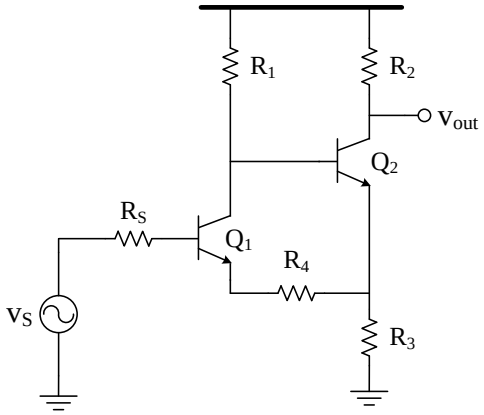
In the Name of Allah, the Most Beneficent, the Most Merciful.

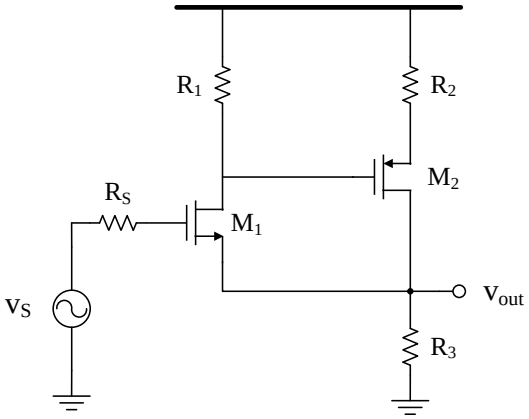
Electronics 2, Assignment #8, Feedback configurations.

Shahrood University of Technology

1- In the following circuits, specify the feedback network, main amplifier section and the type of the feedback.



(a)



(b)

2- Determine the sign of the feedback in the following circuits.

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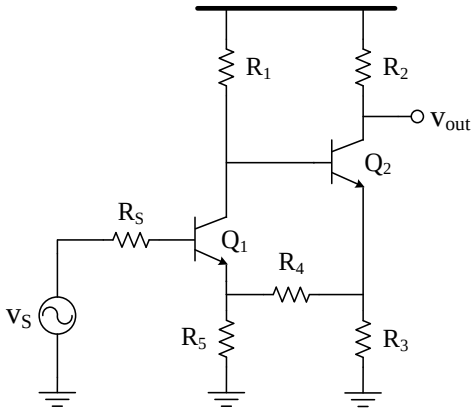
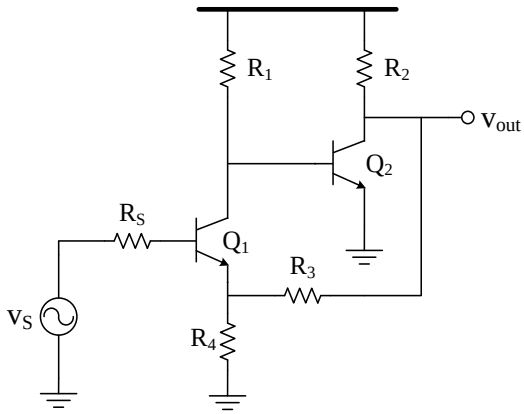
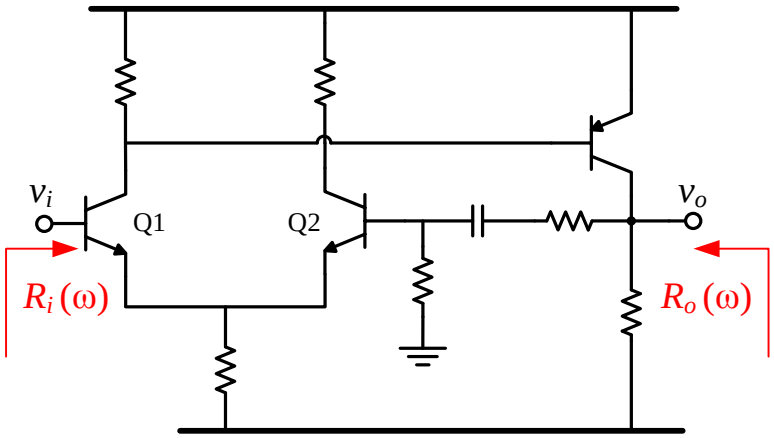


(a)

