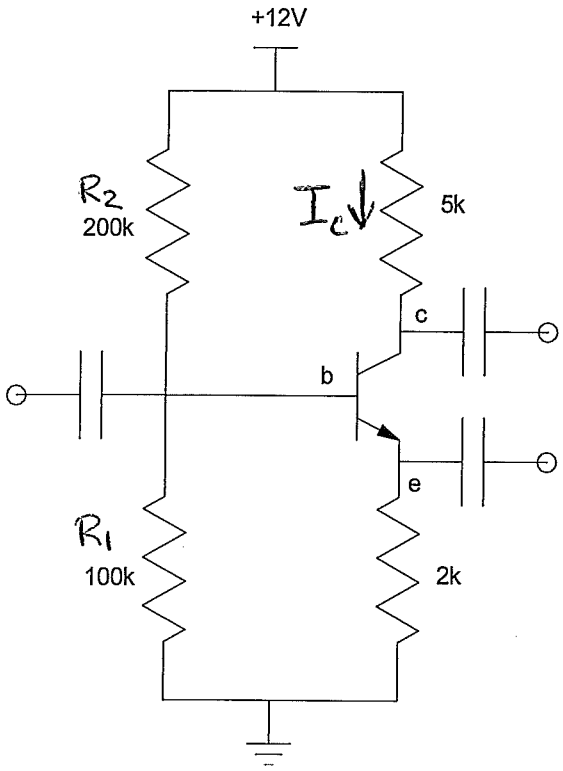
ECE 321 - Quiz #4: Name _____

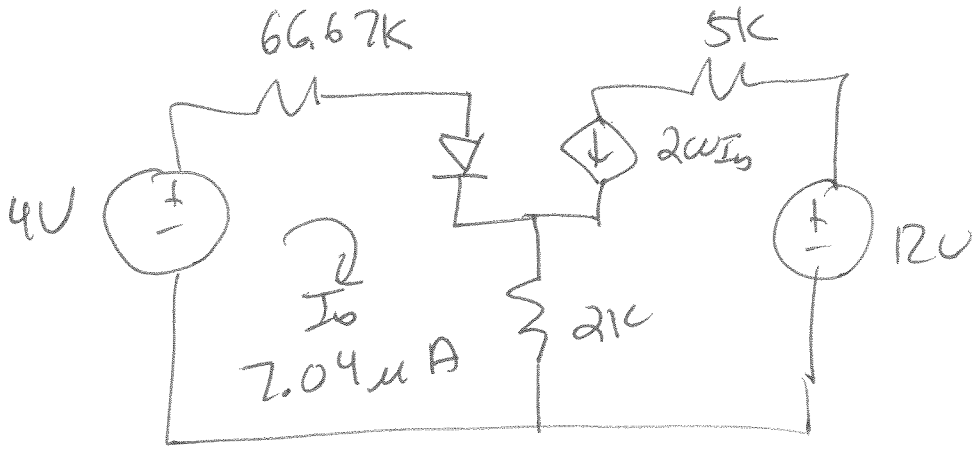
CE Amplifiers and 2-Port Models - April 30, 2015

1) DC Analysis: Determine the Q-point for the following circuit. Assume

- Current gain = 200 ($\beta = 200$)
- Vbe = 0.7V when on

Vbb *Thevenin voltage for R1:R2*	Rbb *Thevenin resistance for R1:R2*	Vc	Ic
4V	66.67K	4.95V	1.4mA





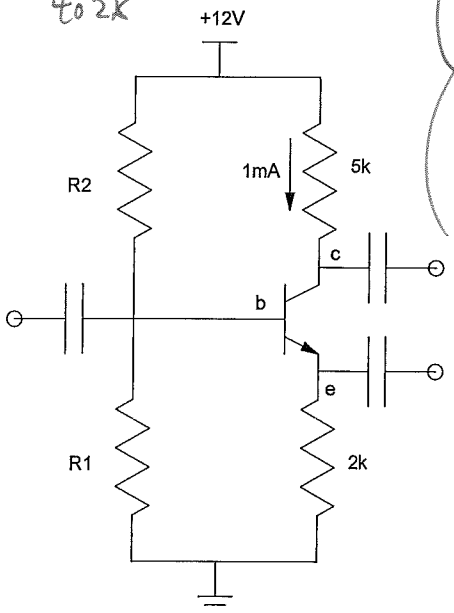
2) DC Analysis: Specify the parameters Vbb and Rbb along with R1 and R2 so that

