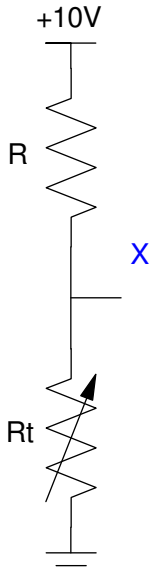
ECE 321 - Quiz #2 - Name _____

Tempeature Sensors & Active Flters

1) A thermistor has a temperature-resistance relationship where T is the temperature in degrees C.

$$R_t = 2000 \cdot \exp\left(\frac{3000}{T+273} - \frac{3000}{298}\right)\ \Omega$$



Assume

R = 800 + 100*(your birth month) + (your birth day)

If X = 4.00V, determine the resistance, R, and the temperature, T

R 800 + 100*mo + day	X volts	Rt Ohms	T degrees C
	6.73V		

2) A thermistor has a temperature-resistance relationship where T is the temperature in degrees C.

$$R_t = 2000 \cdot \exp\left(\frac{3000}{T+273} - \frac{3000}{298}\right)\ \Omega$$

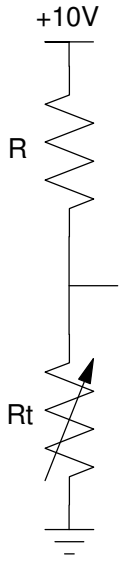
Design a circuit which outputs

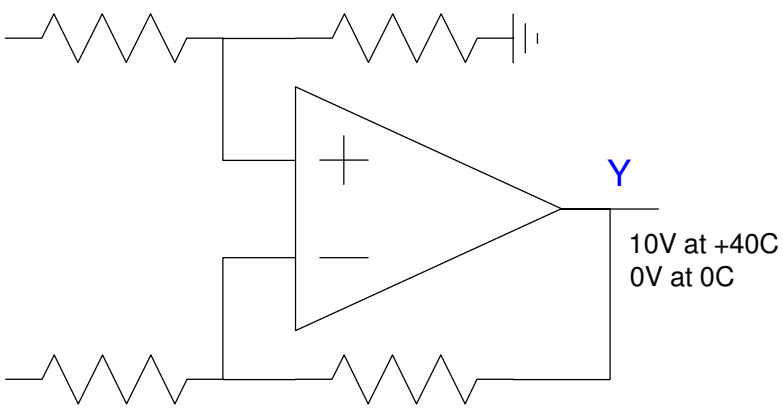
- 0V at 0C and
- +10V at +40C

Assume

R = 800 + 100*(your birth month) + (your birth day)

note: A linearizing circuit isn't required.