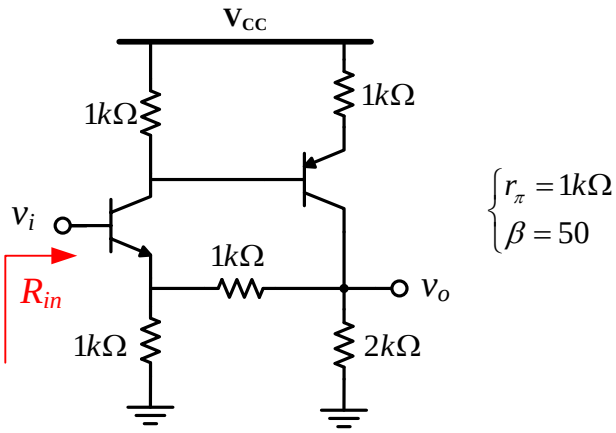


(b)

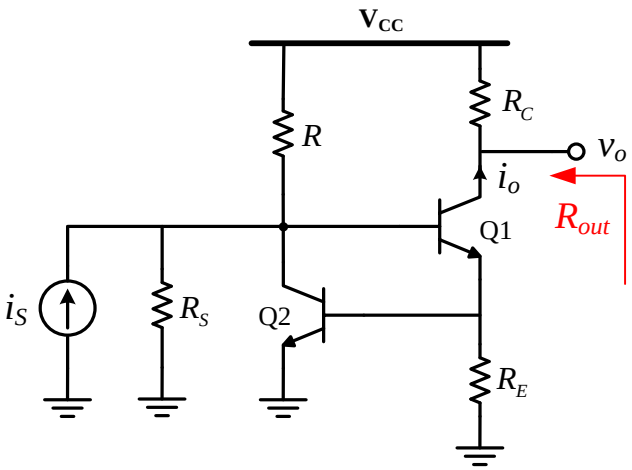
3- In the circuit shown below, $R_i(\omega)$ and $R_o(\omega)$ are the input resistance and output resistance in terms of ω. How do $R_i(\omega)$ and $R_o(\omega)$ change as the frequency varies from 0 to infinity.
(Hint: Capacitor is modeled as an open-circuit in $\omega=0$ and as a short-circuit as the frequency goes to infinity)



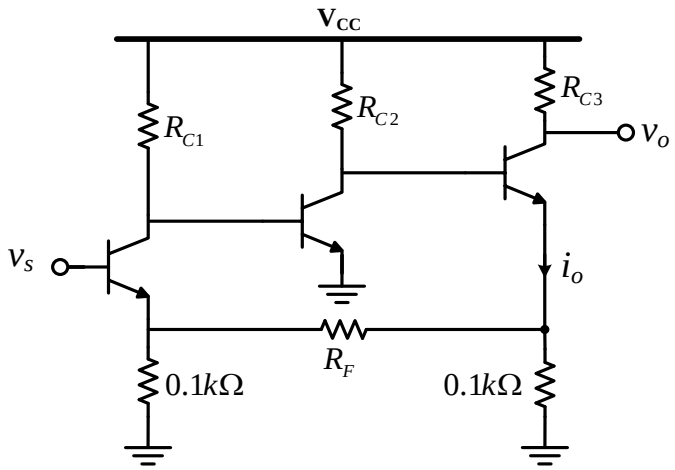
4- Calculate the input resistance of the following figure.



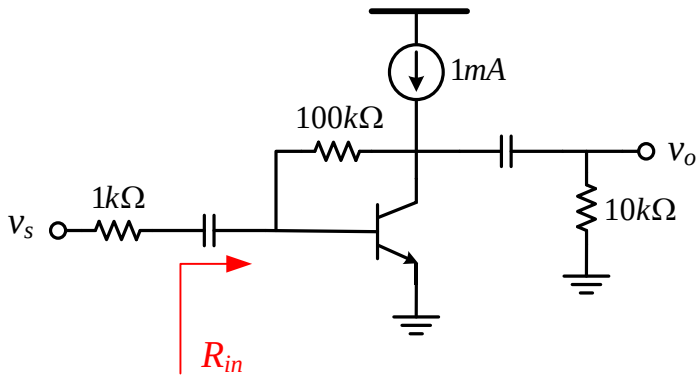
5- In the following circuit, specify the type of the feedback configuration. In addition, calculate the current gain ($\frac{i_o}{i_S}$) and the output resistance.



