EE420 quiz-10b

Last time, we almost designed a 5th order Butterworth filter:
$\alpha_p = .5$ dB for $|f| \leq f = 1$kHz
$\alpha_s = 20$ dB for $|f| \geq f = 2$kHz
We found that we needed a 5th order filter, with transfer function:

$$G(s) = \frac{(7753)^5}{(s+7753)(s^2+s(1.618)(7753)+(7753)^2)(s^2+s(0.618)(7753)+(7753)^2)}$$

or..

$$G(s) = \frac{1}{(s/7753+1)(s^2/7753^2+s(1.618/7753)+1)(s^2/7753^2+s(0.618/7753)+1)}$$

You need to design the filter. It doesn't matter what the passband gain is.
It looks like a first order section:

$$G_1(s) = \frac{1}{s/7753+1}$$

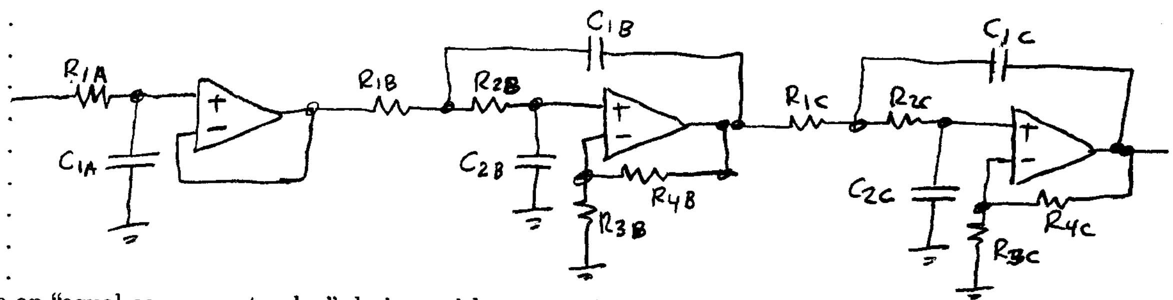
and two second order sections:

$$G_2(s) = \frac{k_2}{(s^2/7753^2+s(1.618/7753)+1)}$$

and...

$$G_3(s) = \frac{k_3}{(s^2/7753^2+s(0.618/7753)+1)}$$

Here's the schematic:



Use an "equal component value" design, with most resistors = 10k.
Hint:

1. Scale the frequency: $C = C_N/\omega$
2. Scale for the resistance: $C = C_{(R=1)}/R$ ..... Keep RC constant.
3. Set the damping: $R_4 = R_3(2-d)$

	Section A	Section B	Section C
R_1			
R_2	xxxx		
R_3	xxxx		
R_4	xxxx		
C_1			
C_2	xxxx		