2) Calibration: A thermistor has the following resistance vs. temperature

| | | | |
|---|---|---|---|
| [illegible] | 0C | 10C | |
| [illegible] | [illegible] | [illegible] | |

2a) Use endpoint calibration to determine the resistance vs. temperature between 0C and 10C in the form of

$T = ax + b$ $\quad\quad$ x = resistance in Ohms

2b) From your curve fit, determine the temperature if the resistance is R ohms where

- R =1000 + 100 * (your birth month) + (birth date). May 14th gives R = 1514 Ohms.

| a | b | R<br>1000 + 100 * [illegible] | [illegible] |
|---|---|---|---|
| | | | |

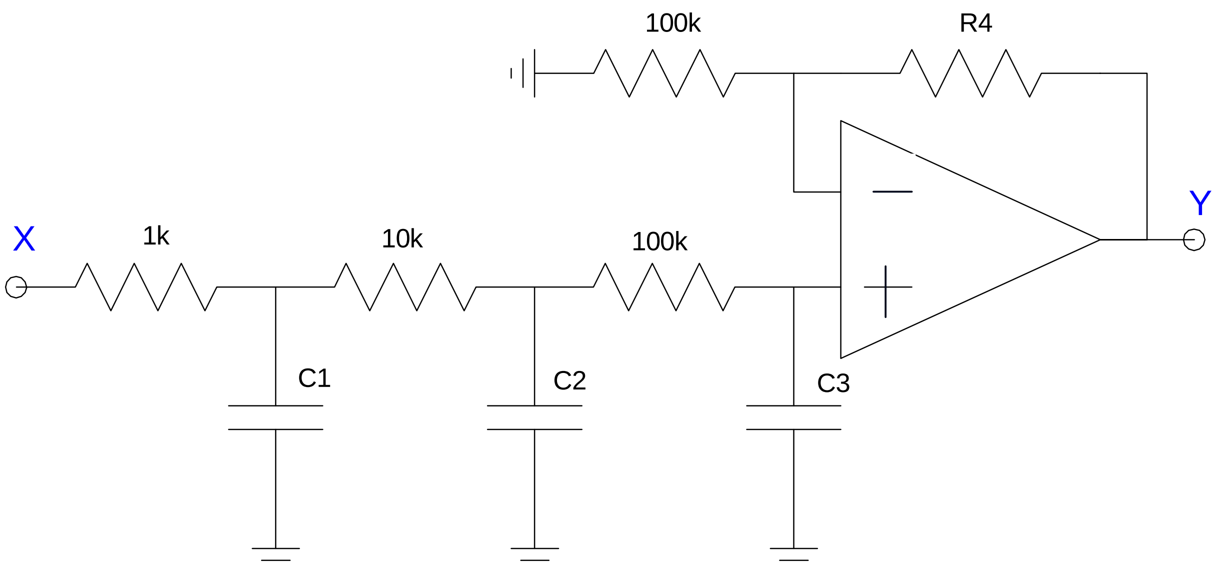
3) Active Filters. Real Poles. Find R and C to implement

$$Y = \frac{10{,}000}{(s+10)(s+m)(s+d)} X$$

where

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

| m<br>birth month | d<br>birth day | C1 | C2 | C3 | R4 |
|---|---|---|---|---|---|
| | | | | | |



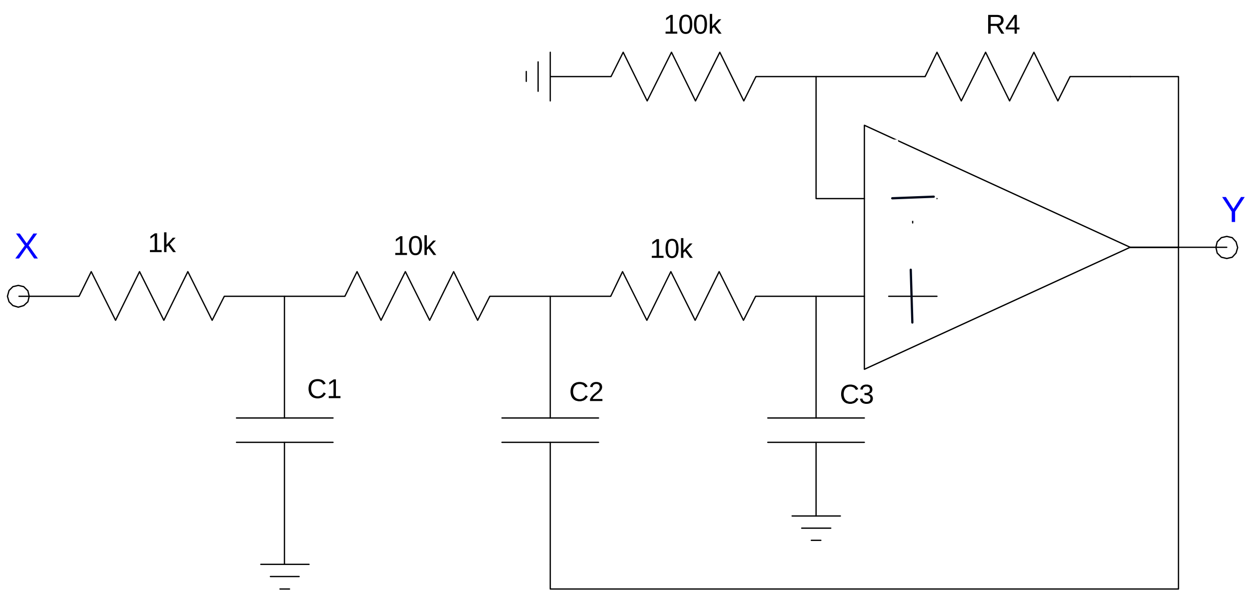
4) Active Filters: Complex Poles: Find R and C to Implement

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

where

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

| m | d | C1 | C2 | C3 | R4 |
|---|---|---|---|---|---|
| | | | | | |



5) Filters: Assume X and Y are related by the transfer function

$$Y = \frac{100}{(s+m)(s+d)} X$$

where

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

a) What is the differential equation relating x and y?

b) Determine y(t) assuming

$$x(t) = 3 + 4\cos(5t) + 6\sin(5t)$$

| m | d | diffy eq | y(t) |
|---|---|---|---|
| | | | |

6) Determine the poles of a filter with the following gain vs. frequency (Bode) plot.

| pole 1 | pole 2 |
|---|---|
| | |