EELE 5131
Assignment 2 — Winter 2019

Preliminary work

This assignment requires the use of Cadence tools. It is recommended that you perform the following tutorials before solving the problems:

1. How to run Cadence for the first time
2. Introduction to Virtuoso Schematic Editor and Analog Environment
3. ACM Parameter Extraction from Simulations

Problems

1. Extract the ACM parameters for the thick-oxide NMOS transistor with $W = L = 10$ μm.
2. An NMOS current mirror has two identical (thick-oxide) transistors with $W = 30$ μm and $L = 2$ μm. The supply voltage is 2 V. For each of the following input current values 10 nA, 5 μA and 100 μA, calculate:
   (a) The voltage at the drain of the input transistor
   (b) The resistor value to generate the input current
   (c) The minimum output voltage to keep mirror working
   (d) The difference between the input and output currents when the output voltage is set to 2 V
   (e) Neglecting channel-length modulation, estimate the percentage difference between the input and output currents when V_{th} mismatch between transistors is 10 mV
3. Verify the results of parts (a), (c) and (d) in the previous problem using simulations. Show schematic used for simulation and organize results in a table for each current value (shown below) and comment if there are any unexpected discrepancies.

Parameter	Calculated	Simulated
V_{in} (V)		
$V_{o,min}$ (V)		
ΔI (nA)		