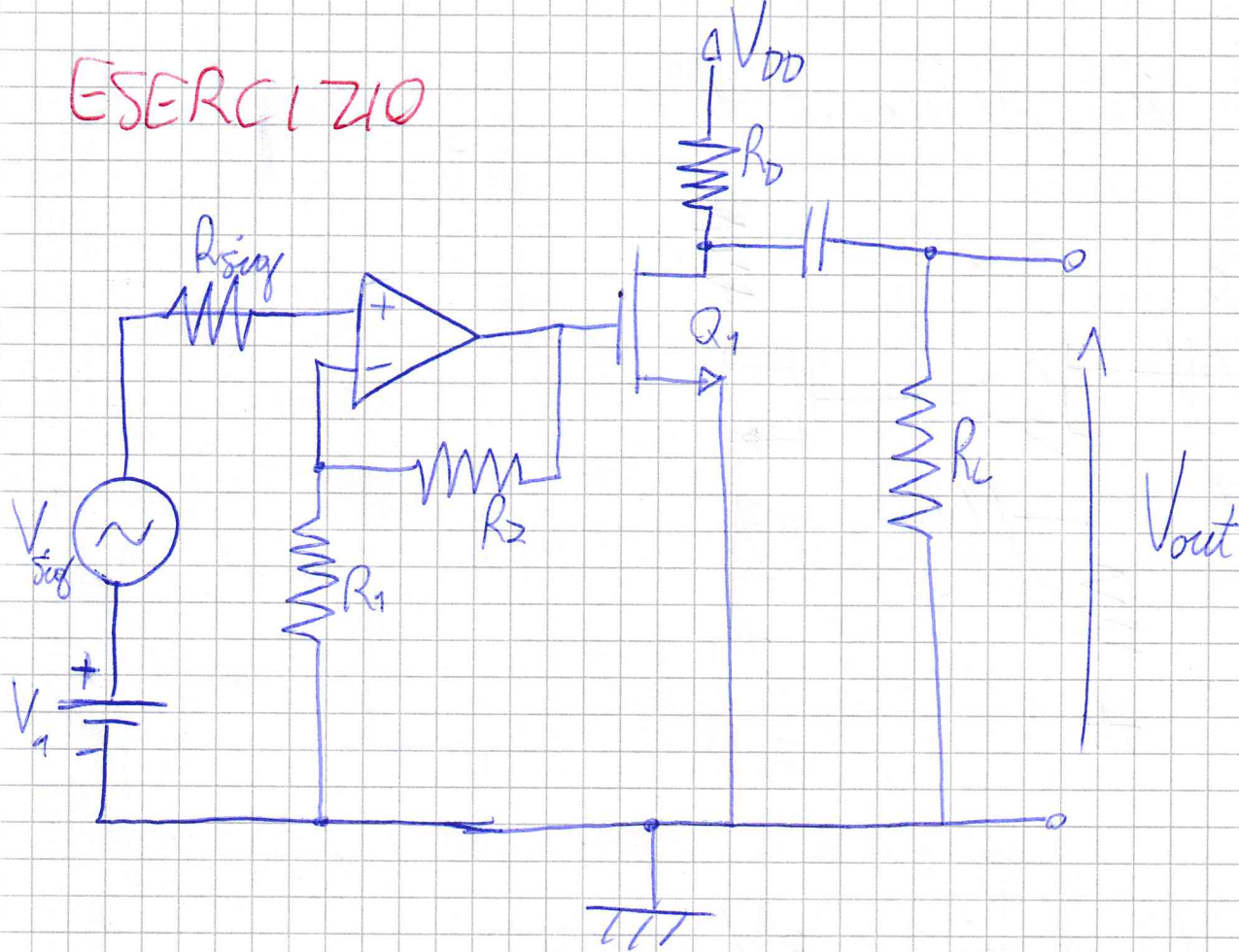


ESERCIZIO



$$V^+ = |V^-| = 12V$$

$$Q_1 = \left\{ V_{t1} = 1V; K = 0,5 \frac{mA}{V^2}; \lambda = 0 \right\}$$

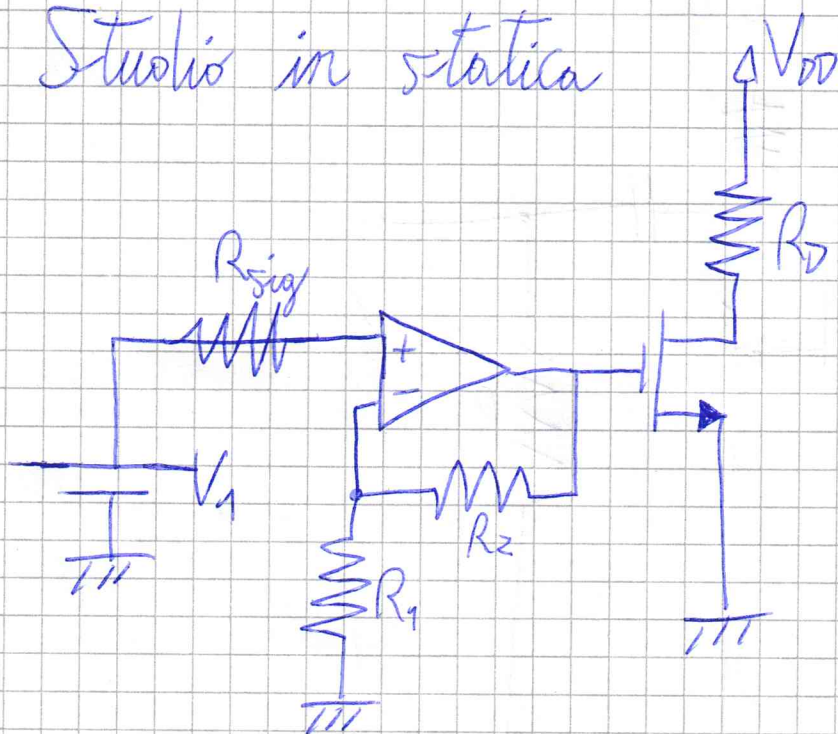
$$R_1 = 1k\Omega \quad R_2 = 2k\Omega \quad R_{sig} = 1k\Omega \quad R_L = 4k\Omega$$

