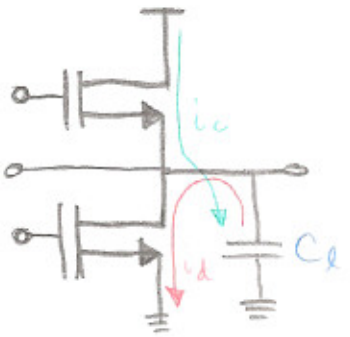
ENHANCED LOAD



$$dV_c = \frac{1}{C_l} i_c(t)\, dt$$

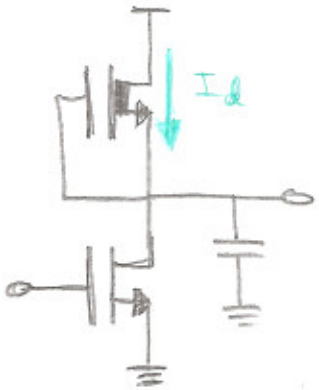
$$\int_{V_{out}^{\circ}}^{V_{out}'} dV_c = \frac{1}{C_l} \int_{0}^{\Delta t_{0\to 1}} i_c(t)\, dt$$

assume $i_c(t) = I_c$ = constant.

$$\therefore V_{OUT}' - V_{OUT}^{\circ} = \frac{I_c}{C_l} (\Delta t_{0\to 1})$$

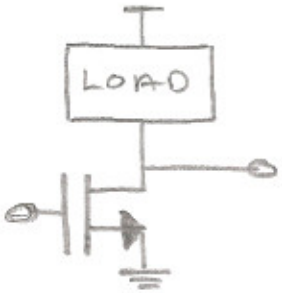
$$\Delta t_{0\to 1} = \frac{(V_{OUT}' - V_{OUT}^{\circ}) C_l}{I_c}$$

DEPLETION LOAD



$$\Delta t_{0\to 1} = \frac{(V_{OUT}' - V_{OUT}^{\circ}) C_l}{I_d}$$

DERIVATION



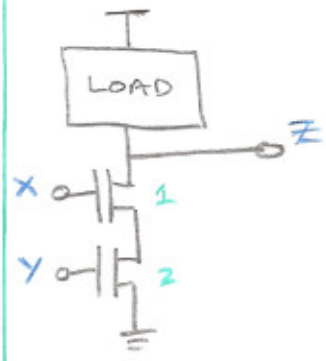
$$V_{out} = I_d \cdot R_{ch}$$

$$R_{ch} = R_{no} \cdot \frac{l}{w}$$

$$R_{no} = f(I_d)$$

$$\left(\frac{l}{w}\right)_l = \frac{1}{R_{no}} \cdot \frac{V_{OUT}^{\circ}}{I_d}$$

NAND



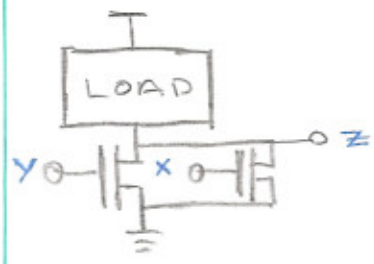
$$Z = \overline{X \cdot Y}$$

$$R_{ch_e} = R_{ch_1} + R_{ch_2}$$

$$R_{no}\left(\frac{l}{w}\right)_e = R_{no}\left(\frac{l}{w}\right)_1 + R_{no}\left(\frac{l}{w}\right)_2$$

$$\left(\frac{l}{w}\right)_i = \frac{1}{n}\left(\frac{l}{w}\right)_e \quad \text{if} \quad \left(\frac{l}{w}\right)_1 = \left(\frac{l}{w}\right)$$

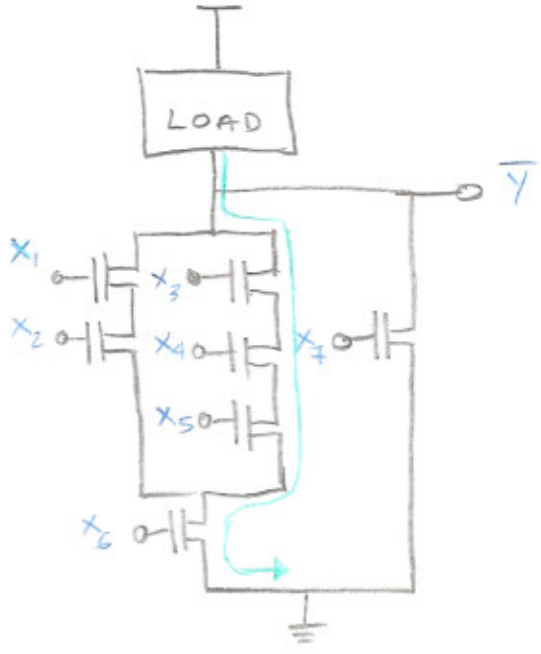
NOR



$$Z = \overline{X + Y}$$

COMPLEX N-MOS

EX: $Y = (X_1 \cdot X_2 + X_3 \cdot X_4 \cdot X_5) \cdot X_6 + X_7$



$$\left(\frac{l}{w}\right)_i = \frac{1}{m}\left(\frac{l}{w}\right)_e$$

m in our case is 4.