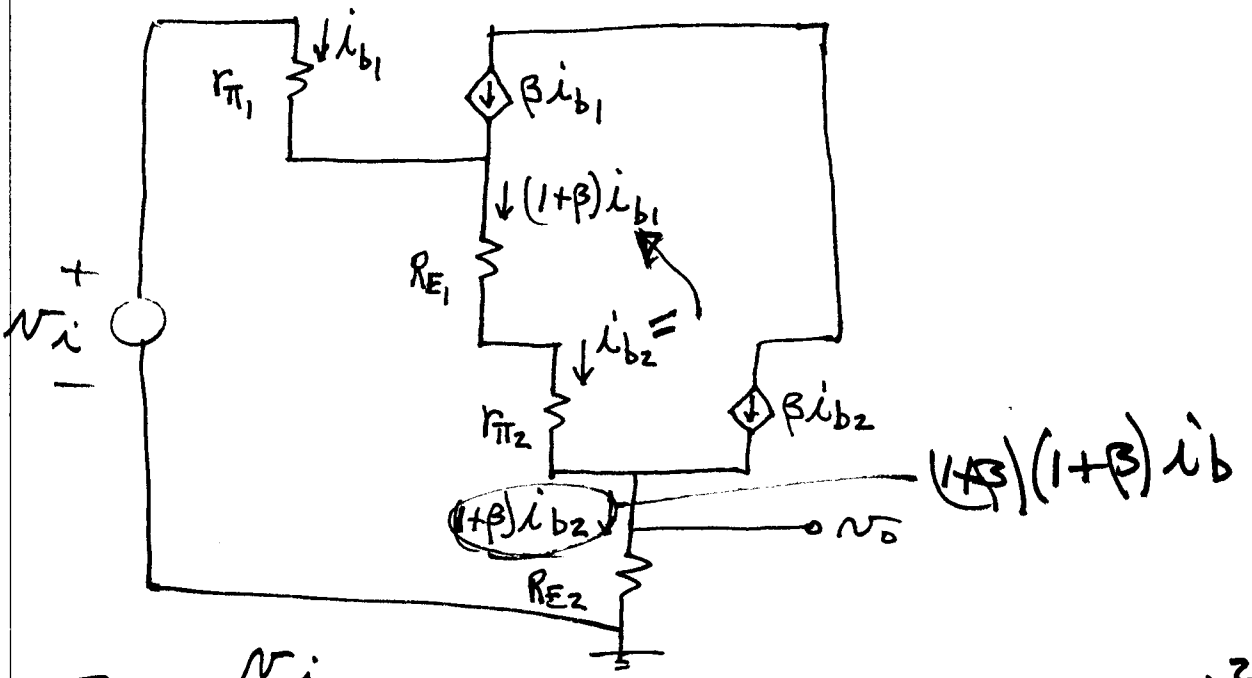
PSpice output:

- small-signal results from the output file
- power consumption from the output file
- probe output showing an undistorted 4-V peak-to-peak output
- probe output showing the results of your amplifier working as an op-amp inverting amplifier. That is, connect an input resistor R1 and a feedback resistor R2, and show the input and output voltages and compare the results to the theoretical vo = vi(-R2/R1).

Show the amplifier model for each stage of your design(i.e., R_{in}, A_{vo}, and R_{out}). Show how you obtained the model parameters for each stage. Connect the stage models together, and calculate the overall gain of your design. Compare the gain with the PSpice results.



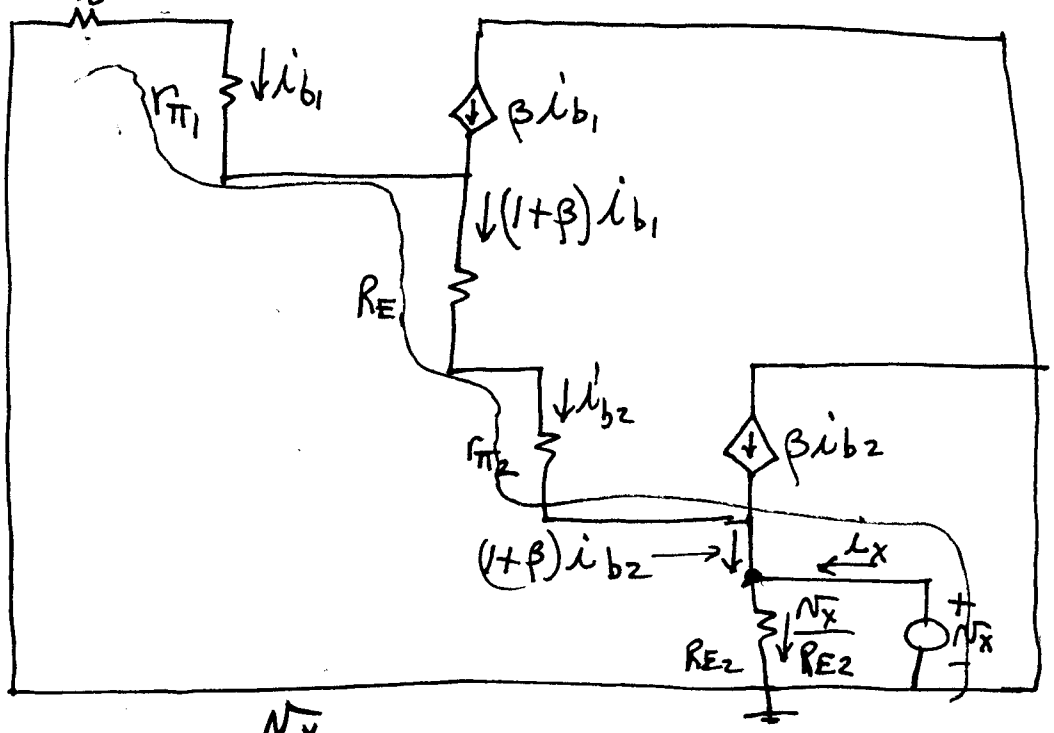




$$R_{in} = \frac{v_i}{i_{b_1}} = r_{\pi_1} + (1+\beta)(R_{E_1} + r_{\pi_2}) + (1+\beta)^2 R_{E_2}$$

$$\frac{v_o}{v_i} \approx 1$$

$R_B = R_{out}$ OF THE PREVIOUS STAGE



$$R_{out} = \frac{V_X}{I_X}$$

$$I_X = \frac{V_X}{R_{E_2}} - (1+\beta) i_{b_2}$$

$$= \frac{V_X}{R_{E_2}} - (1+\beta)^2 i_{b_1}$$

KVL: $r_{\pi_1} + R_B (i_{b_1}) + R_{E_1}(1+\beta) i_{b_1} + r_{\pi_2}(1+\beta) i_{b_1} + V_X = 0$

$$i_{b_1} = \frac{-V_X}{(R_B + r_{\pi_1}) + (1+\beta)(R_{E_1} + r_{\pi_2})}$$

$$I_X = \frac{V_X}{R_{E_2}} + \frac{(1+\beta)^2 V_X}{r_{\pi_1} + R_B + (1+\beta)(R_{E_1} + r_{\pi_2})}$$

$$\frac{I_X}{V_X} = \frac{1}{R_{out}} = \frac{1}{R_{E_2}} + \frac{1}{\frac{r_{\pi_1} + R_B}{(1+\beta)^2} + \frac{R_{E_1} + r_{\pi_2}}{1+\beta}}$$

$$R_{out} \approx R_{E_2} \,//\, \left(\frac{R_{E_1} + r_{\pi_2}}{1+\beta}\right)$$