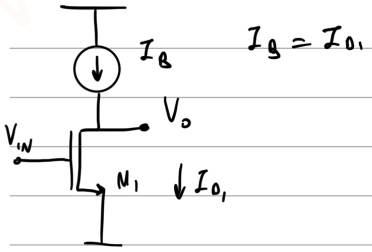
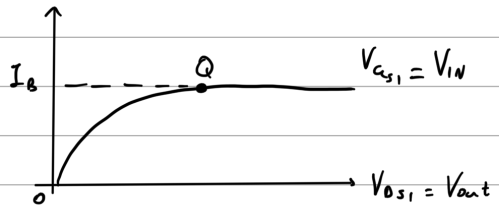
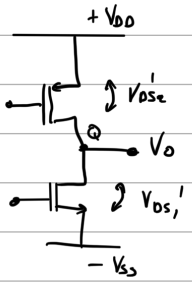
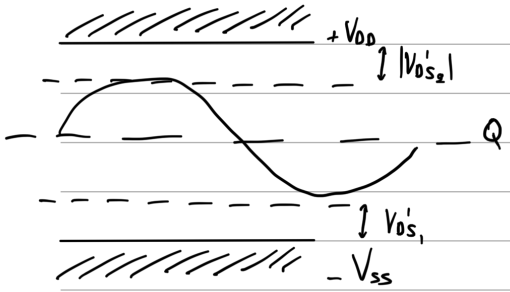
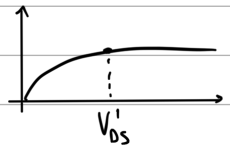


$I_B = I_{D_1}$

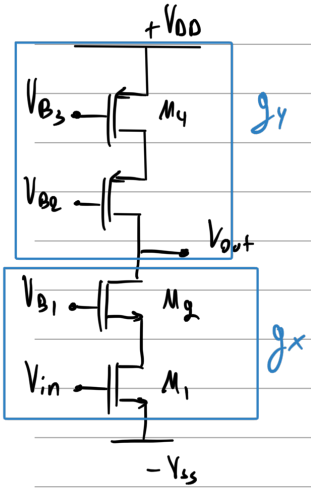


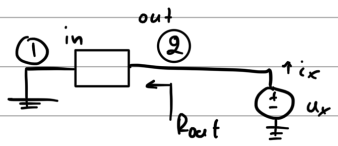




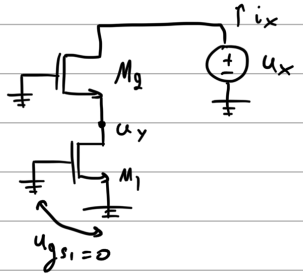


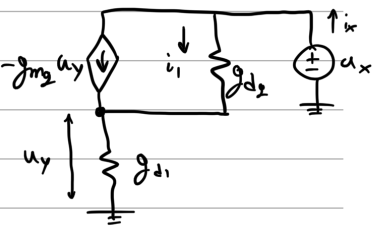
$V_{DS} \gg V'_{DS}$



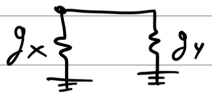


$$g_x^{-1} \equiv \frac{u_x}{i_x}$$





$$u_x = \frac{i_1}{g_{d_2}} + \frac{i_x}{g_{d_1}}$$



$$i_x = i_1 - g_{m_2} u_y \qquad u_y = \frac{i_x}{g_{d_1}}$$

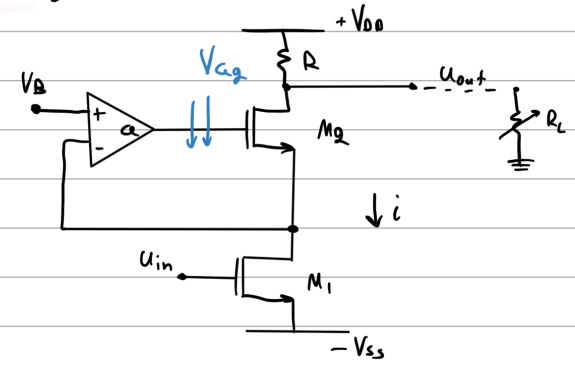
$$\rightarrow \quad i_1 = i_x + \frac{g_{m_2}}{g_{d_1}} i_x = i_x \left(1 + \frac{g_{m_2}}{g_{d_1}}\right)$$

