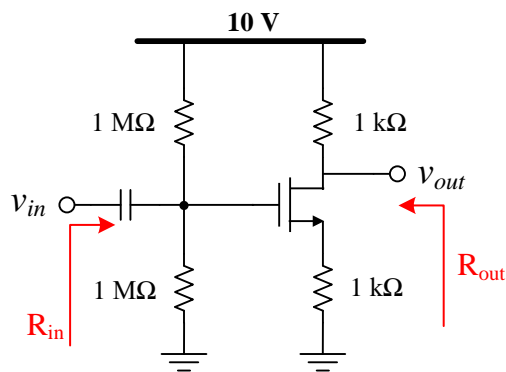
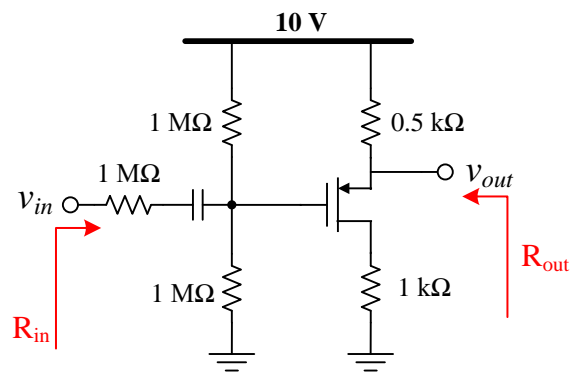


Electronics 2, Assignment #3, Single-stage MOS amplifiers.

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



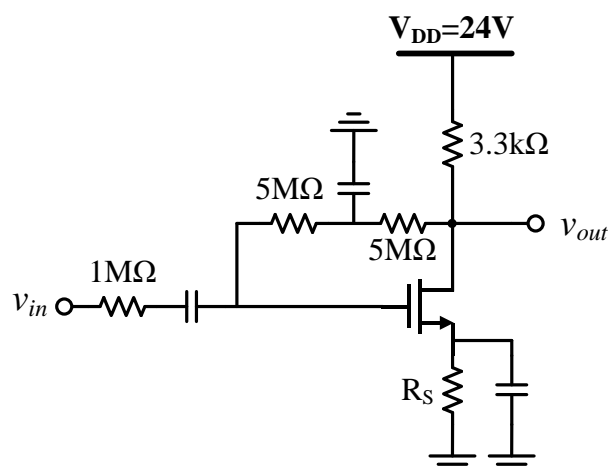
$$\begin{cases} V_{TH} = 2V \\ \mu_n C_{ox} \frac{W}{L} = 0.5 \frac{mA}{V^2} \\ \lambda = 0V^{-1} \end{cases}$$



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

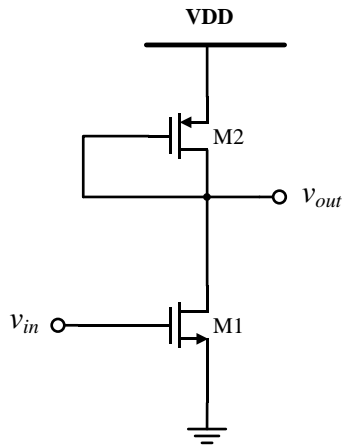
2- In the following circuit,

- Specify the source resistance so that $I_D = 2.5 \text{ mA}$.
- Calculate the voltage gain and the input and the output resistances.

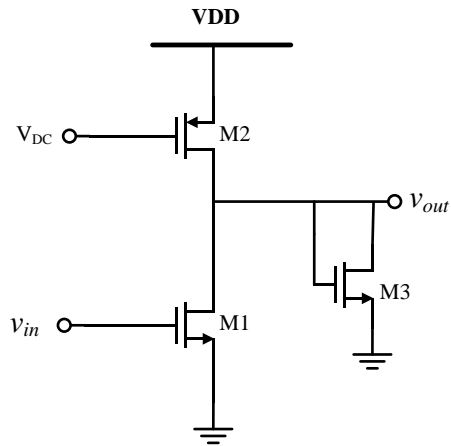


$$\begin{cases} \beta = 0.25 \frac{mA}{V^2} \\ |V_{TH}| = 3V \\ \lambda = 0 \end{cases}$$

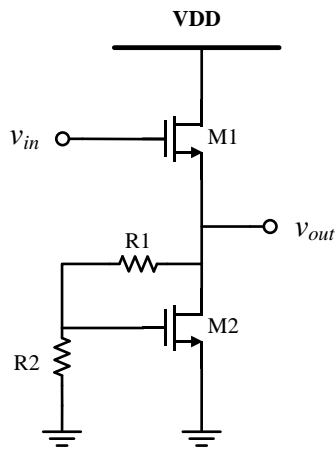
- 3- Determine a relation for the voltage gain ($A_v = \frac{v_{out}}{v_{in}}$) of the following circuits. Assume that the transistors operate in saturation and $\lambda \neq 0$.



