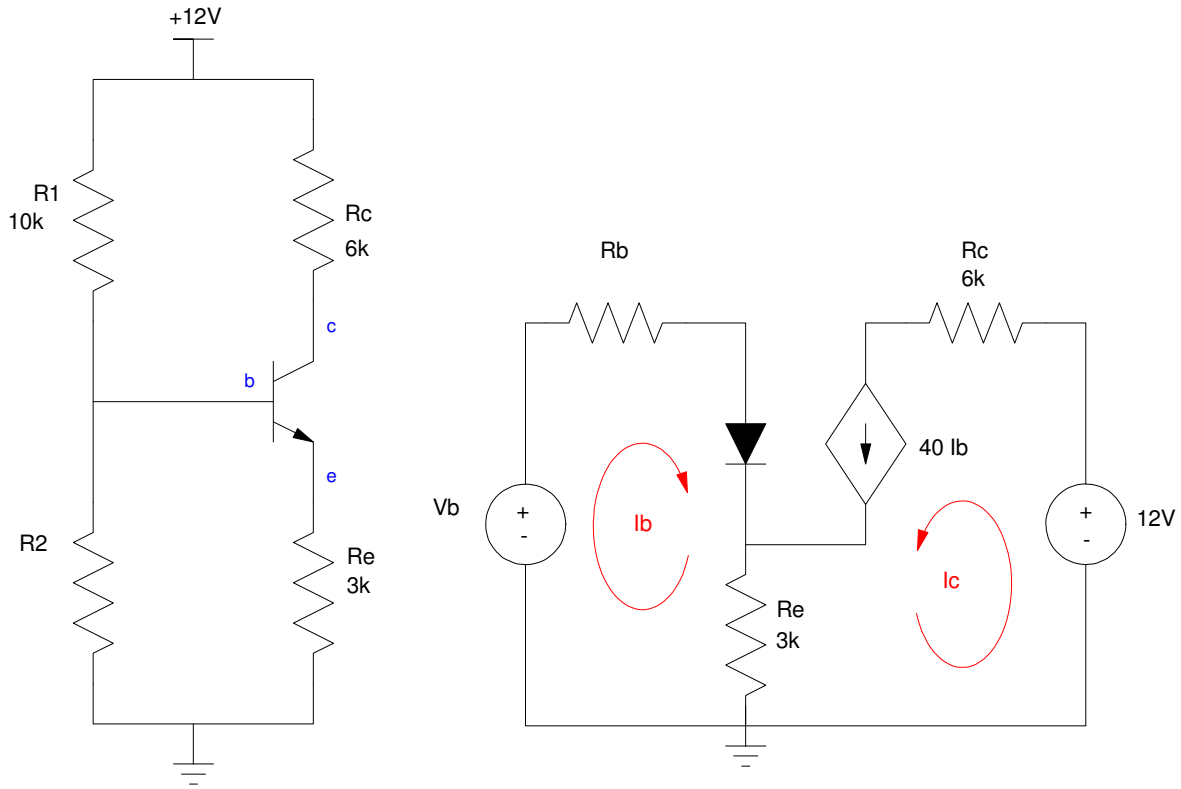
ECE 321 - Quiz #3 - Name _____

BJT Amplifiers & 2-Port Models

1) BJT Amplifier: DC Analysis. Determine the Thevenin equivalent of R1 and R2 as well as the Q-point. Assume ideal silicon transistors:

- |Vbe| = 0.7V
- $\beta = 40$
- R2 = 1100 + 100*(your birth month) + (your birth day). May 14th would give R = 1614 Ohms

R2 1100 + 100*mo + day	Vb	Rb	Vce	Ic



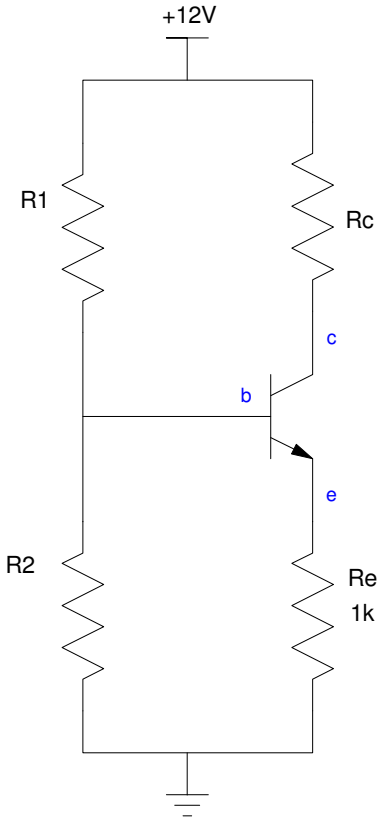
2) BJT Amplifier: DC Design. Determine R1 and R2 so that