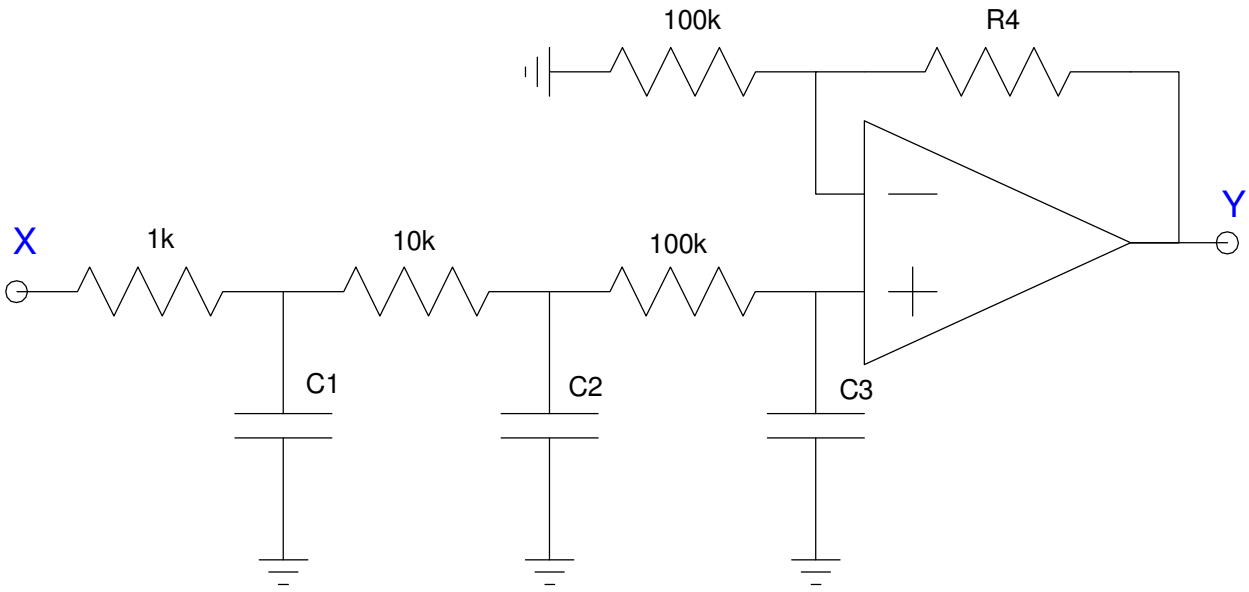


3) Find C1, C2, C3, and R4 so that this circuit implements

$$Y = \left(\frac{10000}{(s+3)(s+m)(s+d)} \right) X$$

where

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



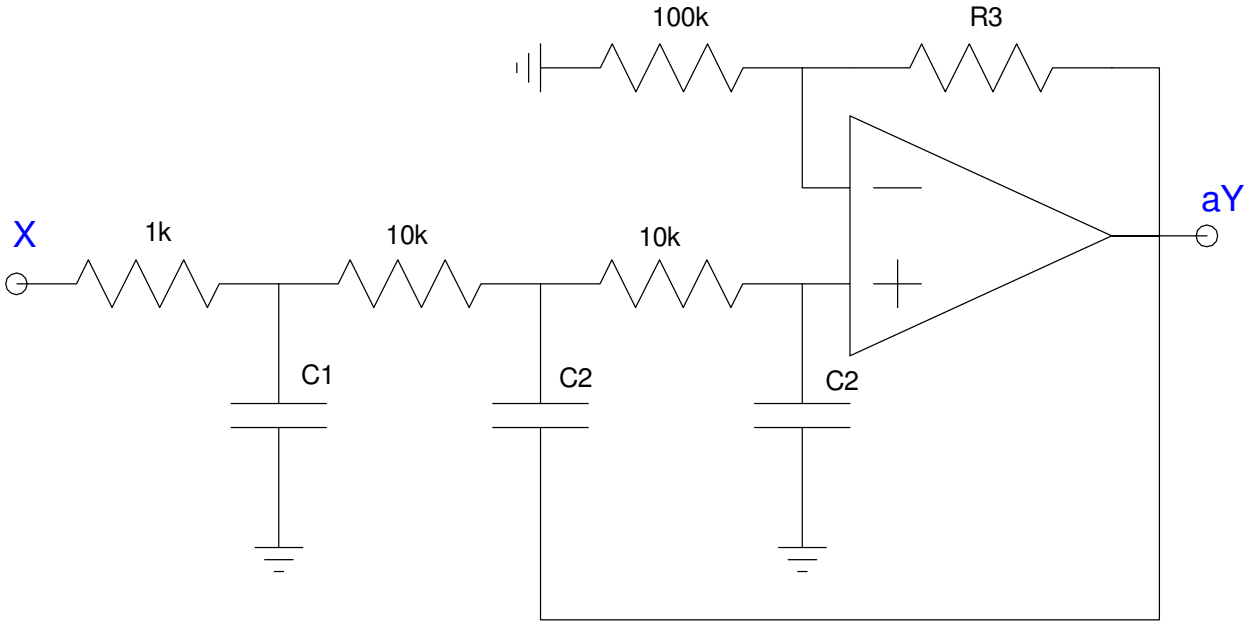
m 77month	d day	C1 uF	C2 uF	C3 uF	R4 k Ohms

4) Find R's and C's so that the following circuit implements

$$Y = \left(\frac{10{,}000}{(s+3)(s+m+jd)(s+m-jd)} \right)$$

where

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



m month	d day	C1 uF	C2 uF	R3 k Ohms	a output is a*Y

5) Let X and Y be related by the following transfer funciton:

$$Y = \left(\frac{10000}{(s+3)(s+m)(s+d)} \right) X$$

where

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

Assume

$$x(t) = 5 + 6\cos(2t) + 7\sin(2t)$$

Determine y(t) (i.e. find a, b, and c)

$$y(t) = a + b\cos(2t) + c\sin(2t)$$

6) Determine a filter, G(s), with the following gain vs. frequency