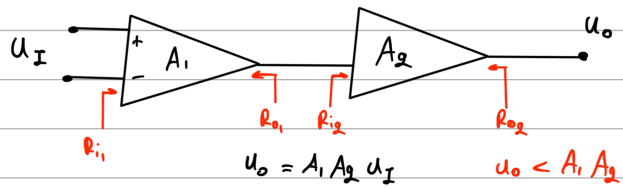
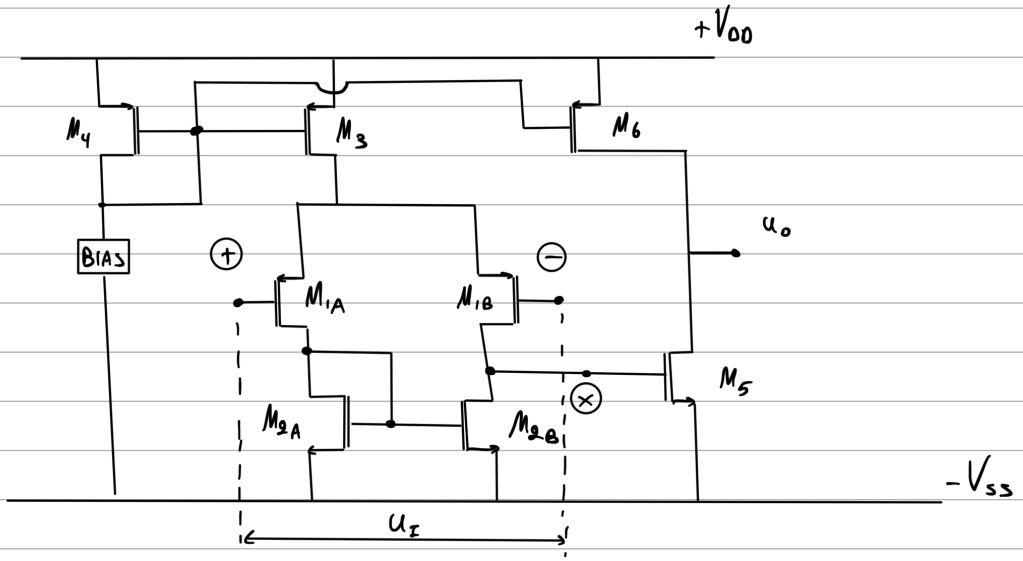
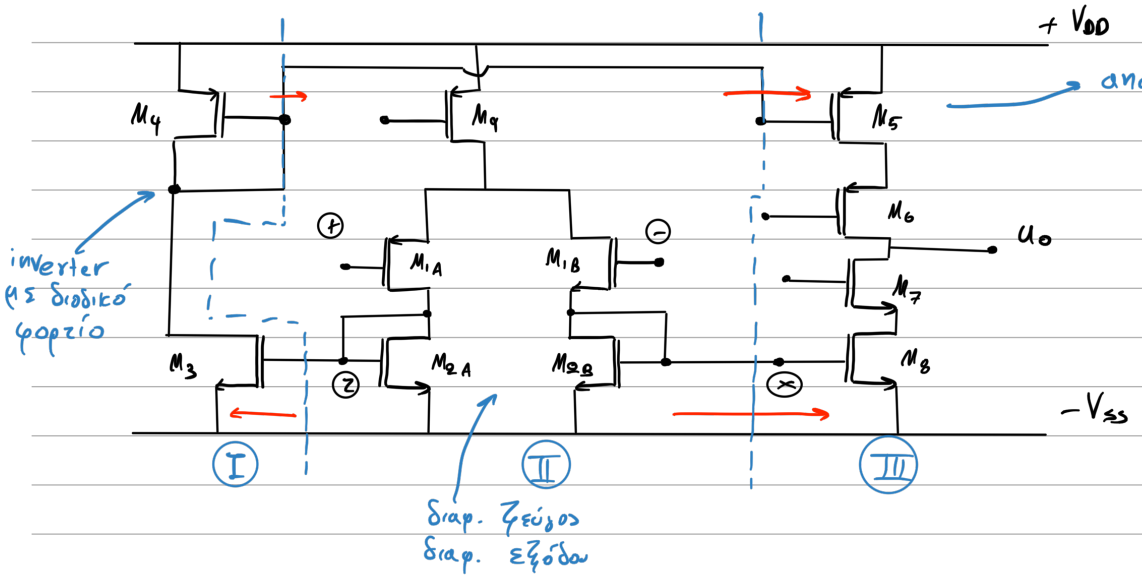


