Quiz for Lesson 31 and 32

Dec. 1, 2015 Electronic Circuits 1 Prof. Woo-Young Choi

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<u>Prob. 1</u>

Determine the small-signal voltage gain of the following CS with degeneration amplifier. Assume both transistors are in saturation. M₁ has transconductance of g_{m1} and $\lambda_1=0$. M₂ has transconductance of g_{m2} and $\lambda_2=0$.

$$V_{in} \sim H_{M_1}$$

<u>Prob. 2</u>

Now, assume M_1 has $\lambda_1=0$ but M_2 has $\lambda_2>0$ with r_{02} . Determine the small-signal voltage gain of the circuit shown above.

<u>Prob. 3</u>

Now, assume M_1 has $\lambda_1 > 0$ with r_{02} and M_2 has $\lambda_2 > 0$ with r_{02} . Determine the output resistance for the circuit shown in Prob. 1.

Prob. 4

Consider the CG amplifier shown below where $V_{DD}=3V$, $R_D=1k\Omega$, $R_3=500\Omega$, $R_S=10\Omega$, M_1 has $u_nC_{ox} = 100\mu A/V^2$, W/L=20, $V_{TH} = 0.5V$, $\lambda = 0$. Select values for R_1 and R_2 so that the bias drain current is 1mA.



Prob. 5

What is the numerical value for the input resistance seen to the right of node X?

<u>Prob. 6</u>

What is the numerical value for the small-signal voltage gain?