- The Q-point is stabilized ($R_e >> R_b$), and
- The Q-point is Ic = 1mA
- $\beta = 200$

Vbb *Thevenin voltage for R1:R2*	Rbb *Thevenin resistance for R1:R2*	R1	R2
2.91V	40k	52.8k	165k

f(Rbb) → any < 40k
40 to 2k

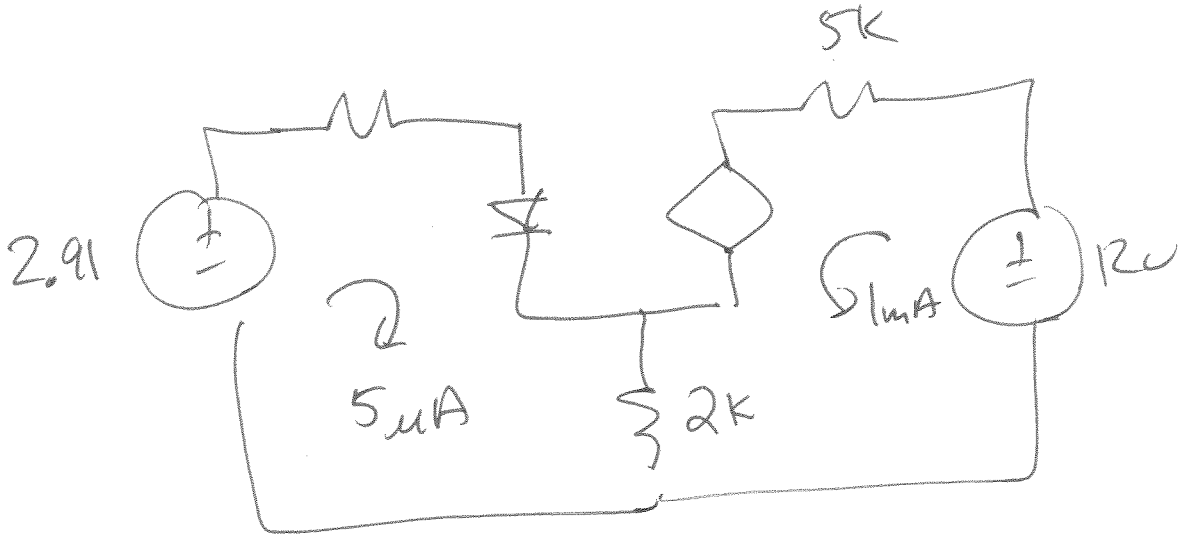
or
$R_1 \| R_2 = R_{bb}$
$\left(\frac{R_1}{R_1+R_2}\right) R_U = V_{bb}$



