

# ECE 321 - Quiz #3 - Name \_\_\_\_\_

Filters - Spring 2023

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

$$Y = \left( \frac{200}{(s+2)(s+7)} \right) X$$

Find y(t) assuming

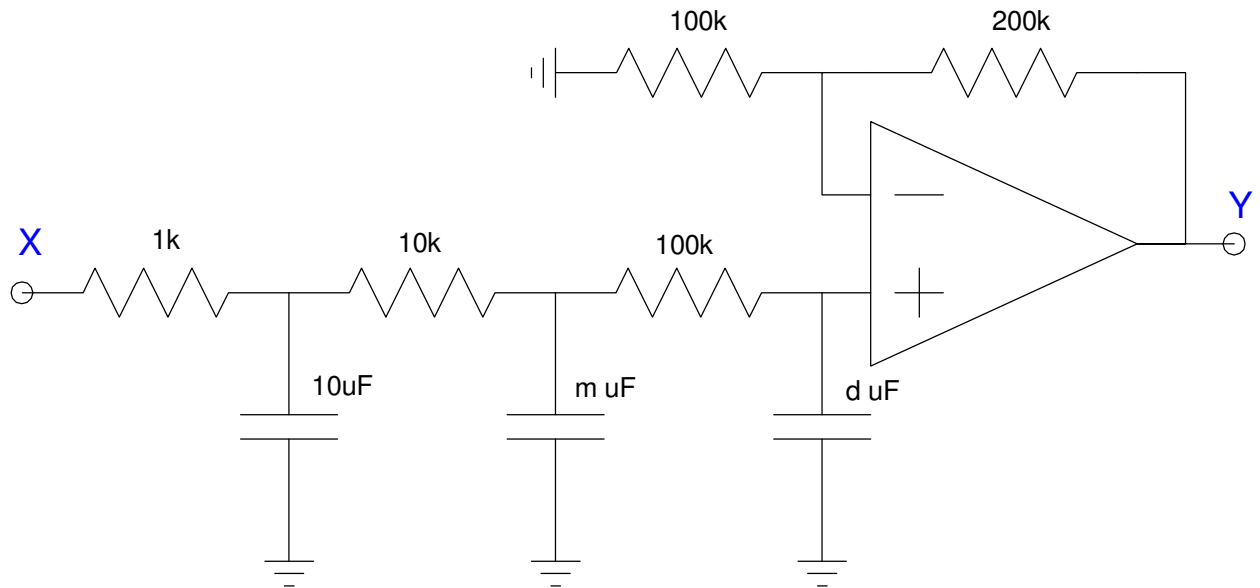
$$x(t) = 10 + 5 \cos(mt) + d \sin(mt)$$

where

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

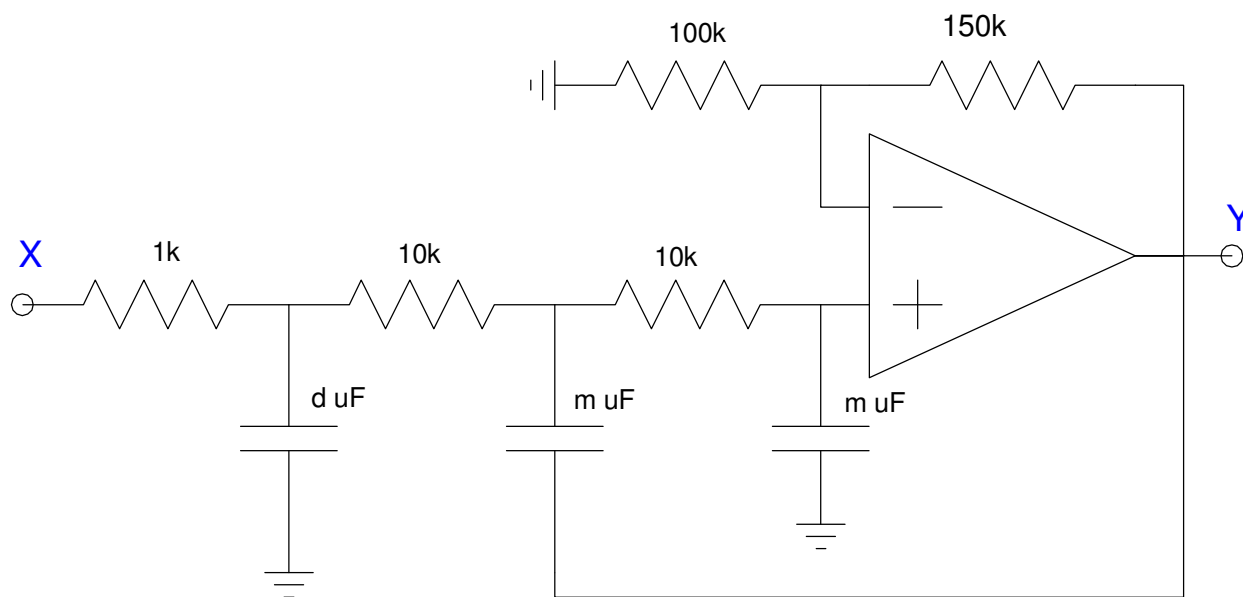
2) Determine the transfer function for the following filter. Assume

- m is your birth month (1..12) ( $C2 = 1..12 \text{ uF}$ )
- d is your birth date (1..31) ( $C3 = .. 31 \text{ uF}$ )



3) Determine the transfer function for the following filter. Assume

- m is your birth month (1..12) ( $C2 = C3 = 1..12 \text{ uF}$ )
- d is your birth date (1..31) ( $C1 = 1..31 \text{ uF}$ )



4) Give the transfer function for a filter which meets the following requirements

- $0.9 < \text{gain} < 1.1$  for frequencies below 80 rad/sec
- $\text{gain} < 0.2$  for frequencies above 110 rad/sec

5) Give the transfer function for a 7th-order Butterworth low-pass filter with a corner at 100 rad/sec

6) The transfer function for a 4th-order Chebychev filter with a corner at 100 rad/sec is

$$G(s) = \left( \frac{k}{((s+72\angle\pm 38.5^\circ)(s+111\angle\pm 77.8^\circ))} \right)$$

Find the R's and C's to implement this filter as well as the resulting DC gain

C1	R1	C2	R2	DC Gain

