ECE 321 - Quiz #3 - Name _____

Filters

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

$$Y = \left(\frac{200}{(s+4)(s+6)} \right) X$$

Find y(t) assuming

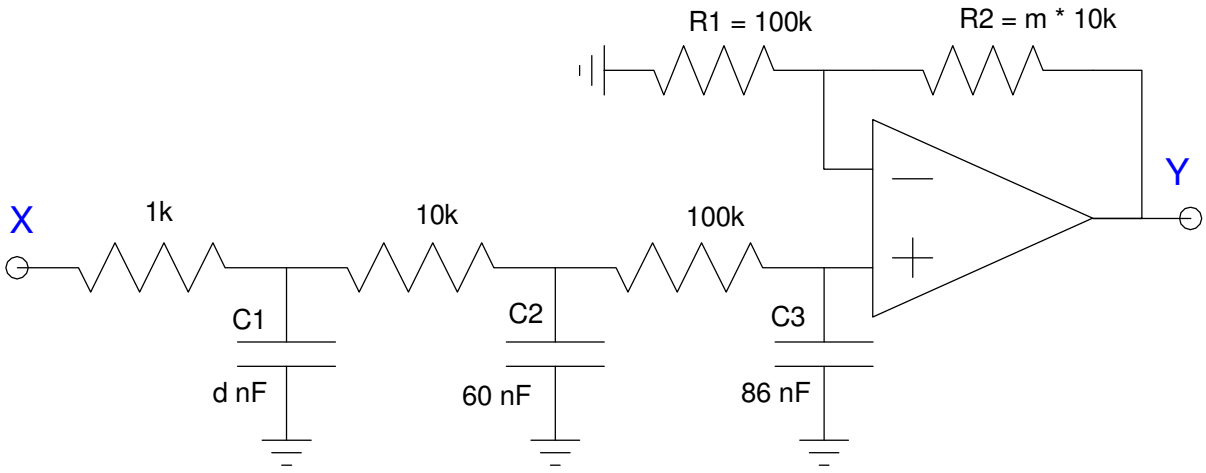
$$x(t) = 10 + 5\cos(mt) + d\sin(mt)$$

where

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

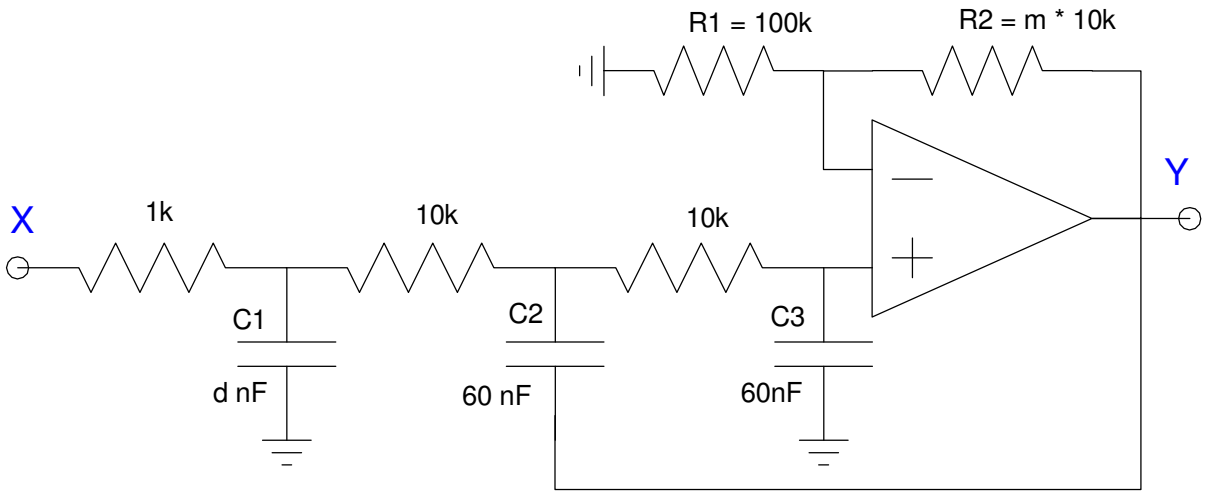
2) Determine the transfer function for the following filter. Assume

- m is your birth month (1..12) (Ra = 10k .. 120k Ohms)
- d is your birth date (1..31) (C1 = 1nf .. 31nF)



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

- m is your birth month (1..12) (Ra = 10k .. 120k Ohms)
- d is your birth date (1..31) (C1 = 1..31 nF)



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

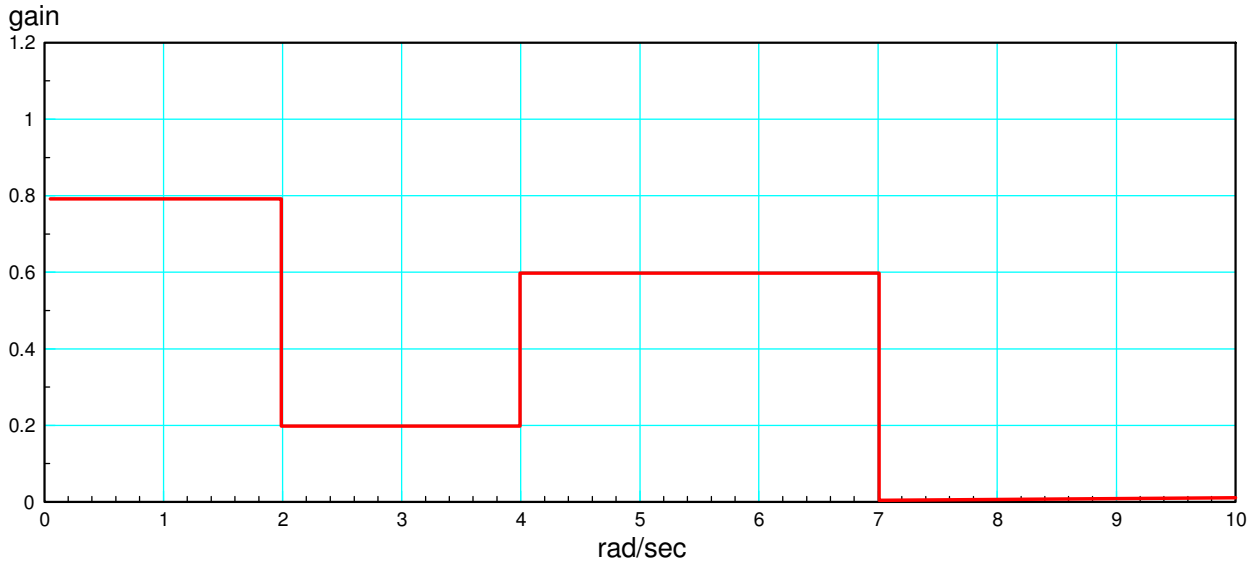
- $0.9 < \text{gain} < 1.1$ for frequencies below 30 rad/sec
- $\text{gain} < 0.2$ for frequencies above 50 rad/sec

5) Give the Matlab code for an m-file you would use to have Matlab's *fminsearch()* design a filter with the following gain vs. frequency

$$G(s) = \left(\frac{a\left(s^2+b\right)}{\left(s^2+cs+d\right)\left(s^2+es+f\right)} \right)$$

The m-file should

- Receive parameters {a,b,c,d,e,f,g}
- Compute G(jw)
- Return the sum squared error between G(jw) and the graph below



6) What is the transfer function for the following analog computer?

Assume

- R1 = your birth month (1..12) k Ohms
- R2 = your birth data (1..31) k Ohms