$\frac{R1 \cdot R2}{R1+R2} = R_{bb}$

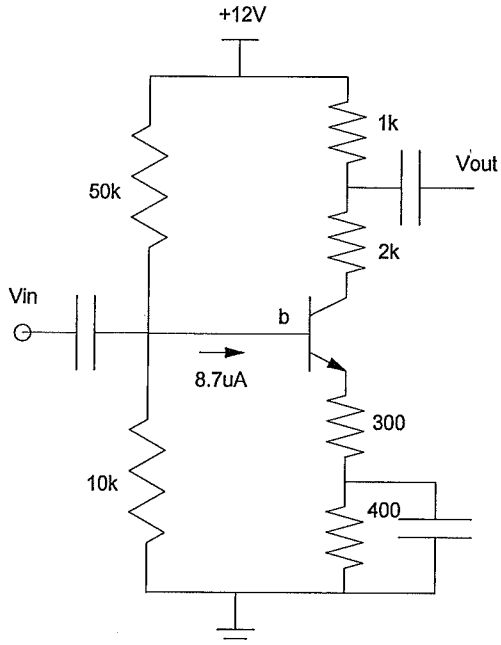
($R_{bb} << 402k\Omega$

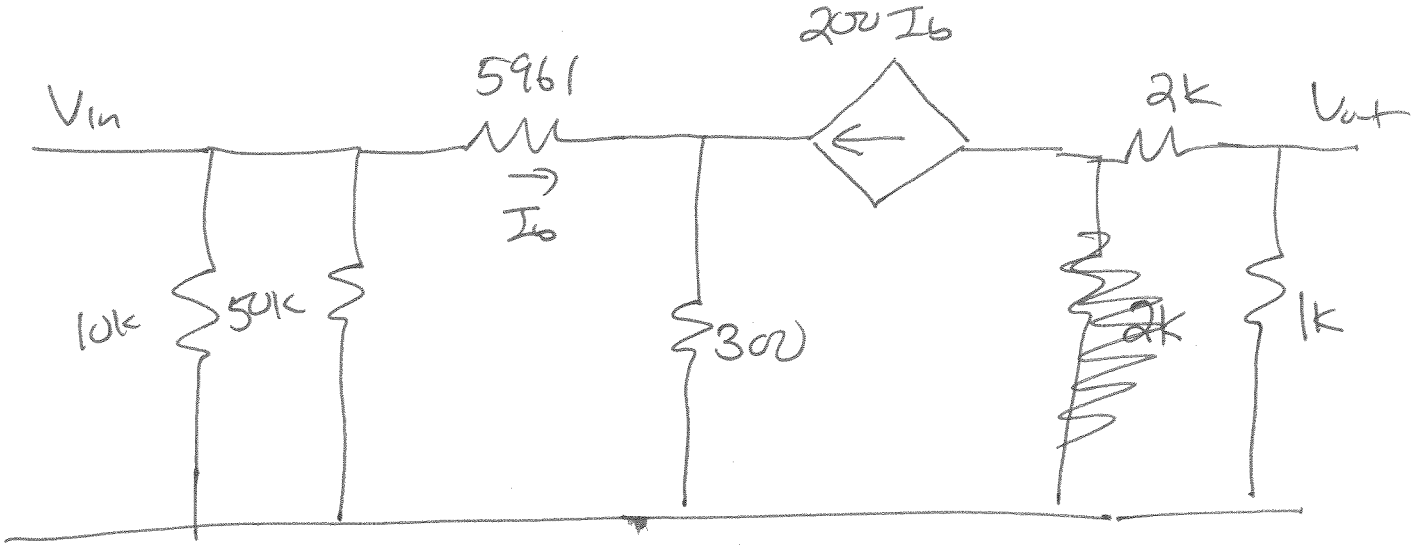
2.2k



3) AC Analysis: Draw the small-signal model for the following circuit. Assume

- $\beta = 200$
- The Q-point is $I_{be} = 8.72\mu A$
- $r_f = \frac{0.052}{I_{be}} = 5961\Omega$

