

ECE 321 - Homework #4

2-Port Models. CE Amplifiers (DC and AC). Due Monday, December 6th

CE Amplifiers (DC Analysis)

1) Determine the Q-point for the following circuits.

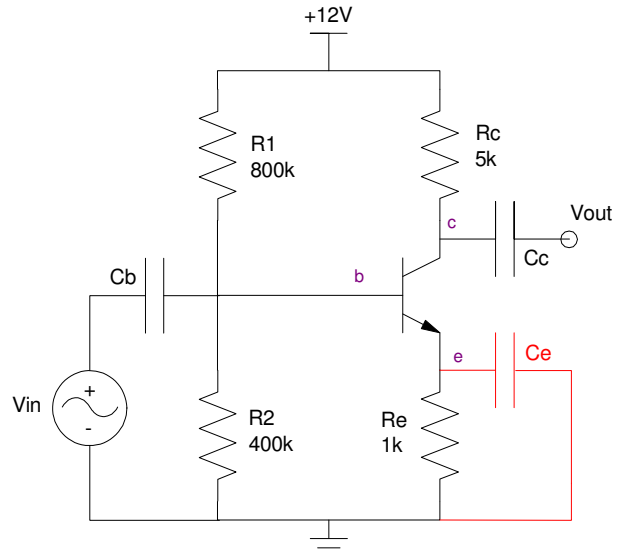
Assume 3904 NPN transistors

- $\beta = 200$
- $|V_{be}| = 0.7V$

2) Modify this circuit so that

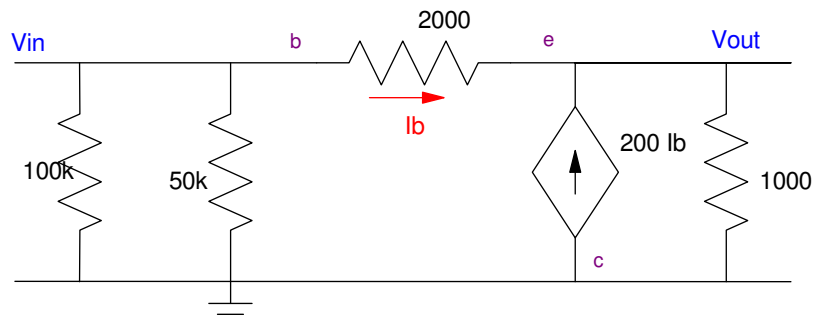
- $V_{ce} = 6.0V$, and
- The Q-point is stabilized for variations in β

3) Check you answers in CircuitLab

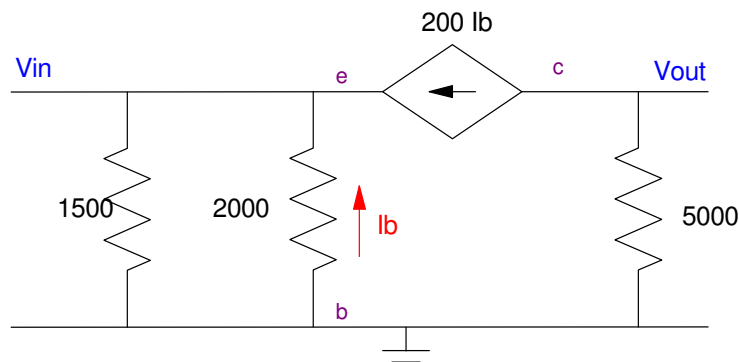


2-Port Models

4) Determine the 2-port model for the following circuit



5) Determine the 2-port model for the following circuit



CE Amplifiers (AC Analysis)

6) Draw the small signal model for the CE amplifier (below)

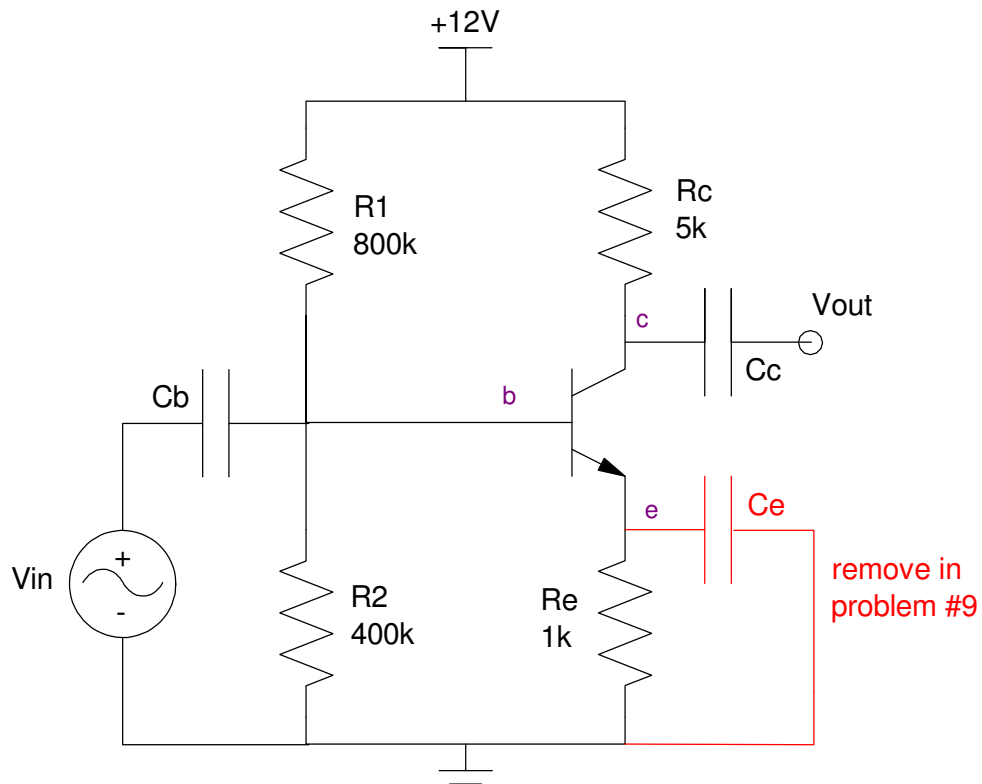
- Determine the resulting 2-port model

7) Check your answers for problem #6 in CircuitLab

- R_{in} : If you add a resistor in series with V_s equal to R_{in} , the output drops by half
- R_{out} : If you load V_{out} with a resistor equal to R_{out} , the output drops by half
- A_o : Apply a 1mV, 1kHz sine wave at V_{in} . The output should be $A_o \cdot V_{in}$

8) Determine the 2-port model for cascading three of these CE amplifiers (CE : CE : CE)

9) Remove C_e . Determine the 2-port model of this CE amplifiers



Problem 1-3 and 6-9