Homework Assignment

2nd order Biquad

\[ R = 1k \Omega \]
\[ C = \frac{1}{2\pi} \mu F \]

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 → 10^9 rad/sec

   (use log-log scales)

   for Q = \( \frac{1}{8} \); \( Q = \frac{1}{2} \); \( Q = 10 \).

5. Plot \( \times \left| \frac{V_1}{V_{in}} \right| \) and \( \times \left| \frac{V_2}{V_{in}} \right| \) vs freq for \( \omega \): 1 → 10^9 rad/sec

   (use a linear y-axis and a logarithmic x-axis)