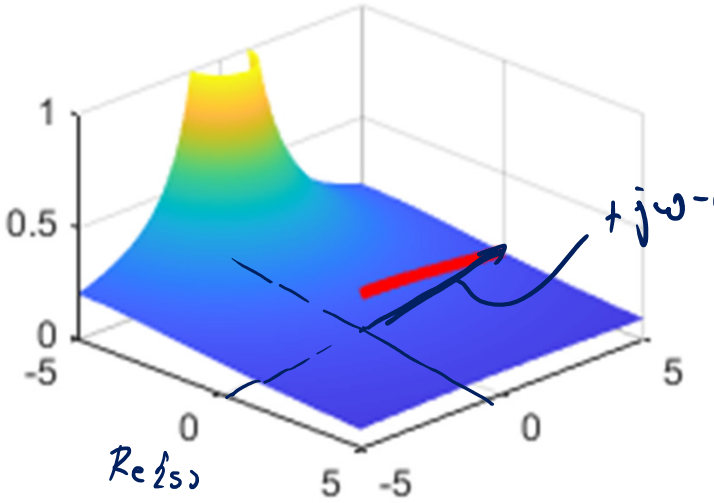
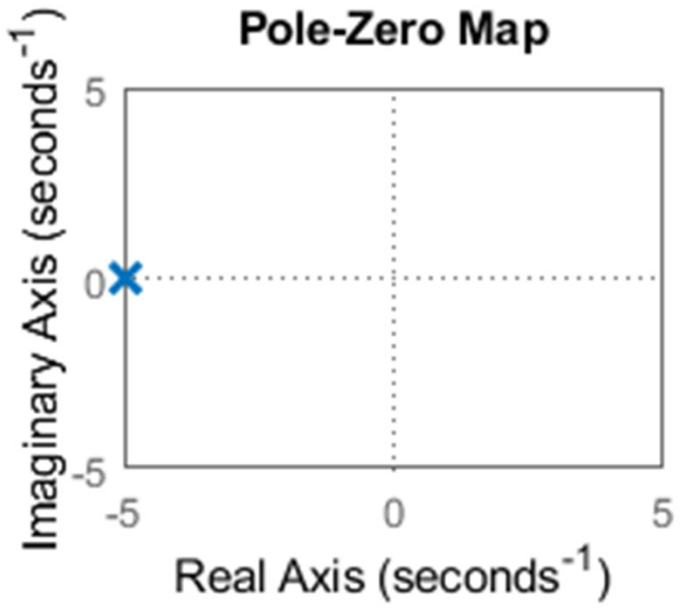
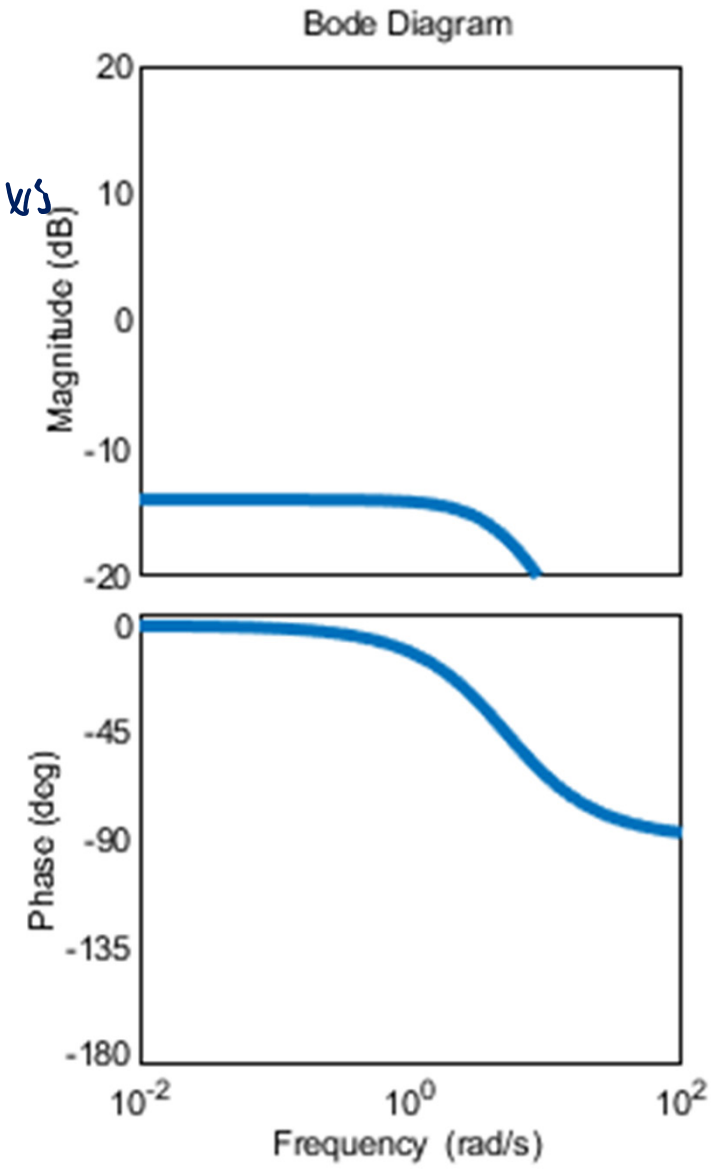

