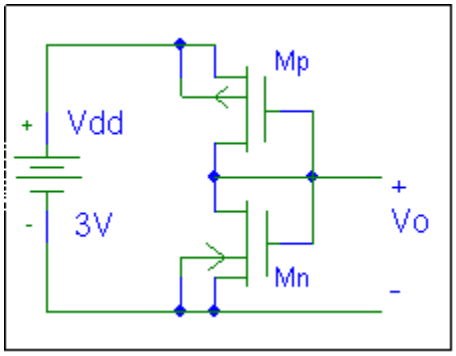
File: c:\temp\courses\spring2005\302\hmwrk6.doc RWN 04/03/05

ENEE 302 Homework 6 due Th April 14, 2005

1. [30 points]



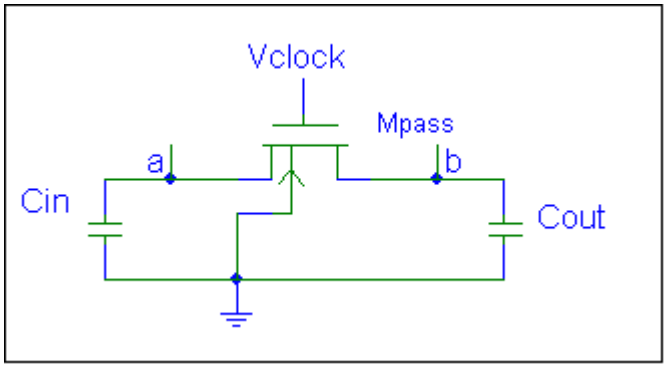
For the above circuit assume Wn=Ln=2Lp=20u, KPn=5KPp=5x10^{-4}, 2VTOn=-VTOp=0.5v, Vdd=3v, get Vo=Vdd/3,

a) Assuming λn=|λp|=0, find Wp, call it Wpo.

b) Assuming 3λn=|λp|=0.02/v, find the new Wp, call it Wp_λ

c) Compare the results of parts a) and b) and discuss their meaning.

2. [35 points]



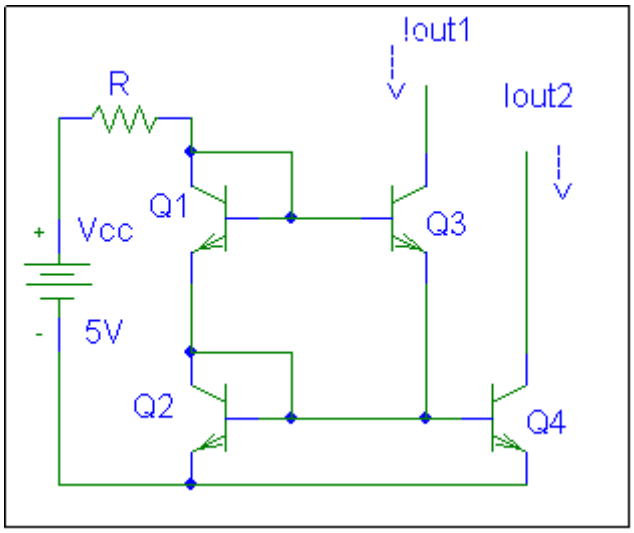
In the above pass transistor circuit va and vb are the voltages at nodes a and b with respect to ground. At t=0, the clock turns from off (=0v) to on (=Vdd=5v) and remains stuck at off, while va(0)=0 and vb(0)=E=5v. For Mpass, KP=3x10^{-4}, VTO=0.5v, W=2L=60u, LAMBDA=0.01.

a) Determine which are the drain and source nodes at t=0.

b) Give the differential equations for va(t) and vb(t).

c) When Cin=20Cout=20pFd determine the final values for va(t) and vb(t). At the final time which node is the drain and which the source?

3. [35 points]



Assume that all transistors are equal with β=8, operate at room temperature (where V_T=0.026v), and that V_{BE}=0.6v when $-I_E$=1ma.

a) Derive an analytic formula for Iout2 in terms of literals (β, Vcc, and R).

b) Find R to give Iout2=0.3ma.

c) For the R of a) find Iout=Iout1+Iout2.