1. Design a passive RC low pass filter with cutoff frequency $f_1 = \frac{\omega_1}{2\pi} = 20 \text{kHz}$. We will call this filter 1. Calculate the gain $G_1(f)$ and phase $\phi_1(f)$.

2. Design a passive RC high pass filter with cutoff frequency $f_2 = \frac{\omega_2}{2\pi} = 20 \text{Hz}$. Choose component values so that it can be cascaded with filter 1. This is filter 2. Calculate the gain $G_2(f)$ and phase $\phi_2(f)$.

3. Assuming zero current at the outputs of both filters, calculate and sketch the combined response of the cascaded filters—both gain and phase.

4. Something is wrong with the circuit below.
   (a) Is this intended to be a high pass or a low pass filter?
   (b) Make the circuit well-behaved by rewiring as few components as possible (but use all of them, and the filter should fulfill its intended function).