Quiz for Lesson 17, 18

Oct. 27, 2015 Electronic Circuits 1 Prof. Woo-Young Choi

 Name:
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<u>Prob. 1</u>

What is the intrinsic gain (i.e. the largest small-signal voltage gain possible) of a BJT in Common-Emitter amplifier configuration? Give your answer in terms of Early voltage (V_A) and the thermal voltage (V_T).

<u>Prob. 2</u>

Consider the Common-Emitter amplifier shown below. Assuming V_{CC} is fixed, give at least two changes you can make in the circuit, which increases the small-sign voltage gain. What limits the maximum voltage gain achievable? For this problem, ignore the influence of the Early effect.



For Problems 3 and 4, assume Q₁ has collector saturation current of 1×10^{-16} A, $\beta = 100$, V_A (Early voltage) = 20V, V_{BE} = 750mV, R_C = 1k Ω , V_{CC} = 3V, and V_T = 25mV.

Prob. 3

Determine the numerical value of the small-signal input resistance for Q_1 in the circuit shown in Prob. 2.

Prob. 4

Determine the numerical value of the small-signal output resistance of Q_1 in the circuit shown in Prob. 2.

Prob. 5

Determine the expression for the small-signal voltage gain (v_{out}/v_{in}) of the following CE amplifier. Express your answer in terms of small-signal circuit parameters and R_{in} , R_{L} . Include the Early effect.



Prob. 6

Determine R_{out} for the following transistor circuit. Assume the transistor is in the forward active region and its output resistance is r_0 .

