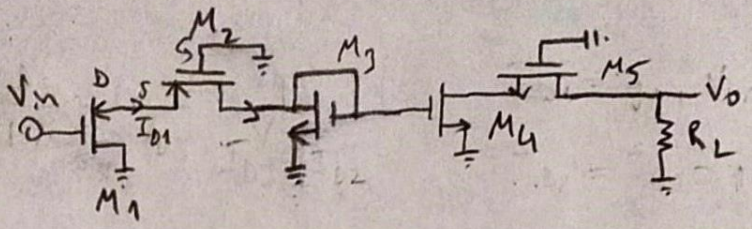
2)

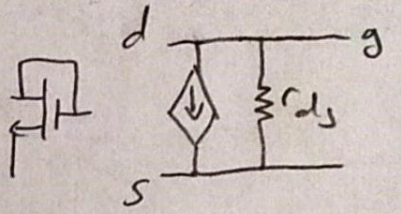
a) $I_{DQ_1} = I_{DQ_2} = I_{DQ_3} = 50\,\mu A$

$$I_{DQ_4} = I_{DQ_3} \cdot \frac{\beta_4}{\beta_3} = \underline{\underline{100\,\mu A}}$$

b)



$$\frac{I_{D3}}{V_{in}} = \frac{I_{D3}}{V_{D3}} \cdot \underbrace{\frac{V_{D2}}{V_{S2}} \cdot \frac{V_{S1}}{V_{g1}}}_{g_{m1} \cdot R_0}$$



$$\left.\begin{aligned} \frac{V_{D3}}{V_{in}} &= -g_{m1} \cdot r_{di3} \\ \frac{I_{D3}}{V_{D3}} &= \frac{1}{r_{di3}} \end{aligned}\right\} \quad \frac{I_{D3}}{V_{in}} = -g_{m1} = -\sqrt{2\beta_1 \cdot I_{D1}} = \underline{\underline{-0{,}2\ mS}}$$

c) $$\frac{V_{out}}{V_{in}} = \underbrace{(-g_{m1})}_{M_1, M_2 \text{ gain}} \cdot \underbrace{(-g_{m4} \cdot R_L)}_{M_4, M_5 \text{ gain}}$$

$$g_{m4} = \sqrt{2\beta_4 I_{D4}} = 0{,}4\ mS$$

$$\frac{V_{out}}{V_{in}} = \underline{\underline{0{,}0008}}$$