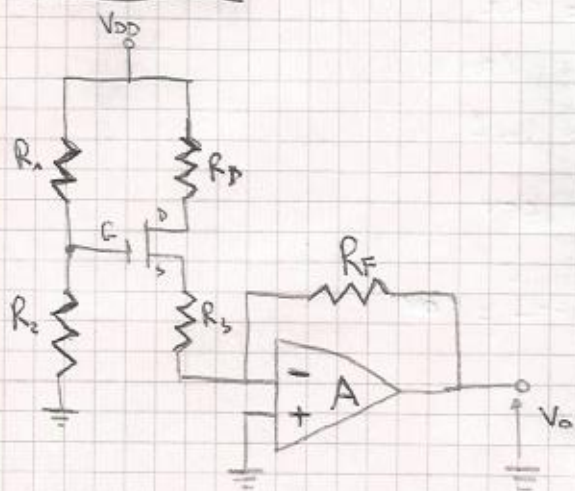


3/3/2011



$$\begin{aligned} V_{DD} &= 5V \\ R_1 &= 2M\Omega \\ R_2 &= 8M\Omega \\ R_D &= 750\Omega \\ R_S &= 500\Omega \\ R_F &= 3K\Omega \end{aligned}$$

$$\begin{aligned} V_T &= 1V \\ K &= 0,5 \text{ mA/V}^2 \\ |L^+| = |L^-| &= 15V \end{aligned}$$

$$V_G = V_{DD} \frac{R_2}{R_1 + R_2} = 5 \cdot \frac{8}{10} = 4V$$

$$V_S = I_D \cdot R_S$$

$$\begin{cases} I_D = K (V_{GS} - V_T)^2 \\ V_{GS} = V_G - V_S \end{cases} \Rightarrow \begin{cases} I_D = \frac{1}{2} (4 - \frac{0,5}{1} I_D - 1)^2 \end{cases} \Rightarrow \begin{cases} 2I_D = \frac{0,25}{1} I_D^3 - 3I_D \end{cases}$$

$$I_D = \begin{cases} 18 \\ 2 \end{cases}$$

$$V_G - V_S > V_T = 4 - 18 \cdot 0,5 > 1 \quad \text{NO}$$

$$4 - 2 \cdot 0,5 > V_T \quad \text{SI, FUNZIONA}$$

$$I_D = 2 \text{ mA}$$

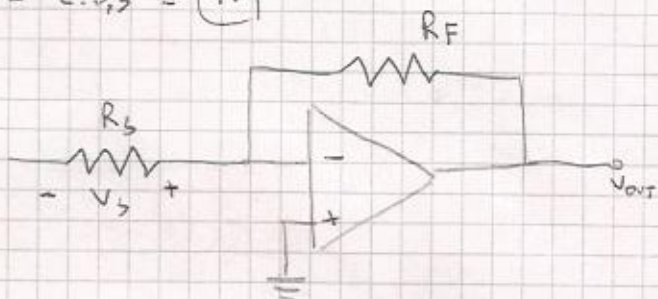
$$V_S = 3V$$

$$V_{DS} \geq V_{GS} - V_T \quad \text{per SATURAZIONE}$$

$$V_{DD} - I_D R_D - I_D R_S \geq 3 - 1$$

$$2,5 \geq 2 \quad \text{OK e SATURO}$$

$$V_S = R_S \cdot I_D = 2 \cdot 0,5 = 1V$$



$$V_{OUT} = V_S \left(-\frac{R_F}{R_S} \right)$$

$$= 1 \cdot \left(-\frac{3}{0,5} \right) = -6V$$