1
0.5
0
-5
0
5
Re{s}
5
0
-5
+jω-axis


Pole-Zero Map
Imaginary Axis (seconds^{-1})
5
0
-5
-5
0
5
Real Axis (seconds^{-1})


Bode Diagram
Magnitude (dB)
20
10
0
-10
-20
Phase (deg)
0
-45
-90
-135
-180
10^{-2}
10^{0}
10^{2}
Frequency (rad/s)

Approximate Graphical Analysis

- $\| H_1(s) \cdot H_2(s) \|_{dB} = \| H_1(s) \|_{dB} + \| H_2(s) \|_{dB}$

multiplication → addition

- $\| \omega^n \|_{dB} \rightarrow 20(n) \log(\omega) \longrightarrow 20(n)$ dB/dec line

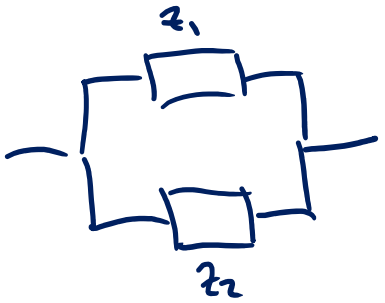
exponentiation → mult.

- $\| 1 + jX \|_{dB} = \begin{cases} 1 & , \ X << 1 \\ \sqrt{2} & , \ X = 1 \\ \| X \|_{dB} & , \ X >> 1 \end{cases}$

addition → max( )

$z_{eq} = z_1 + z_2$

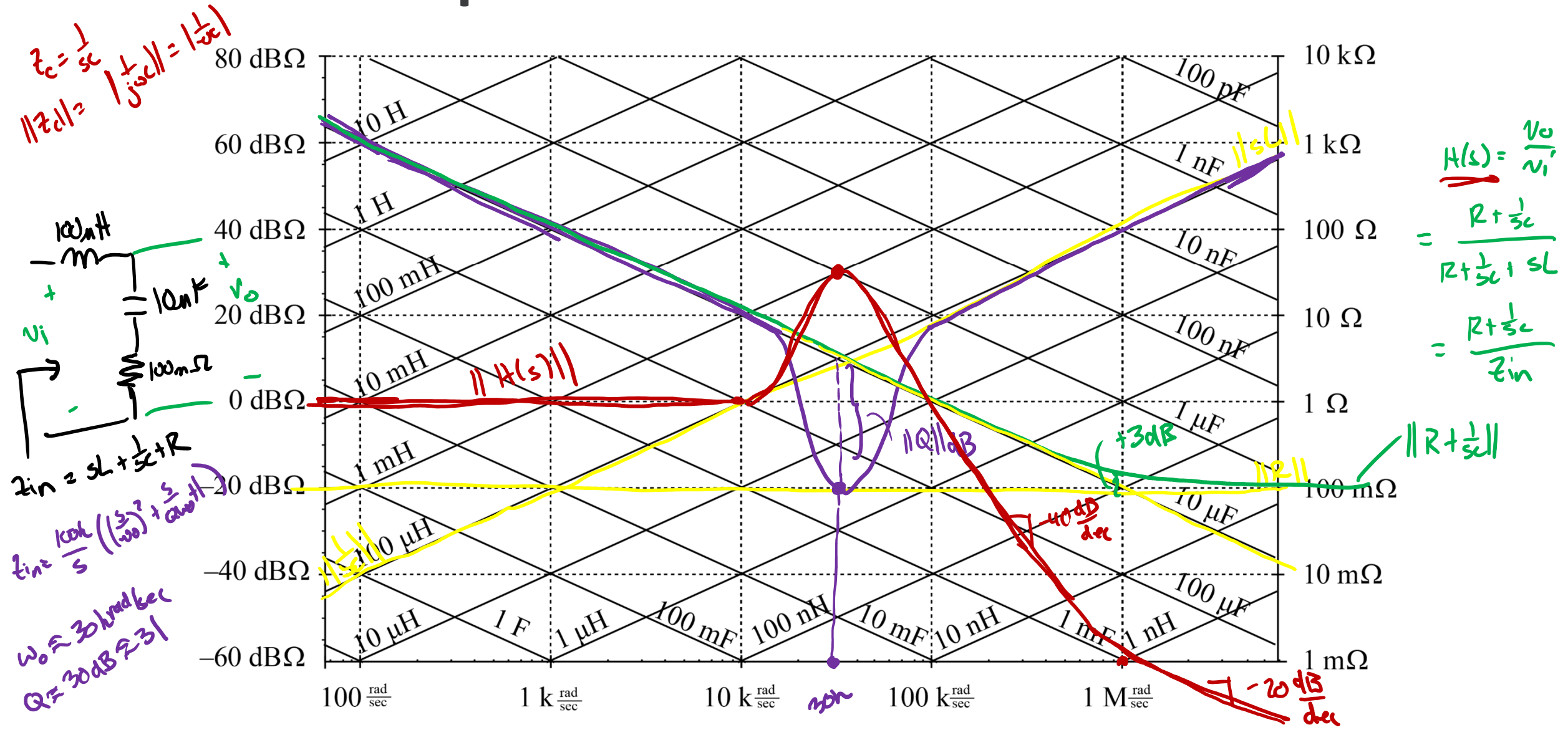
$\| z_{eq} \|_{dB} = \| z_1 + z_2 \|_{dB} = \begin{cases} \| z_1 \|_{dB} & , \ |z_1| >> |z_2| \\ ? & , \ |z_1| = |z_2| \\ \| z_2 \|_{dB} & , \ |z_2| >> |z_1| \end{cases}$



