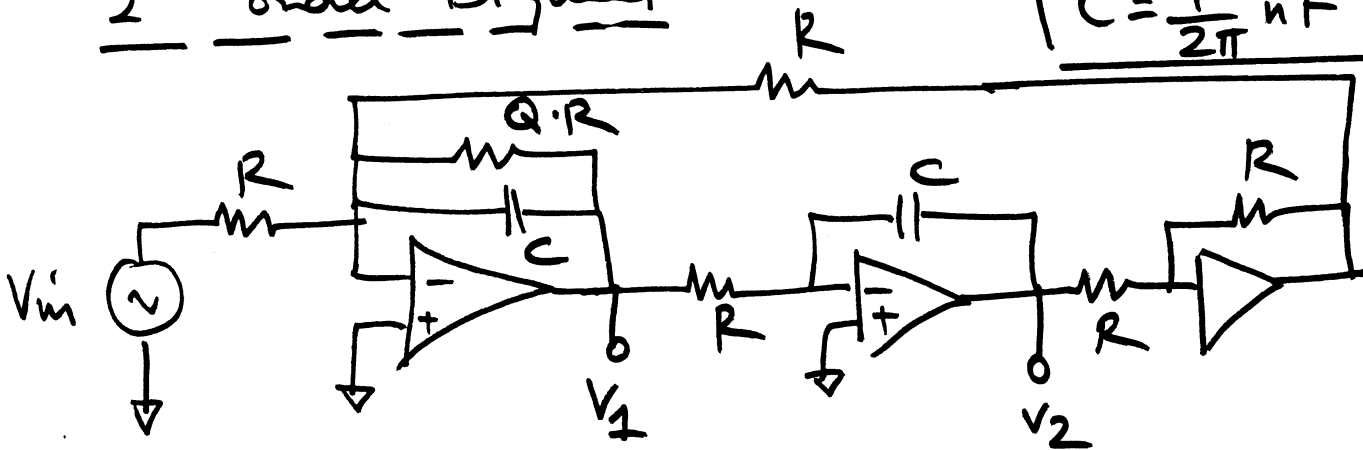


# Homework Assignment

## 2<sup>nd</sup> order Biquad

$$\begin{aligned} R &= 1k\Omega \\ C &= \frac{1}{2\pi} \mu\text{F} \end{aligned}$$



1/ Transform the circuit into the s-domain

2/ Derive  $\frac{V_1}{V_{in}} = H_1(s)$  and  $\frac{V_2}{V_{in}} = H_2(s)$

3/ Draw a pole-zero diagram for  $H_1(s)$  and  $H_2(s)$   
for  $Q = \frac{1}{8}$ ;  $Q = \frac{1}{2}$ ;  $Q = 10$

4/ Assume  $v_{in}(t) = \cos(\omega t)$

Plot  $\left| \frac{V_2}{V_{in}} \right|$  and  $\left| \frac{V_1}{V_{in}} \right|$  vs frequency for  $\omega: 1 \rightarrow 10^9 \frac{\text{rad}}{\text{sec}}$   
(use log-log scales)  
for  $Q = \frac{1}{8}$ ;  $Q = \frac{1}{2}$ ;  $Q = 10$ .

5/ Plot  $\angle \left| \frac{V_1}{V_{in}} \right|$  and  $\angle \left| \frac{V_2}{V_{in}} \right|$  vs freq for  $\omega: 1 \rightarrow 10^9 \frac{\text{rad}}{\text{sec}}$   
for  $Q = \frac{1}{8}$ ;  $Q = \frac{1}{2}$ ;  $Q = 10$   
(use a linear y-axis and a logarithmic x-axis)