

EE338L Spring 2007 Homework 2,
due 2/22

Use the following parameters

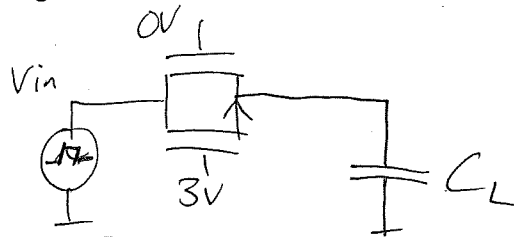
NFET: $V_t=0.67V$, $k_p=150\mu A/V^2$, $\lambda=55e-6\ 1/V$

PFET: $V_t=-0.95V$, $k_p=60\mu A/V^2$, $\lambda=25e-6\ 1/V$

2.1 Calculate the required resistance such that a 1pF capacitor can be charged to 99% of v_{in} in 1 μs . $0.99=1-e^{-(t/RC)}$

Size the transmission gate for this resistance as a maximum. $L=L_{min}=0.5\mu m$, $V_{dd}=3V$.

Worst case is at $V_{in}=V_{DD}-V_{tp}$ and $V_{in}=V_{tn}$, where only one device has to do all the conducting



2.2 Design a common source amplifier for a gain of 10. $V_{DD}=3V$, use the models above.

- choose a load to use – current source, resistor, p-device, diode connected device.
- Design the small signal requirements
- Calculate the operating point
- There is a 1pF load capacitor on the output – what is the bandwidth?
- What is the input referred noise in the band from 20Hz-20kHz? (thermal noise only)?

2.3 What is the transconductance of the following circuit