6- In the following circuit, specify R_F so that $\frac{i_o}{v_S} = 0.1$. The gain of the main amplifier is assumed to be very large.

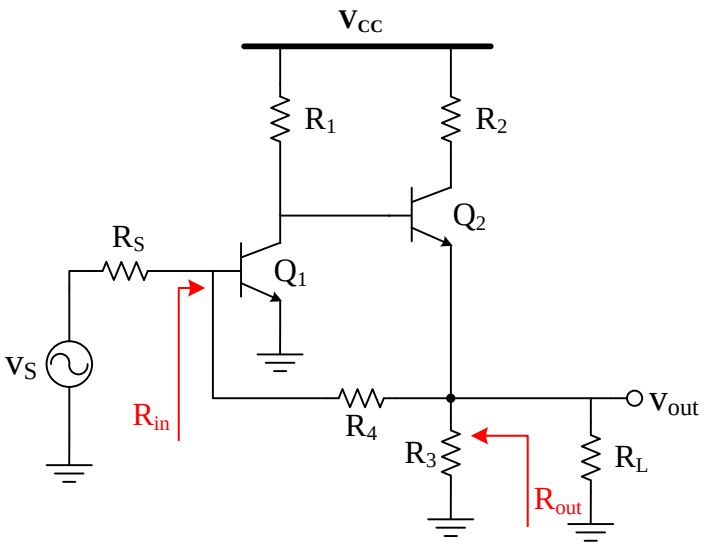


7- Calculate the voltage gain ($\frac{v_o}{v_S}$) and the input resistance (R_{in}) of the following circuit.



$$\begin{cases} v_T = 25mV \\ \beta = 100 \end{cases}$$

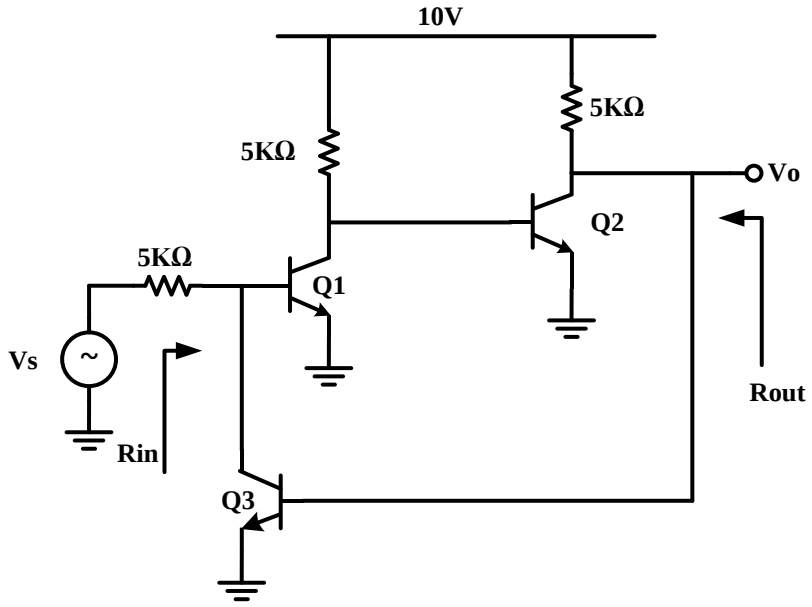
8- a) In the following circuit, prove that the feedback sign is negative. In addition, specify the type of the feedback configuration.
b) Calculate the voltage gain, input resistance and output resistance of the circuit.



$$\begin{cases} R_1 = R_3 = R_L = 10k\Omega \\ R_2 = R_S = R_4 = 5k\Omega \\ \beta = 100 \\ g_m = 40mA/V \\ V_A = \infty \\ V_{CC} = 10V \end{cases}$$

9- In the following circuit, suppose that I_C=1 mA and β=100 for all of the transistors.

a) Specify the feedback loop of the circuit and show that the feedback sign is negative.
b) Specify the type of the feedback configuration.
c) Calculate the voltage gain.
d) Calculate the input and the output resistances (R_{in} and R_{out})



Good Luck- M.R. Ashraf