University of Michigan
EECS 311: Electronic Circuits
Fall 2008

PROBLEM SET 8

Issued 11/19/2008
Due in Lecture 11/26/2008

J&B refers to the course text: "Microelectronic Circuit Design (3rd Edition)," by Richard Jaeger and Travis Blalock.

P8.1 For this problem, refer to the circuit shown in figure P14.109 on page 836 of J&B. For all parts, ignore base-width modulation and assume $\beta_F = 100$ and $V_{BE(on)} = 0.7V$.

a) Calculate the DC collector currents for the two transistors, I_{C1} and I_{C2}.

b) Calculate the small-signal parameters g_m and r_π for the two transistors.

c) Calculate R_{in}, G_m, and R_{out} for each stage. Assume capacitors C_{1-5} are bypass capacitors. Assume stage 1 is between C_1 and C_3, and stage two is between C_3 and C_5.

d) Cascade the two stages and calculate the midband gain of the amplifier including the $2k\Omega$ source resistor and the $100k\Omega$ load resistor.

P8.2 J&B Problem 14.1, parts a) through m). Assume capacitors drawn in the circuit are bypass capacitors. When drawing the AC equivalent circuit, you may draw the transistor in your AC circuit (no need to substitute with the small signal model).

P8.3 J&B Problem 14.21. Ignore channel-length modulation.

P8.4 J&B Problem 14.31. Ignore channel-length modulation.

P8.5 J&B Problem 14.39. Ignore base-width modulation.