# EECS 140, Fall 91
# Quiz 2
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OPEN BOOK: Present the essence of your solution for each problem on the front of a page. The back sides of the pages may be used for computations but will not be evaluated. Do not use blue books.

## Problem #1

1. A two-stage amplifier is shown in Figure Q2.1. Values of the BJT parameters for the two devices are given in the figure.
a. For VA = oo and Re = 0, estimate the frequency response of the overall voltage gain, Av = vo/vs.
b. How is the frequency response changed if VA = 100V?
(Use approximations to arrive at a conclusion.)
c. How does the product of the low-frequency gain and the -3dB bandwidth change as Re is increased from zero to 10ohms?

note: this problem refers to Figure Q2.1 which is a circuit diagram

## Problem #2

2. A feedback amplifier is shown in Figure Q2.2. Bias levels and circuitry are assumed present to produce the specified collector currents, Ic = 1mA.
a. Establish whether the overall feedback is positive or negative.
b. With respect to the output node vo1, what is the value of the open-loop gain, aL?
c. What is the value of the open-loop gain aL with respect to the output node vo2?
d. Estimate the value of the output resistance seen from vo1 and from vo2.

note: this problem refers to Figure Q2.2 which is a circuit diagram

## Problem #3

3. A feedback amplifier is modeled as in Figure Q2.3.
a. Sketch the locii of the natural frequencies of the closed-loop amplifier as the amplifier gain value, avo, is increased from zero.
b. For Rf = 100k, what value of avo is required to achieve a maximally flat magnitude response for the closed-loop gain, Av(s)?
c. If the value of avo is fixed at -100, and if aLo is varied by changing Rf, what value of Rf is needed to achieve the MFM response?

note: this problem refers to Figure Q2.3 which is a circuit diagram

## Problem #4

4. A simple MOS amplifier is shown in Figure Q2.4. The biasing elements provide drain currents of ID = 0.1mA. Device parameters include W/L = 10, KP=40uA/v2, LAMBDA=0.

a. For a 'following' measurement system passband of 2megHz, estimate the value of the minimum detectable signal with respect to vs.

b. If a feedback resistance, Rf = 100k, is ac-connected in a shunt-shunt arrangement without changing the bias state, how is the result of Part a changed?

note: this problem refers to Figure Q2.4 which is a circuit diagram

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