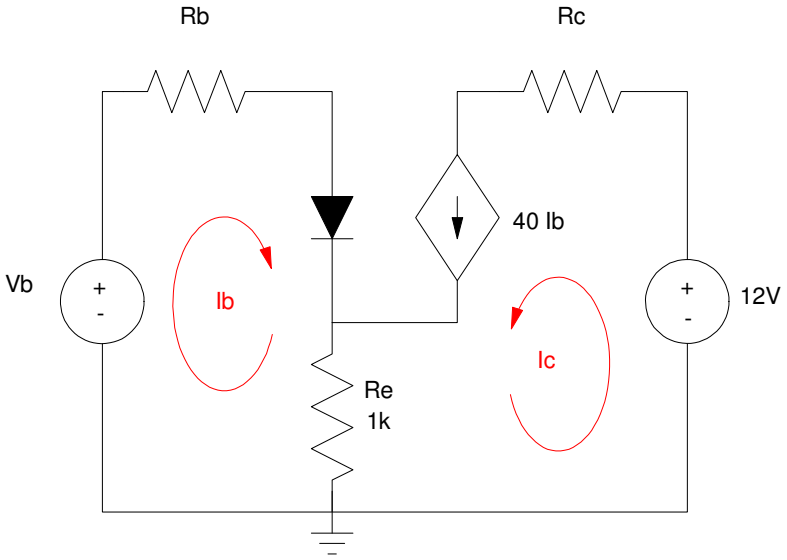
- The Q point is Vce = 6.00V and
- The Q point is stabilized for variations in β

Assume

- Ideal silicon transistors (Vbe = 0.7V, $\beta = 40$)
- Rc = 1100 + 100*(birth month) + (birth day). May 14th gives Rc = 1614 Ohms

