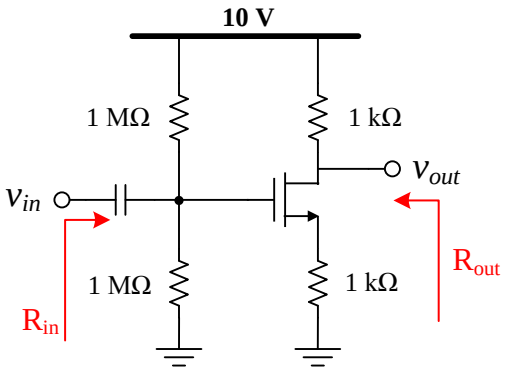
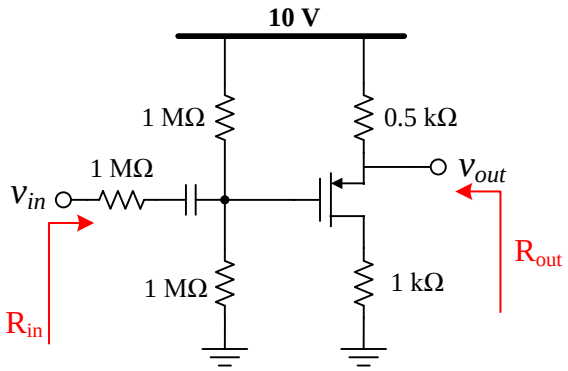
In the Name of Allah, the Most Beneficent, the Most Merciful.

Electronics 2, Assignment #3, Single-stage MOS amplifiers.

1- In the following circuits, determine the voltage gain, input resistance and output resistance.



$$\begin{cases} V_{TH} = 2V \\ \mu_n C_{OX} \dfrac{W}{L} = 0.5 \dfrac{mA}{V^2} \\ \lambda = 0V^{-1} \end{cases}$$

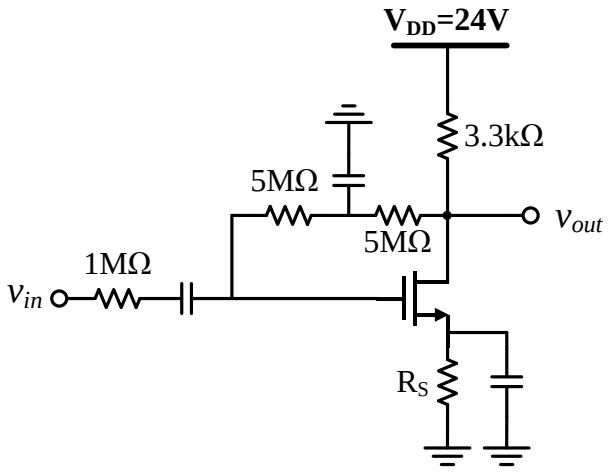


$$\begin{cases} V_{TH} = -1V \\ \mu_p C_{OX} \dfrac{W}{L} = 2 \dfrac{mA}{V^2} \\ \lambda = 0V^{-1} \end{cases}$$

2- In the following circuit,

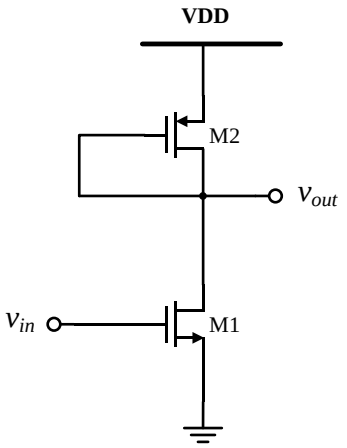
a) Specify the source resistance so that I_D=2.5 mA.

b) Calculate the voltage gain and the input and the output resistances.

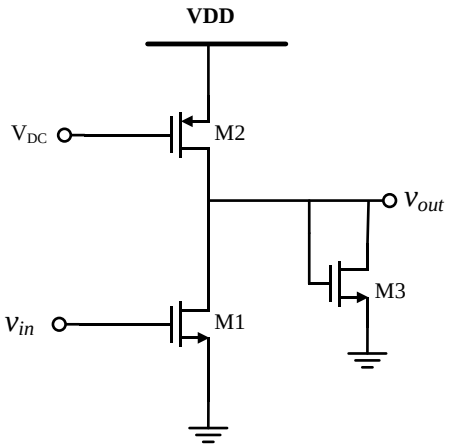


$$\begin{cases} \beta = 0.25 \dfrac{mA}{V^2} \\ |V_{TH}| = 3V \\ \lambda = 0 \end{cases}$$

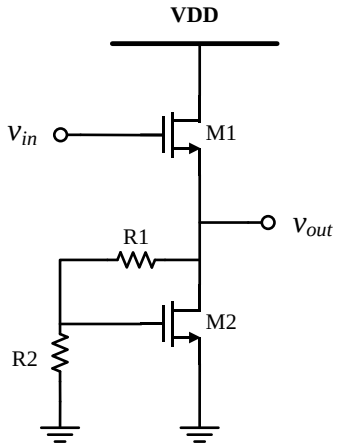
3- Determine a relation for the voltage gain ($A_V = \frac{v_{out}}{v_{in}}$) of the following circuits. Assume that the transistors operate in saturation and $\lambda \neq 0$.



