ECE 351 Exam 1
Fall 2009

Name____________________

Section 1

CM____

Scores:
1) 
2) 
3) 
4) 

Total____________

I pledge on my honor that I did not copy any of this exam, and that this work is entirely my own. Furthermore, I did not use PSpice during this exam.

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Problem 1 (25 Points):

For the MOSFETS, $K_2 = mK_1$ and $V_{T1} = V_{T2}$. Find an equation that describes the current $I_{out}$ and how it is related to the reference current $I$. 

![Circuit Diagram]
Problem 2: (25 Points)

If $I_1$ is equal to 10 $\mu$A, find a numerical value for $I_{out}$. 
Problem 3: (30 Points)

A new device has recently been discovered called a BJM Device:

The equations that govern this device are:

\[ I_A = K_1 V_{xy}^3 \]
\[ I_Q = K_2 I_A (1 + K_3 V_{zy}) \]

Where \( K_1, K_2, \) and \( K_3 \) are constants. Find equations for \( r_{xy}, g_m, \) and \( r_o \) in the small signal model below:
Problem 3: (20 Points)
In the circuit below, assume that $R_{X1}=R_{X2}$ and that the BJT’s are matched. You may not ignore $R_{X1}$ and $R_{X2}$. Find an equation for the common mode gain.