Experiment 4: CMOS Inverter and Characterization

3 Lab

3.1 PMOS Characterization

Plot $I_D$ vs. $V_{DS}$ curves with different $V_{GS}$. Label the cutoff, triode and saturation regions on the plot.

What is the channel length modulation $\lambda$: ************.

Plot $I_D^2$ vs. $V_G$, extract $V_{TP}$: ************ and $K_n$: ************.

Plot $C_{GS}$ vs. $V_{GS}$ curve.

What zero bias drain gate capacitance $C_{GD}$: ************.

3.2 CMOS Inverter

Plot $V_{out}$ vs. $V_{in}$ curves.

What is $V_{IL}$ ************ and $V_{IH}$ ************

Plot out the output signal $v_{out}(t)$ without load.

What is fall time $t_f$ ************ and fall time $t_r$ ************

Plot out the output signal $v_{out}(t)$ with 10nF load capacitor.

What is fall time $t_f$ ************ and fall time $t_r$ ************