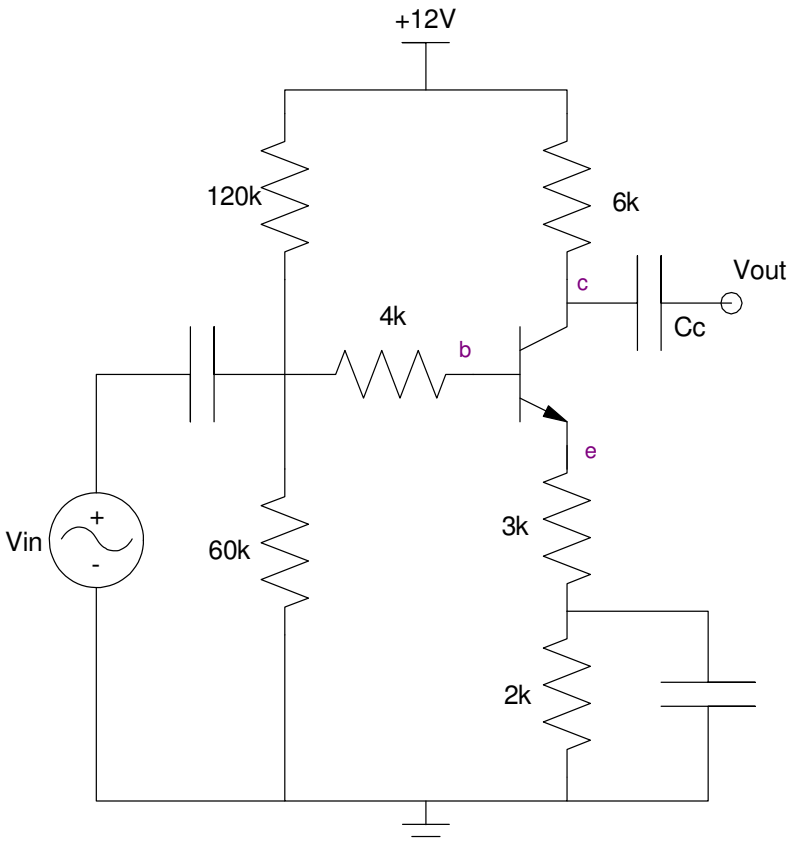
Rc 1100 + 100*mo + day	R1	R2	Vb	Rb





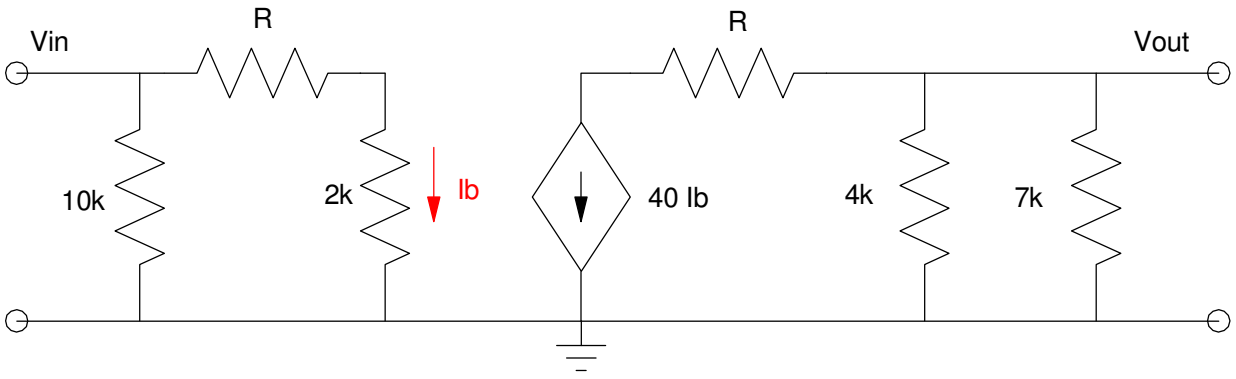
3) BJT: AC Analysis: Draw the small signal model for the following BJT amplifier. Assume

- $r_f = 1500\Omega$
- $\beta = 40$



4) 2-Port Models. Determine the 2-port model for the following circuit:

R 1100 + 100*mo + day	Rin	Ain	Rout	Ao



5) 2-Port model (experimental): Determine the 2-port parameters based upon the following experimental data:

Case 1:
- Vin = 1mV @ 1kHz
- R1 = 0 Ohms
- R2 = 10M Ohms

results in Vout = 57mV

Case 2:
- Vin = 1mV @ 1kHz
- R1 = X Ohms
- R2 = 10M Ohms

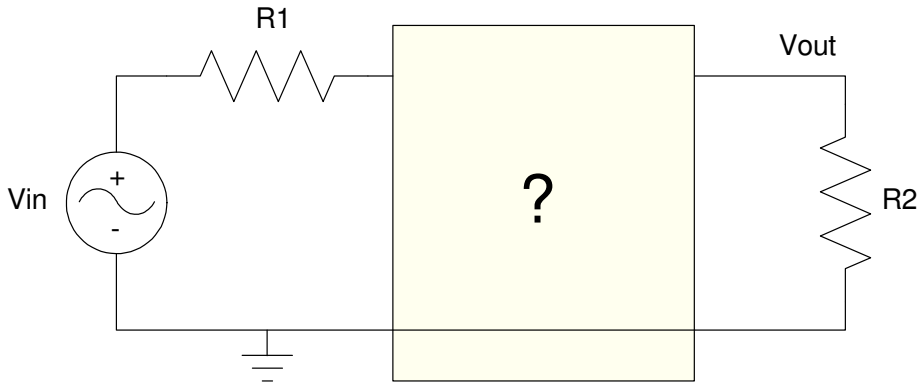
results in Vout = 43mV

Case 3
- Vin = 1mV @ 1kHz
- R1 = 0 Ohms
- R2 = X Ohms

results in Vout = 37mV

Assume
- X = 1100 + 100*(your birth month) + (your birth date) Ohms
- Ai = 0

X 1100 + 100*mo + day	Rin	Ai	Rout	Ao
		0		



6) Assume X and Y are related by the following transfer function

$$Y = \left(\frac{100(s+m)}{\left(s^3+ms^2+ds+10\right)} \right) X$$

$$x(t) = 4 + 5\cos(mt) + d\sin(mt)$$

where

- m is your birth month (1..12), and
- d is your birth date (1..31)

Find y(t)

m birth month (1..12)	d birth date (1..31)	y(t)