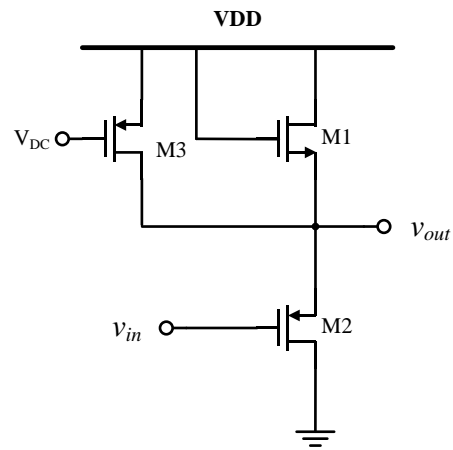
(a)



(b)

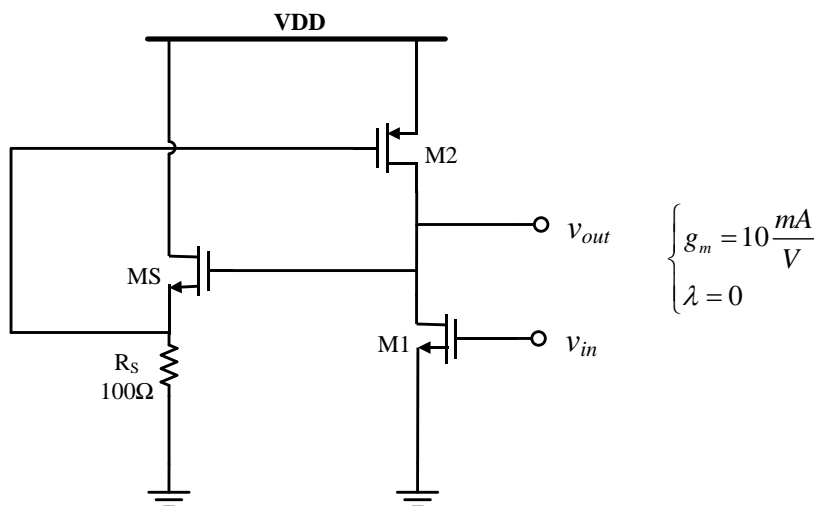


(c)

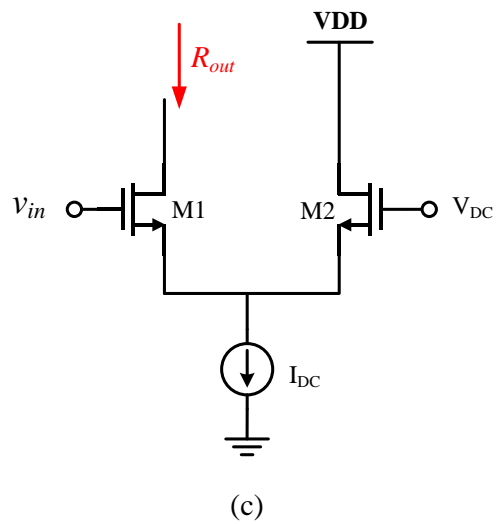
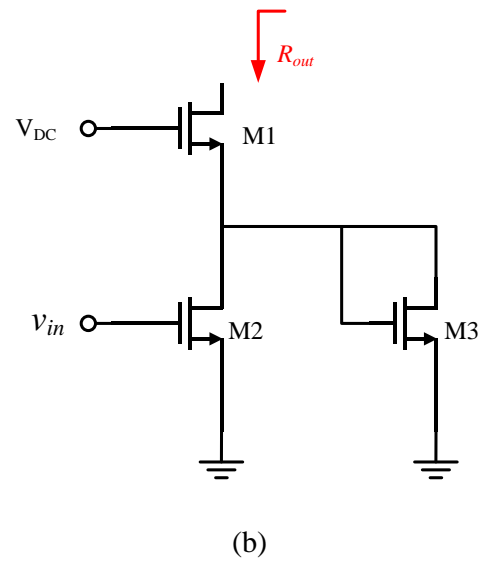
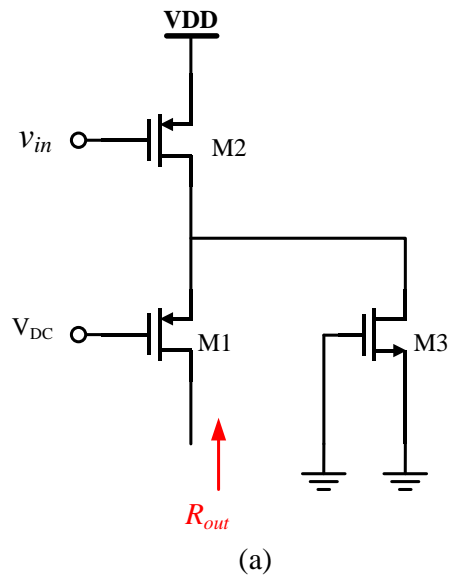


(d)

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



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



Good Luck- M.R. Ashraf