UNIVERSITY OF CALIFORNIA AT BERKELEY
College of Engineering
Department of Electrical Engineering and Computer Sciences

EE105 Lab Experiments

Prelab 8: Multi-stage Amplifiers

Name:

Lab Section:

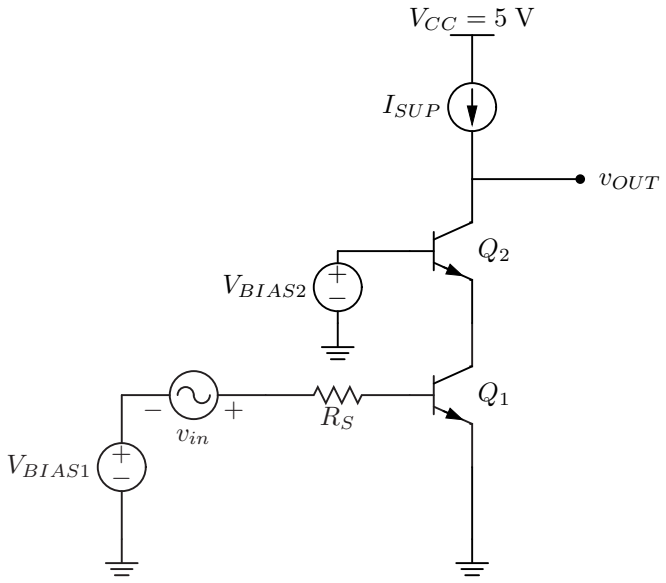

Figure 1: Cascode amplifier with ideal current source

1. The cascode in Figure 1 is biased by an ideal current source. Let $R_S = 51\,\Omega$, $I_S = 1 \times 10^{-15}$ A, $V_A = 100$ V, $\beta = 200$, $I_{SUP} = 1$ mA, $T = 300$ K, $v_{OUT,DC} = 3.5$ V, and $V_{BIAS2} = 2$ V. Calculate V_{BIAS1} to match these biasing conditions.

$V_{BIAS1} =$

2. What is the gain of this amplifier?

$A_v =$

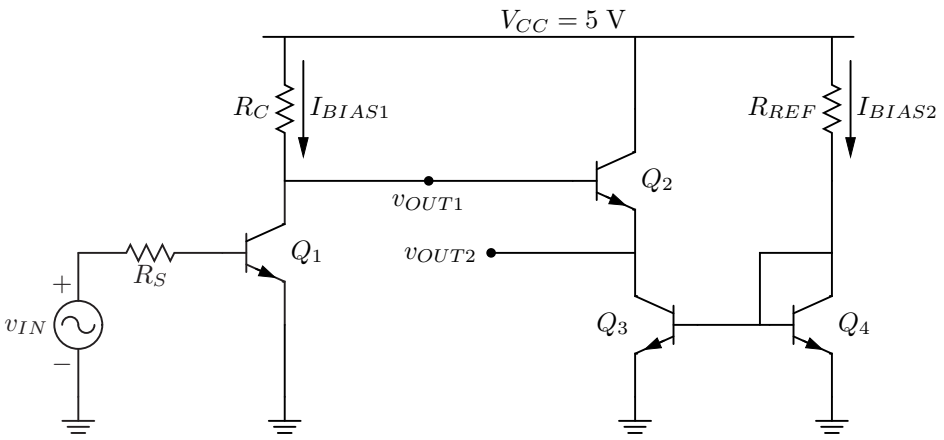

Figure 2: Multi-stage amplifier

3. Now construct a SPICE netlist for the multi-stage amplifier shown in Figure 2. Let $R_C = 10\,\text{k}\Omega$, $R_S = 51\,\text{k}\Omega$, and $R_{REF} = 200\,\Omega$. Bias transistor Q_1 with $V_{BE1} = 560\,\text{mV}$. What is the small signal gain (A_{v1}) between v_{IN} and v_{OUT1}? What is the small signal gain (A_{v2}) between v_{OUT1} and v_{OUT2}? Using A_{v1} and A_{v2}, find the overall gain ($A_{v,tot}$) between v_{IN} and v_{OUT2}. Attach the SPICE netlist to the end of this prelab.

$A_{v1} =$

$A_{v2} =$

$A_{v,tot} =$