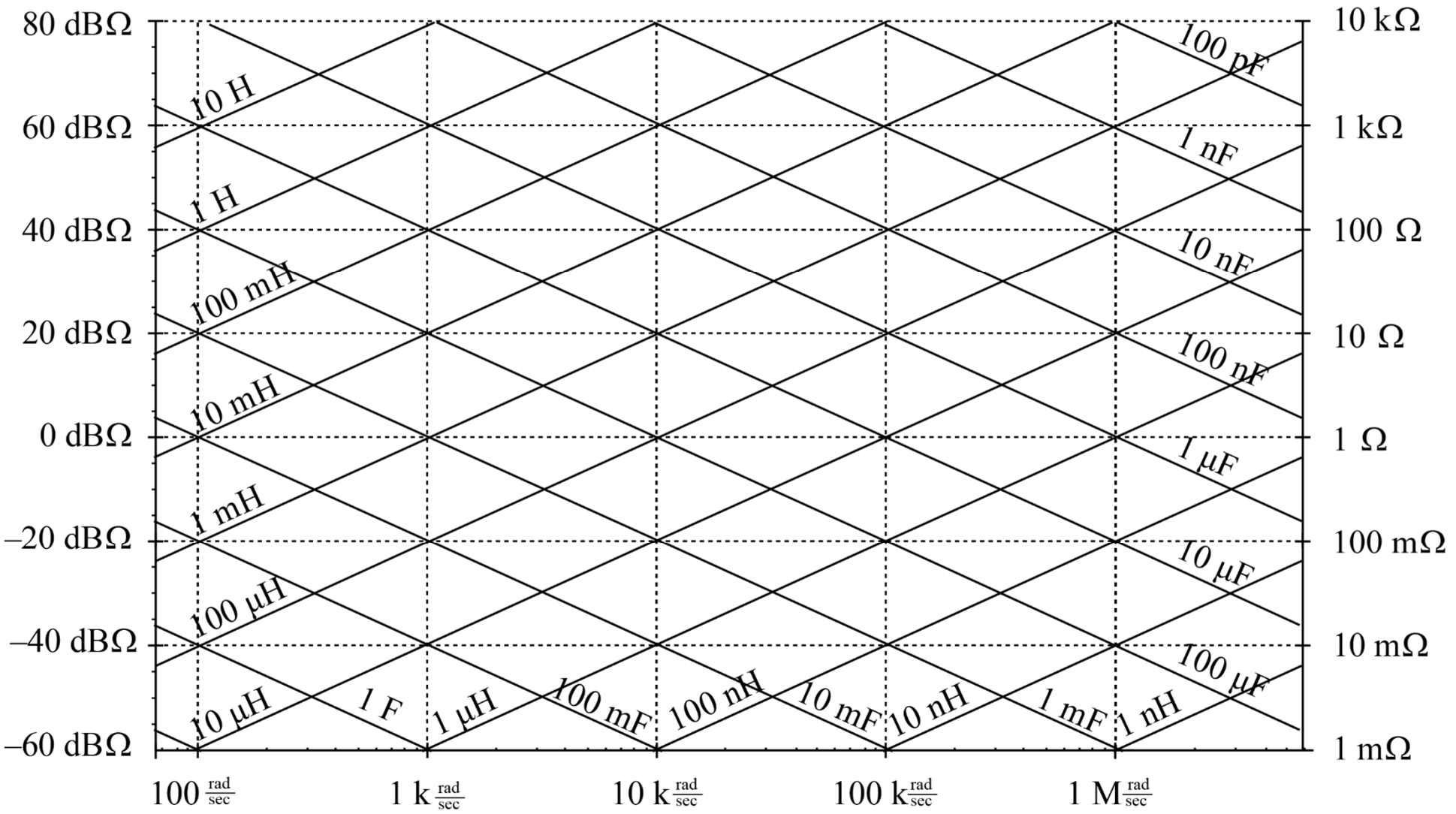
$z_{eq} = z_1 \| z_2$

$\| z_{eq} \|_{dB} = \left\| \frac{z_1 \cdot z_2}{z_1 + z_2} \right\|_{dB} = \begin{cases} \| z_2 \|_{dB} & , \ |z_1| >> |z_2| \\ ? & , \ |z_1| = |z_2| \\ \| z_1 \|_{dB} & , \ |z_2| >> |z_1| \end{cases}$

