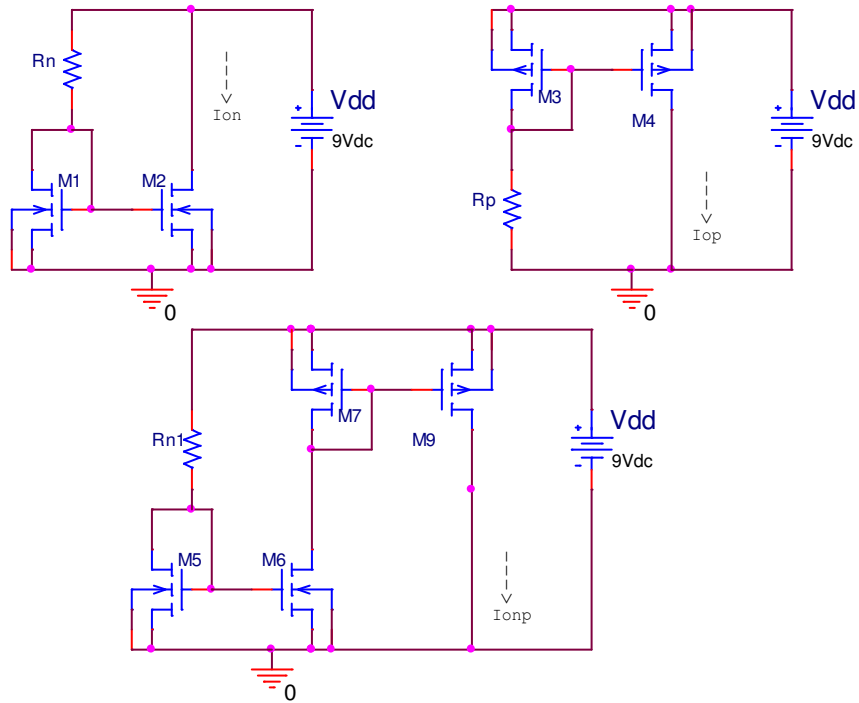303 Fall 2012

Homework 3 – due 09/25/12

1. 50 points (current mirrors)

For the following current mirrors using the 4007 CMOS transistors,

a) Calculate the resistance needed to give an output current of 3mA. Then run Spice and discuss any differences between the design (ie. calculated) and simulations..

b) Repeat when the transistors are replaced by 2N3904/2N3906 ones.

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2. 50 points (amplifier)

Bias the 4007 in the following circuit to have a Q point at VGS=3V, VDS=5V. For this assume an RS=50Ω, Vdd=9V, and one of Ra or Rb of 10MegΩ.   Check using Spice. Give the small signal low frequency voltage gain, $Av=V_{20}/V_{10}$.