ECE 321 - Quiz #3 - Name _____

Filter Design, Butterworth & Chebychev Filters, Analog Computers. Due midnight, April 30, 2020

Calculators, internet, Matlab, circuit lab, tarot cards permitted. Just not someone else.

Please sign pledge if able (i.e. you did not work with anyone else)

No aid given, received, or observer: _____

1) Filter Design: Design a filter to meet the following requirements. (Only the transfer function is needed - you don't need to design the op-amp circuit. That will come with problems 3-6)

$0.9 < \text{gain} < 1.1$ $\omega < 100$ Hz

$\text{gain} < 0.1$ $\omega > 400$ Hz

Filter: G(s)	Gain at 100Hz	Gain at 400Hz

2) Filter Design: Design a filter to meet the following requirements. (Only the transfer function is needed - you don't need to design the op-amp circuit. That will come with problems 3-6)

$0.9 < \text{gain} < 1.1$ $\quad \omega < 100$ Hz

$\text{gain} < 0.1$ $\quad \omega > 130$ Hz

Filter: G(s)	
Gain at 100Hz	Gain at 130Hz

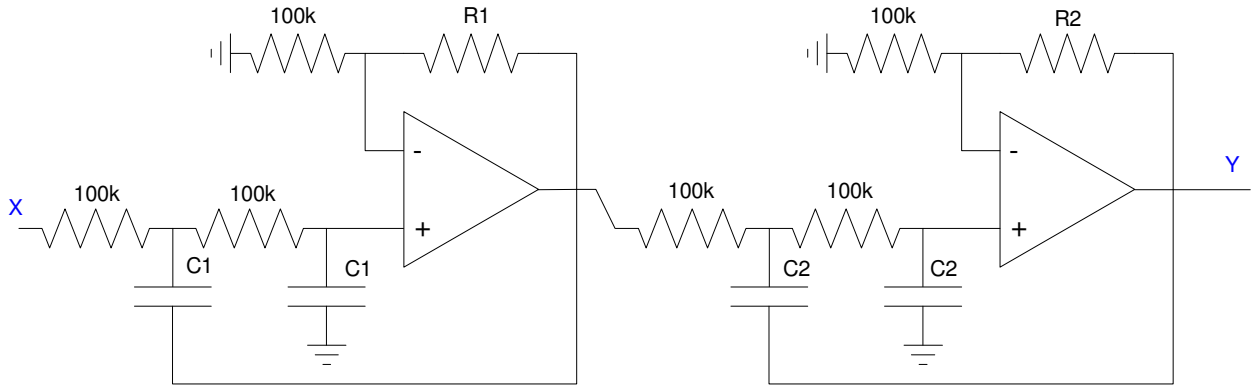
3) Filter Implementation: Design an op-amp circuit to implement the following filter:

$$Y = \left(\frac{100}{(s+2)(s+5)(s+10)} \right) X$$

4) Filter Implementation: Design a circuit to implement the following Butterworth filter:

$$Y = \left(\frac{k}{\left(s+30\angle\pm 22.5^0\right)\left(s+30\angle\pm 67.5^0\right)} \right) X$$

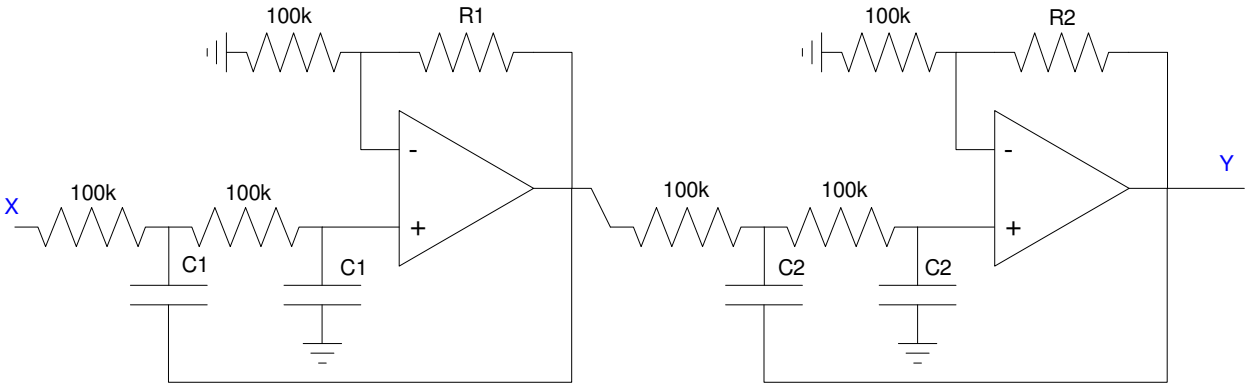
C1	R1	C2	R2	Resulting DC gain



5) Filter Implementation: Design a circuit to implement the following Chebychev filter:

$$Y = \left(\frac{k}{\left(s+20\angle\pm 38.5^0\right)\left(s+33.3\angle\pm 77.8^0\right)} \right) X$$

C1	R1	C2	R2	Resulting DC gain



6) Design an analog computer to implement

$$Y = \left(\frac{3s+50}{(s+2)(s+4)(s+6)} \right) X = \left(\frac{3s+50}{s^3+12s+44s+48} \right) X$$