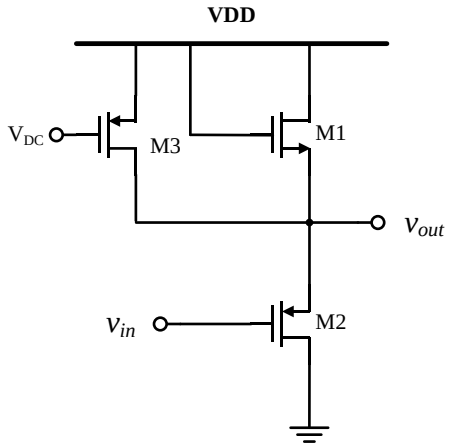
(a)



(b)

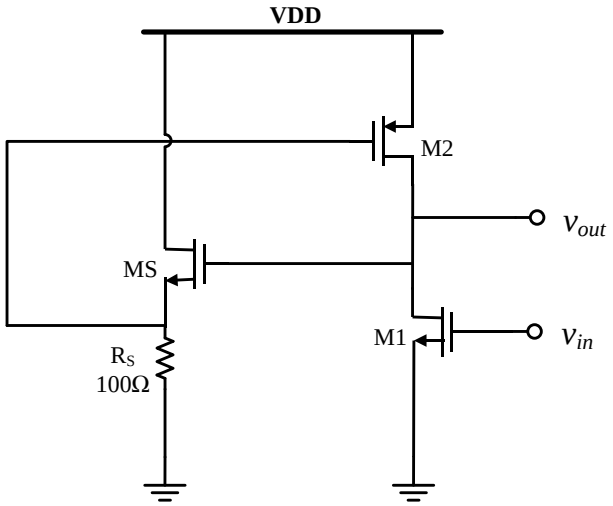


(c)



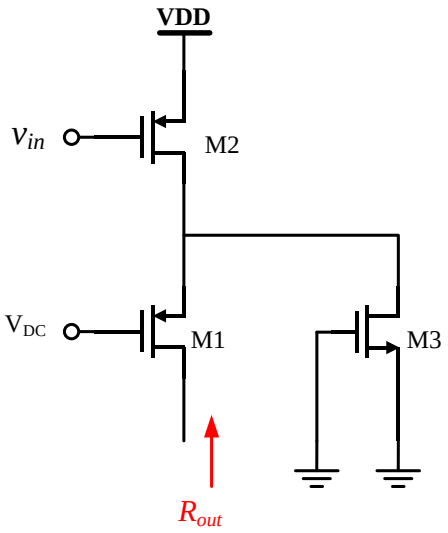
(d)

4- Draw the small-signal model of the following circuit and calculate the voltage gain. Assume that all of the transistors are in saturation.

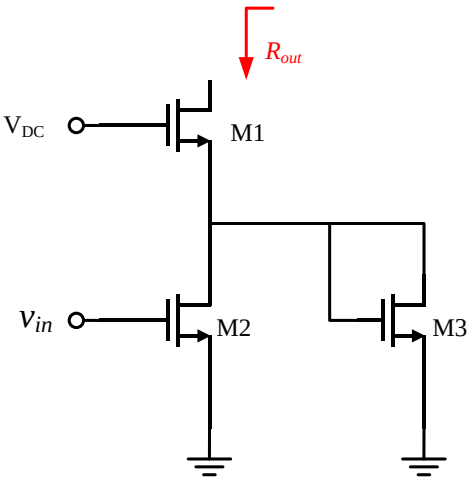


$$\begin{cases} g_m = 10\,\frac{mA}{V} \\ \lambda = 0 \end{cases}$$

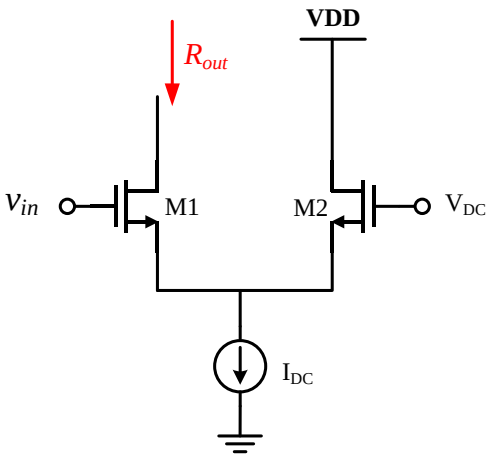
5- Specify a relation for the output resistance of the following circuits. Assume $\lambda \neq 0$.



(a)



(b)



(c)

Good Luck- M.R. Ashraf