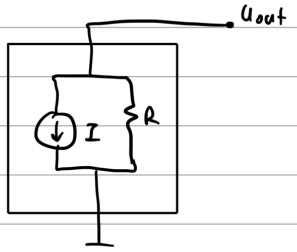
$$u_x = \frac{i_x}{g_{d_2}} \left(1 + \frac{g_{m_2}}{g_{d_1}}\right) + \frac{i_x}{g_{d_1}} \rightarrow g_x^{-1} \equiv \frac{u_x}{i_x} = \frac{1 + g_{m_2}/g_{d_1}}{g_{d_2}} + \frac{1}{g_{d_1}} = \frac{g_{d_1} + g_{m_2} + g_{d_2}}{g_{d_1} \cdot g_{d_2}} \simeq$$

$$\simeq \frac{g_{m_2}}{g_{d_1} \cdot g_{d_2}} = \left(\frac{g_{d_1}}{g_{m_2}/g_{d_2}}\right)^{-1}$$

$$A_{cascode} = \frac{-g_m}{g_x + g_y} \gg A_{inverter}$$

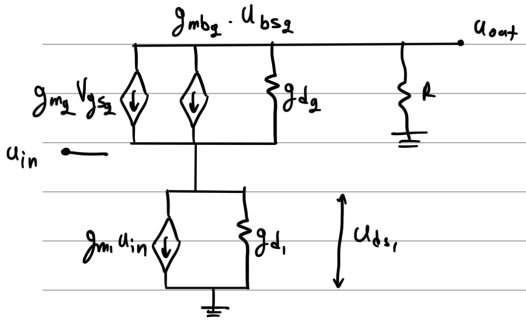
Ενεργός καταδιτικός ενισχυτής

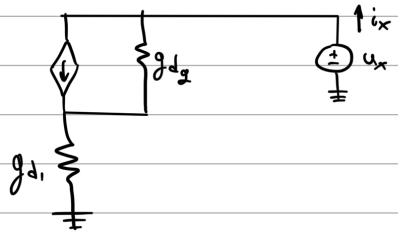




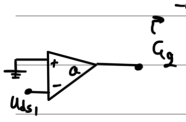
$u_{out}\uparrow \rightarrow i\uparrow\ (=I_{D_1}=I_{D_2}) \rightarrow V_{DS_1}\uparrow \rightarrow V_{D_1}\uparrow$

$\rightarrow V_{cg}\downarrow\downarrow \rightarrow V_{GS_2}\downarrow\downarrow \rightarrow I_{D_2}\downarrow\downarrow\ (=i)$



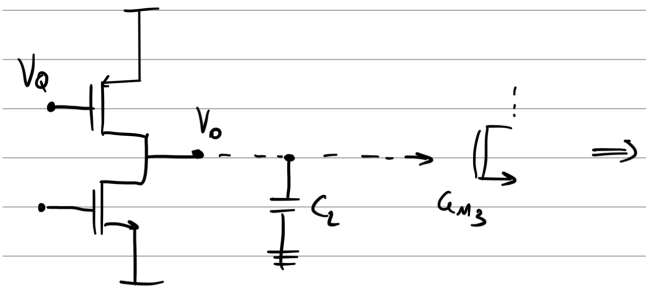


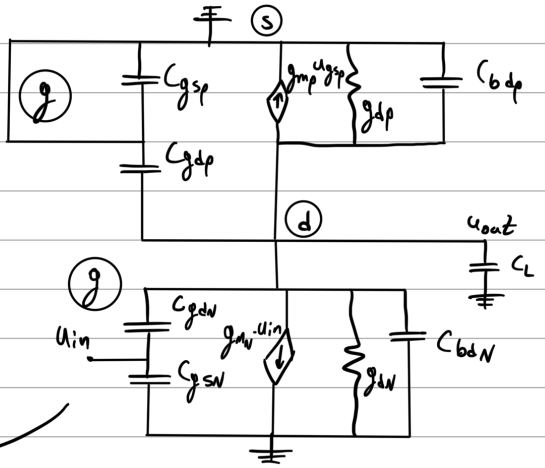
$u_{gs_2} = u_{g_2} - u_{s_2} = -a\,u_{ds_1} - u_{ds_1} = -(a+1)\,u_{ds_1}$

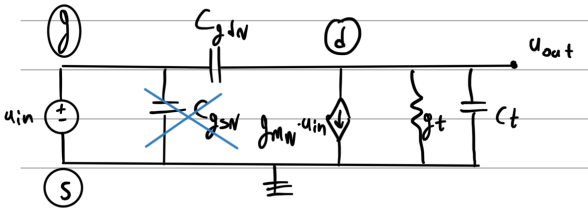


$$g_{out} \simeq \frac{g_{d_1}}{(a+1)\,g_{m_2}/g_{d_2}}$$

active cosc. g_{out} << passive cosc. g_{out} << analog inverter g_{out}







$$g_t = g_{dN} + g_{dP} \qquad C_t = C_{gdp} + C_d + C_{bdN} + C_{bdp}$$

$$Z_L = g_t /\!/ C_t$$

$$C_t' = C_t + C_{gdN}$$

$$A(s) = \frac{-g_{mN} - s C_{gin}}{g_t + s C_t'}$$