TRACCIA DI SOLUZIONE – ESERCIZIO 2

① $V_G = 4V$; $V_{GS} = 1.68V$; $I_D = 2.32\,mA$; $V_D = 5.04\,V$; $V_S = 2.32V$

Il MOSFET è polarizzato in zona di saturazione, infatti $V_{GD} < V_T$
$V_{GS} > V_T$

$g_m = 6.8\ mA/V$; $1/g_m =$

② $$\frac{v_{out_1}}{v_{in}} = \frac{R_1 \| R_2}{R_{IN} + R_1 \| R_2} \cdot \frac{-g_m R_D}{1 + g_m R_S}$$

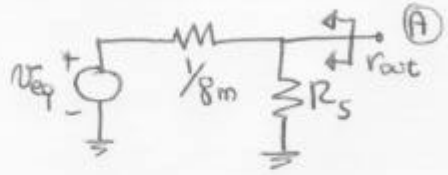
$R_S \gg 1/g_m$ $(1\,k\Omega \gg 147\,\Omega) \Rightarrow \frac{v_{out_1}}{v_{in}} \simeq -\frac{R_1 \| R_2}{R_{IN} + R_1 \| R_2} \cdot \frac{R_D}{R_S} =$

$= -2.61$

③ $$\frac{v_{out_2}}{v_{in}} = \frac{R_1 \| R_2}{R_{IN} + R_1 \| R_2} \cdot \frac{g_m R_S}{1 + g_m R_S} = +0.76$$

↳ idealmente guadagna 1 : EMITTER FOLLOWER

④ Circuito equivalente visto da Ⓐ



Spegnendo v_{eq}:

$r_{out} = R_S \| 1/g_m \simeq 1/g_m = 147\,\Omega$

⑤ $$P_{TOT} = P_{R_1,R_2} + P_{R_D} + P_{R_S} + P_{MOS} =$$

$$= V_{DD} \cdot I_{R_1,R_2} + V_{R_D} I_D + V_{R_S} I_D + V_{DS} I_D =$$

$$= 480\,\mu W + 16.1\,mW + 5.4\,mW + 6.31\,mW \simeq 28\,mW$$