303H Fall 2016 – Homework 5 Due Tu 10/25/16 (two weeks)

1. (100 points; VCO)

> Design a VCO using the circuits in the report of Liang Dai "Low
> Phase Noise Voltage-Controlled Oscillator" Using the 0.5micron
> transistor models in the bicmosis12 Spice library; these are the
> HP05L7N & HP05L7P [use no dimension for W or L than
> 2micon=2u].
> The end result is a transistorization of the VCO block diagram of
> Figure 10.

a) Use the first type of loads of Figure 1, the (a) diode connected MOS, and
individually design and test each component (the inverters and the multipliers)
before inserting them in the final circuit. Choose bias battery voltages of
VDD=3V=-VSS.
b) Test the full circuit in Spice submitting the oscillations and showing them
when voltage controlled.

Justify your design choices and their effect on the VCO's behavior. Compare your
results with those predicted by the equations in the Dai report.