$u_o = A_1 A_2 u_I$ $\quad u_o < A_1 A_2 u_I$



$$A = \frac{u_o}{u_I} = \frac{u_o}{u_x} \cdot \frac{u_x}{u_I} = \frac{g_{m_1}}{g_{d_1} + g_{d_2}} \cdot \frac{g_{m_5}}{g_{d_5} + g_{d_6}} \simeq 100 \cdot 100 = 10.000$$



analog cascode inverter

$A_1 = 1$

$A_2 = 10.000$

$A = A_1 \cdot A_2 \simeq 10.000$

Υπόθεση: (I) $u_x \neq 0$, $u_y = 0$

(II) $u_x = 0$, $u_y \neq 0$

(I) $$A_I = \frac{u_I}{u_{id}} = \frac{u_I}{u_x} \cdot \frac{u_x}{u_{id}}$$

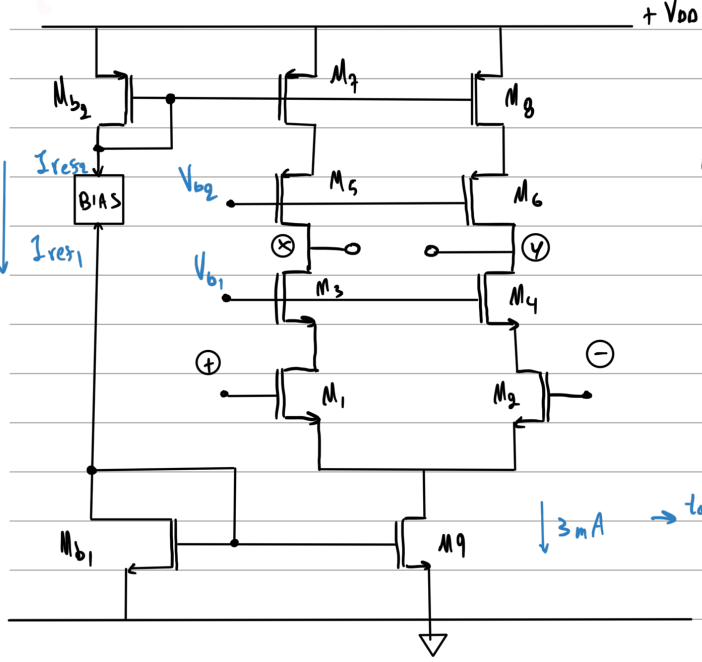
$$\frac{u_I}{u_x} = -\frac{g_{m_8}}{g_v + g_w}$$

$$g_w = \frac{g_{d_8}}{\frac{g_{m_7}}{g_{d_7}}}$$

$$\frac{u_x}{u_{id}} = -\frac{1}{2}\frac{g_{m_1}}{g_{m_2}}$$

$$A_I = \frac{1}{2}\frac{g_{m_8}}{g_v + g_w}\frac{g_{m_1}}{g_{m_2}}$$

Τηλεσκοπικός Ενισχυτής



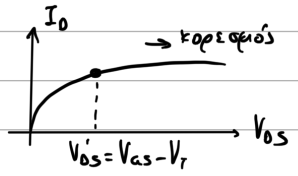
$V_{DD} = 3V$

$CMOS = 0{,}5\mu m$

$\mu_n C'_{ox} = 60\mu A/V^2$, $V_{TN} = 0{,}7V$, $\lambda_n = 0{,}1\ V^{-1}$

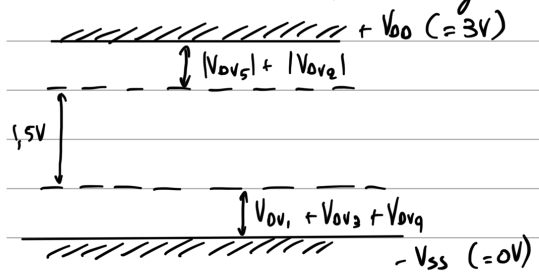
$\mu_p C'_{ox} = 30\mu A/V^2$, $V_{TP} = 10{,}71V$, $\lambda_p = 0{,}2\ V^{-1}$

$\gamma = 0$ (αγνοώ φ. σώματος)



Ζητείται: PD = 10mW (power dissipation

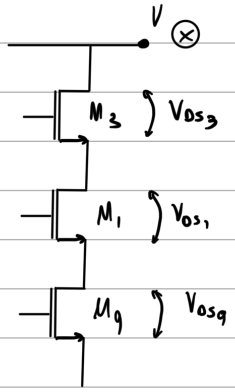
differential output swing : 3V



$V_{DV9} = 0{,}5V$

$|V_{DV5}| = |V_{DV7}| = 0{,}3V$

$V_{DV1} = V_{DV3} = 0{,}2V$



$V_{\otimes min} = V_{DV3} + V_{DV1} + V_{DV9}$

$V_{\otimes max} = V_{DD} - (|V_{DV5}| - |V_{DV7}|)$