$$V_1 = 1V \quad V_{DD} = 12V \quad C = \infty$$

$$A_v = \frac{V_{out}}{V_{sig}} = -12$$

Calcolare R_D

Studio in statica



$$V_G = V_1 \left(1 + \frac{R_2}{R_1} \right) = 3V$$

$$V_{GS} = V_G - V_S = V_G = 3V > V_t = 1V$$

$$i_D = K(V_{GS} - V_t)^2 = \frac{1}{2}(3 - 1)^2 = 2mA$$

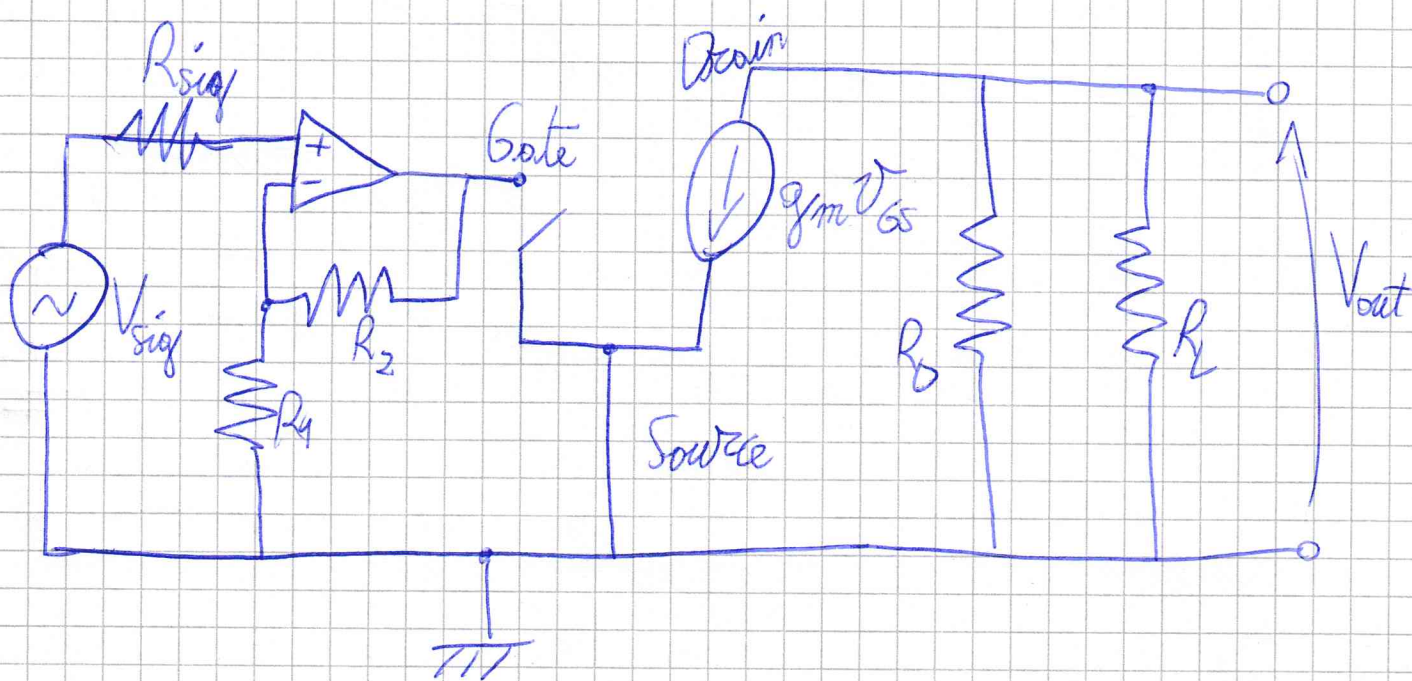
$$V_{DS} = V_{DD} - i_D R_D = 12 - 2R_D > 2$$

$$-2R_D > -10$$

$$R_D < 5 \text{ k}\Omega$$

per avere il transistor
in saturazione

Studio per piccoli segnali



$$g_m = 2K(V_{GS} - V_t) = (3 - 1) = 2$$

$$V_{GS} = V_{sig}$$

$$V_{out} = + g_m V_{GS} \frac{R_D R_L}{R_D + R_L} =$$

$$2 \cdot \frac{4 R_D}{R_D + 4} = -12$$

$$6 R_D - 4 R_D + 24 = 0$$

$$\frac{4 R_D}{R_D + 4} = +6$$

$$4 R_D = 6 R_D + 24$$

$$2 R_D = -24$$

~~$$R_D = -12 \text{ k}\Omega$$~~

$$R_D = -12 \text{ k}\Omega$$