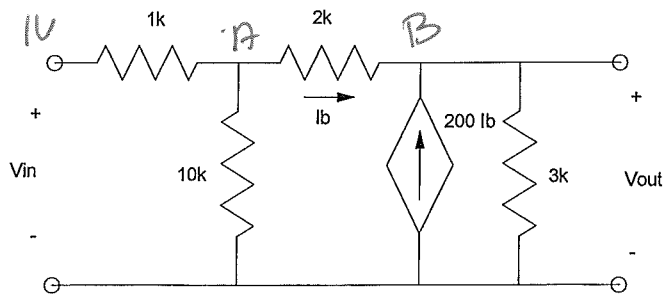


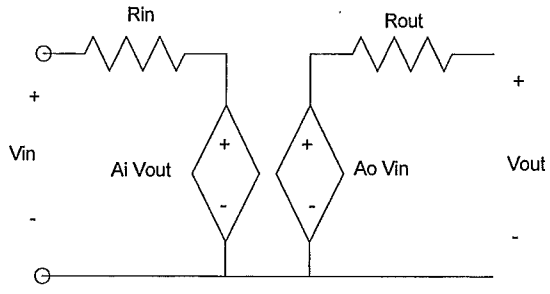


- 1pt for each missing term

4) Find the 2-port model for the following circuit:

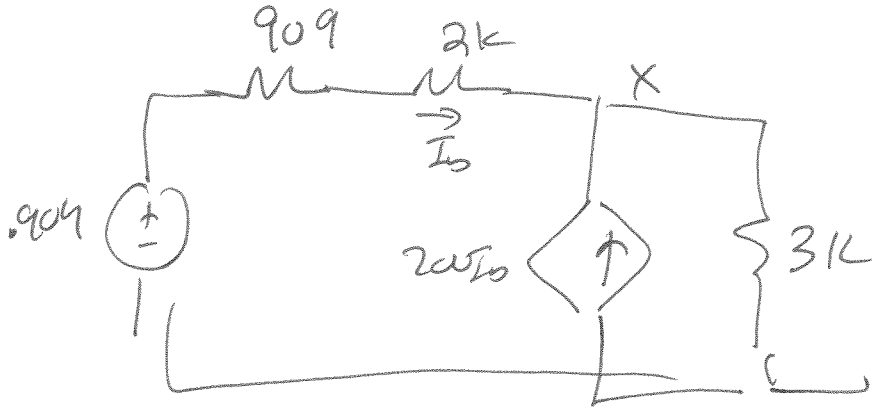
Rin	Ain	Rout	Aout
2.67k	0.833	14.40	.904





$R_{in} = 1k + 2k \| 10k$

$R_{out} = 2909 \| 3k \| 14.55$

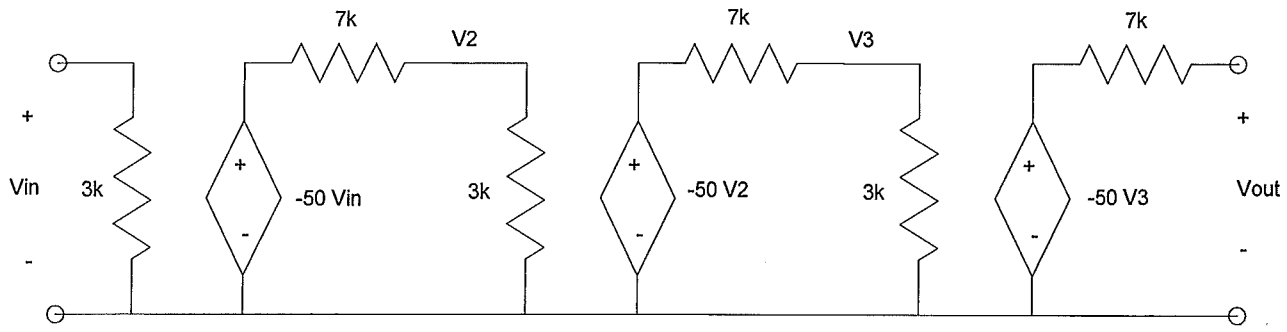


$$(201)\frac{X-.909}{2909} + \frac{X}{3k} = 0 \qquad \left(\frac{\frac{201}{2909}}{\frac{201}{2909}+\frac{1}{3k}}\right).909$$

$X = .904$

5) Determine the 2-port simlpified model for this circuit:

Rin	Ain	Rout	Aout
3k	0	7k	-11250



Bonus! Chernobyl was the worst disaster in history for the nuclear power industry. What is the

- The official death toll to date, and 31
- The estimated death toll (to date) according to Greenpeace: 100,000