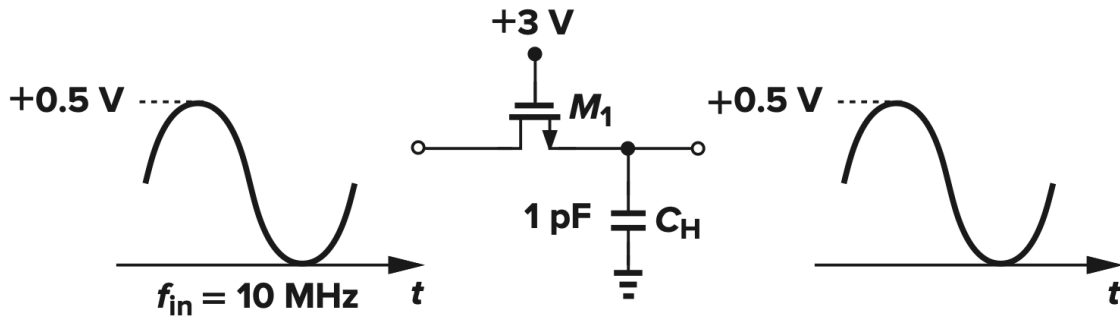
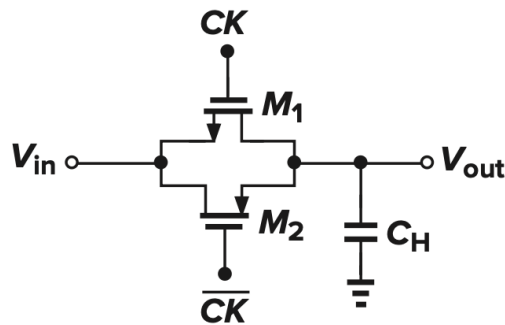


EE-523 – Exercise 3

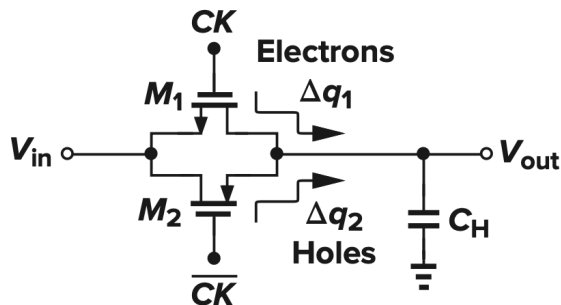
1. In the sampler circuit shown below, calculate the minimum and maximum on-resistance of M_1 . Assume that $\mu_n C_{ox} = 50 \mu\text{A}/\text{V}^2$, $W/L = 10/1$, $V_{TH} = 0.7\text{V}$, $V_{DD} = 3\text{V}$, and $\gamma = 0$. What if the maximum input level is raised to 1.5V ?



2. Considering the complementary switch shown below, what is the condition for which $R_{on,eq}$ remains independent of the input level, V_{in} ? Ignore the body effect in this problem.



3. For the complementary switch shown below, find the condition for which the effect of charge injection by NMOS is canceled by that of PMOS.



4. Considering the unity-gain buffer shown below in the amplification mode, find the equation for the gain assuming that the op amp has a finite input capacitance (C_{in}) and finite gain (A_{v1}). What is the minimum op amp gain that guarantees a gain error of 0.1%, for $C_{in} = 0.5$ pF and $C_H = 2$ pF?