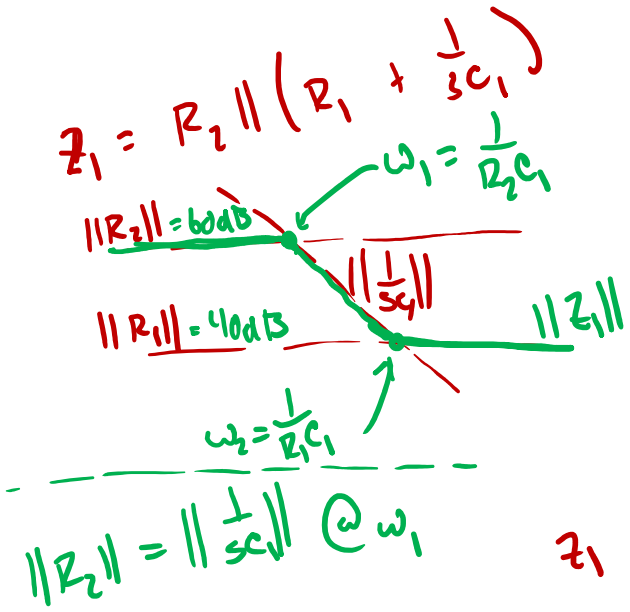
Reactance Paper

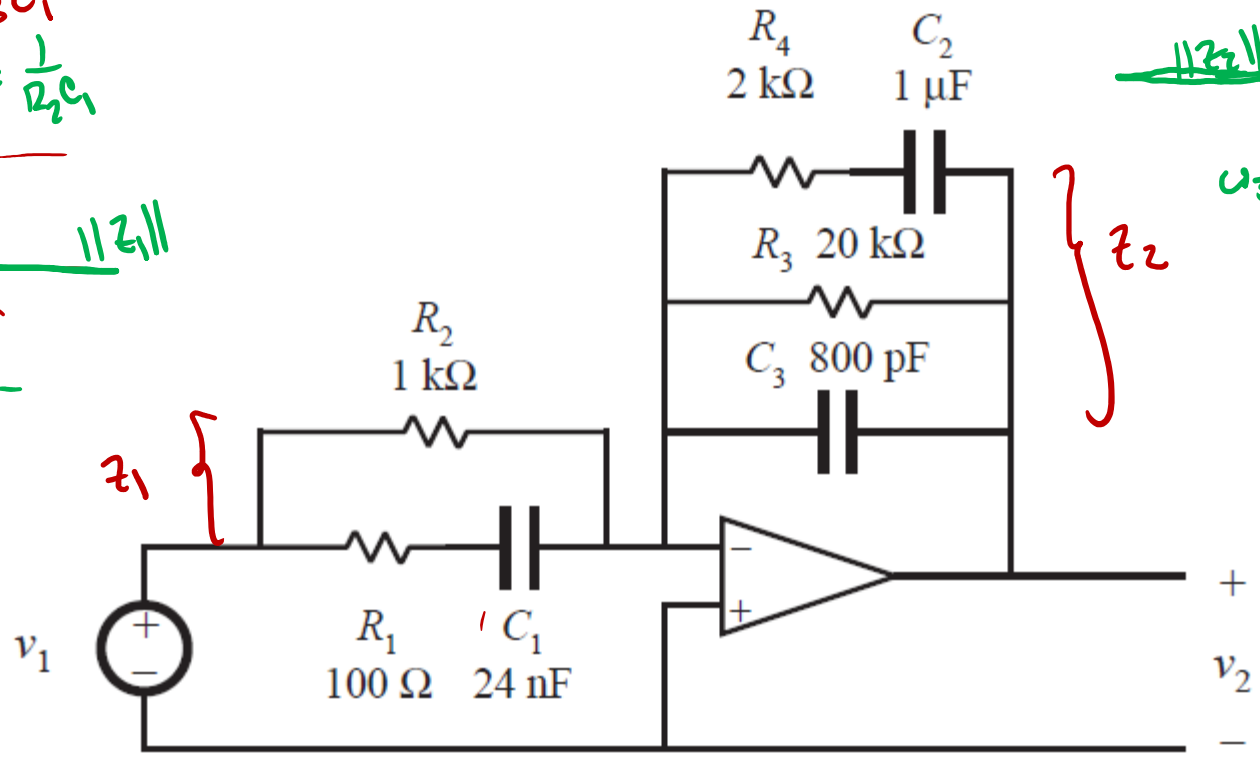


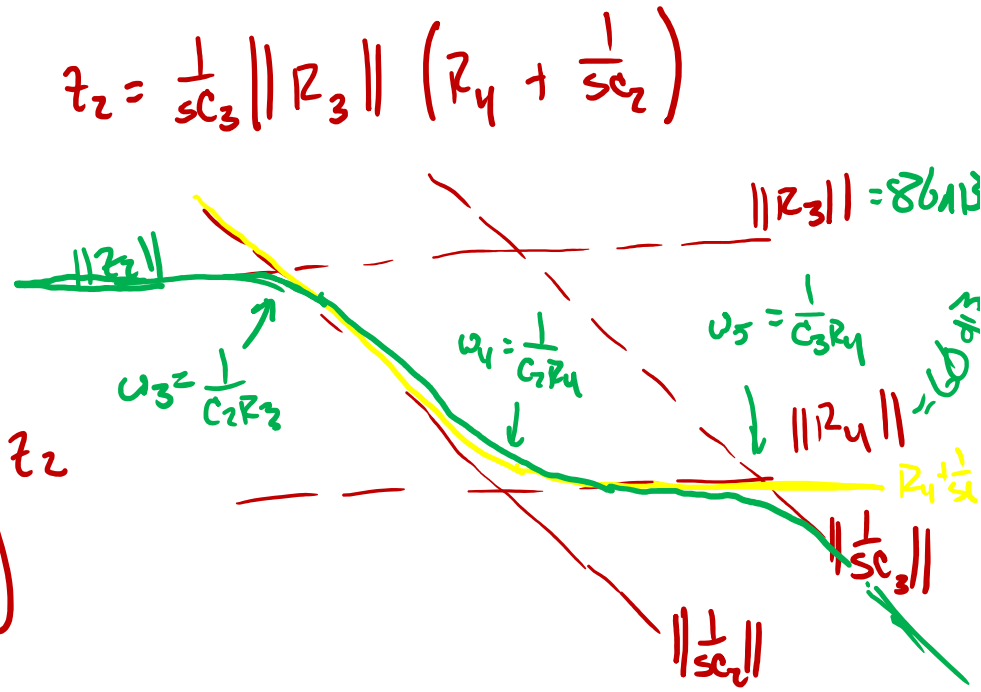
Reactance Paper



Graphical Analysis







$$H(s) = \frac{V_2}{V_1} = \frac{-Z_2}{Z_1}$$

Impedance/Reactance Paper