

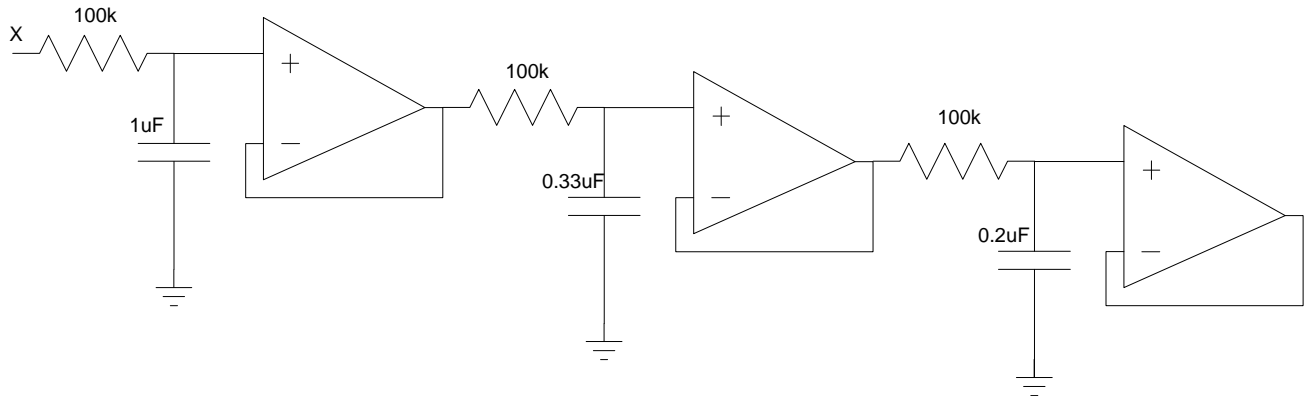
ECE 311 - Homework #22

Active filters with real poles

Problem 1) Design an active filter to implement the following transfer function

$$Y = \left(\frac{10}{s+10}\right)\left(\frac{30}{s+30}\right)\left(\frac{50}{s+50}\right)X$$

There are multiple solutions. One solution is to use an op-amp buffer inbtween each stage to prevent loading:



$$\left(\frac{1}{RC}\right) = 10$$

$$\left(\frac{1}{RC}\right) = 30$$

$$\left(\frac{1}{RC}\right) = 50$$

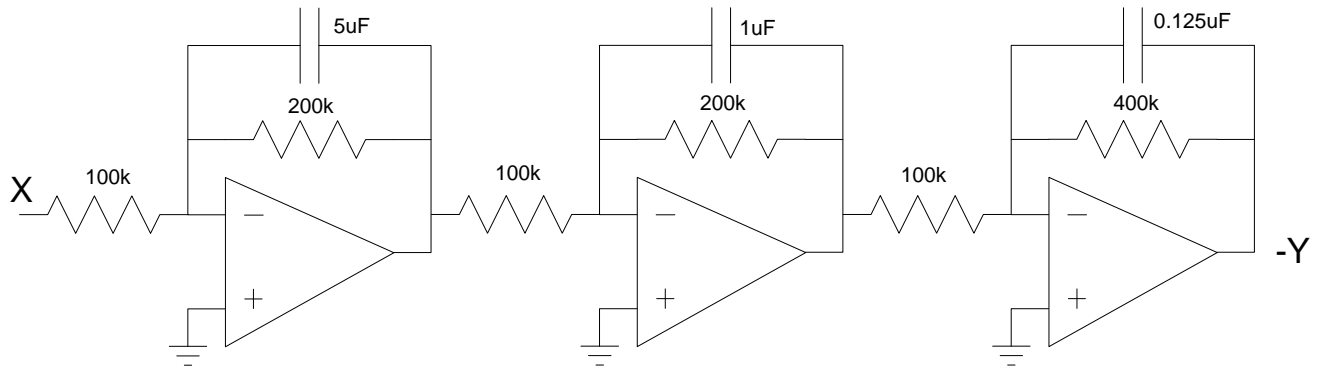
Problem 2) Design an active filter to implement the following transfer function

$$Y = \left(\frac{2000}{(s+1)(s+5)(s+20)} \right) X$$

Another circuit uses an inverting amplifier. This has a DC gain of 20. Spread this gain out as

$$2 * 2 * 5 = 20$$

$$-Y = \left(\frac{-2}{s+1} \right) \left(\frac{-10}{s+5} \right) \left(\frac{-80}{s+20} \right)$$



$$\left(\frac{-2}{s+1} \right)$$

$$\left(\frac{-10}{s+5} \right)$$

$$\left(\frac{-80}{s+20} \right)$$