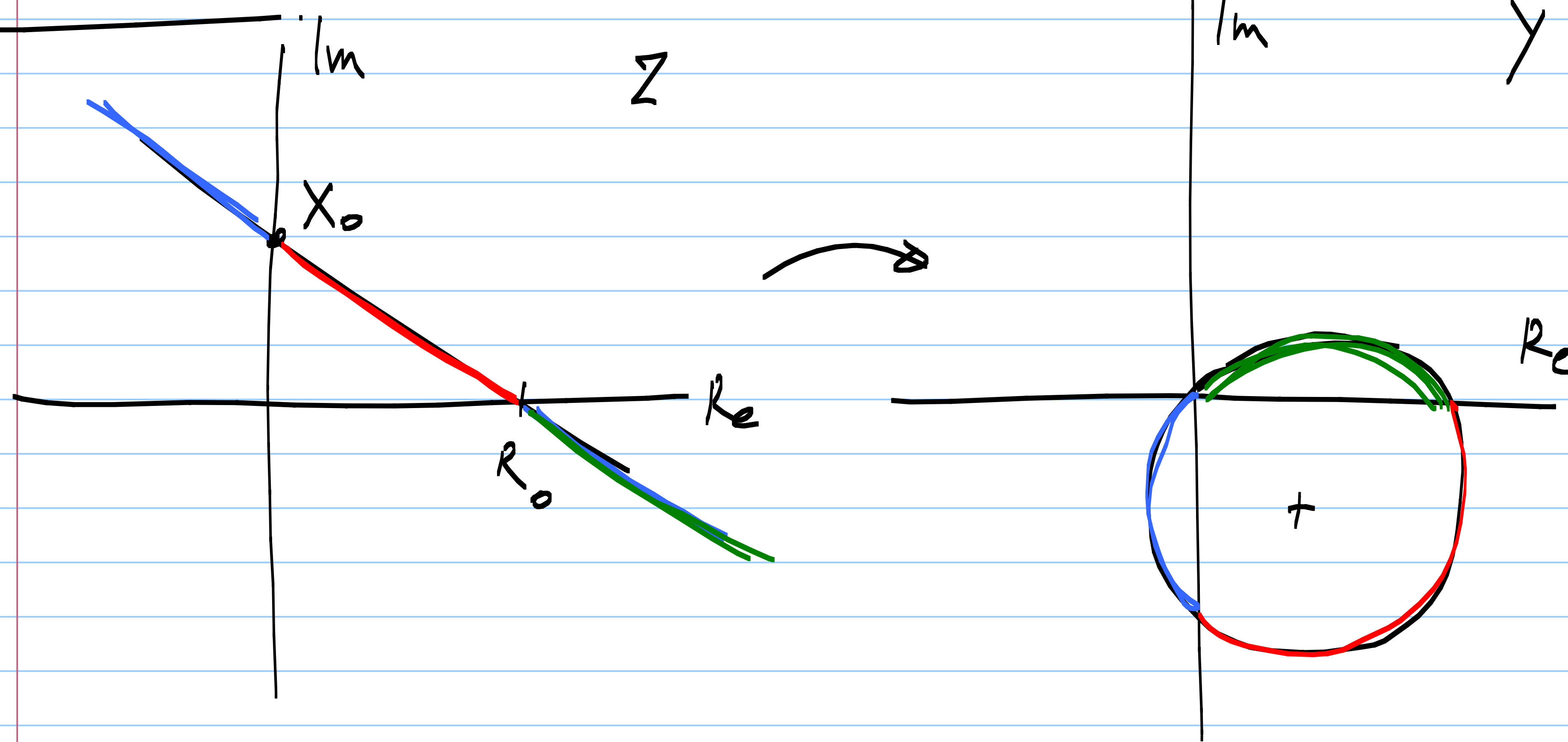
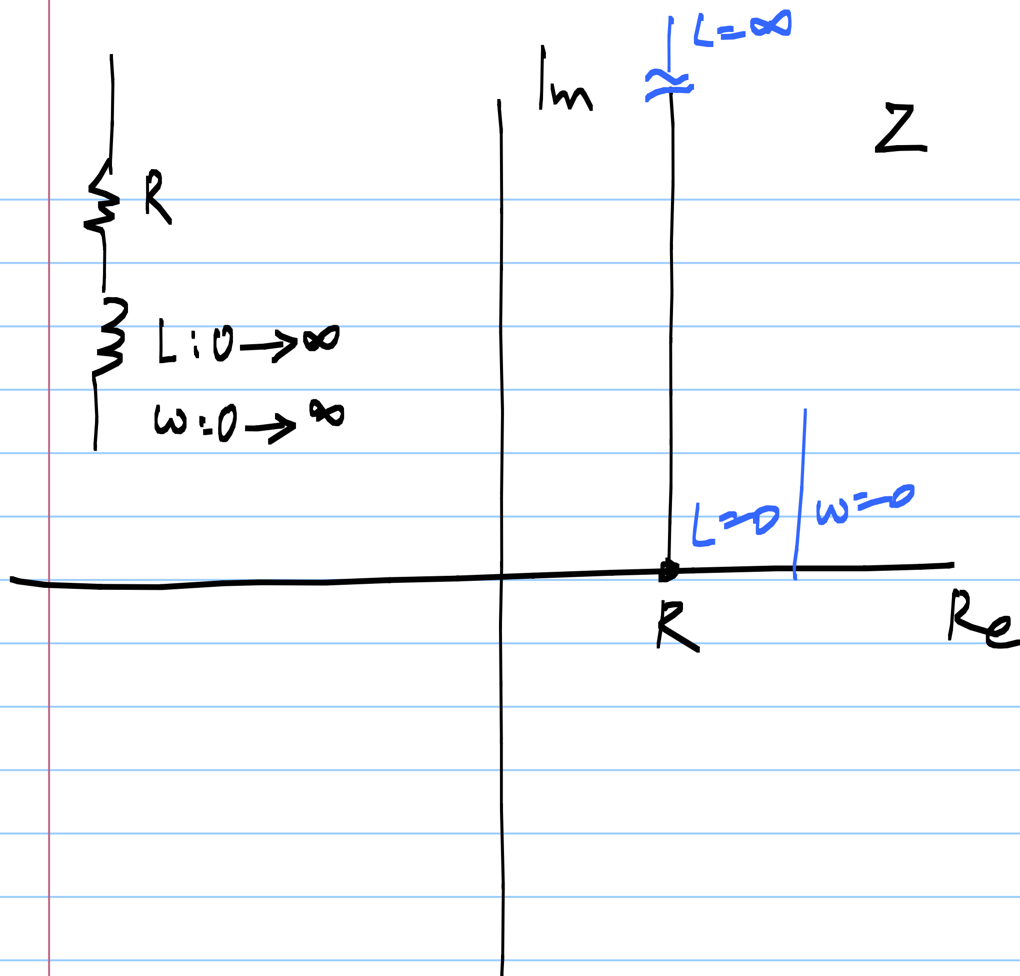
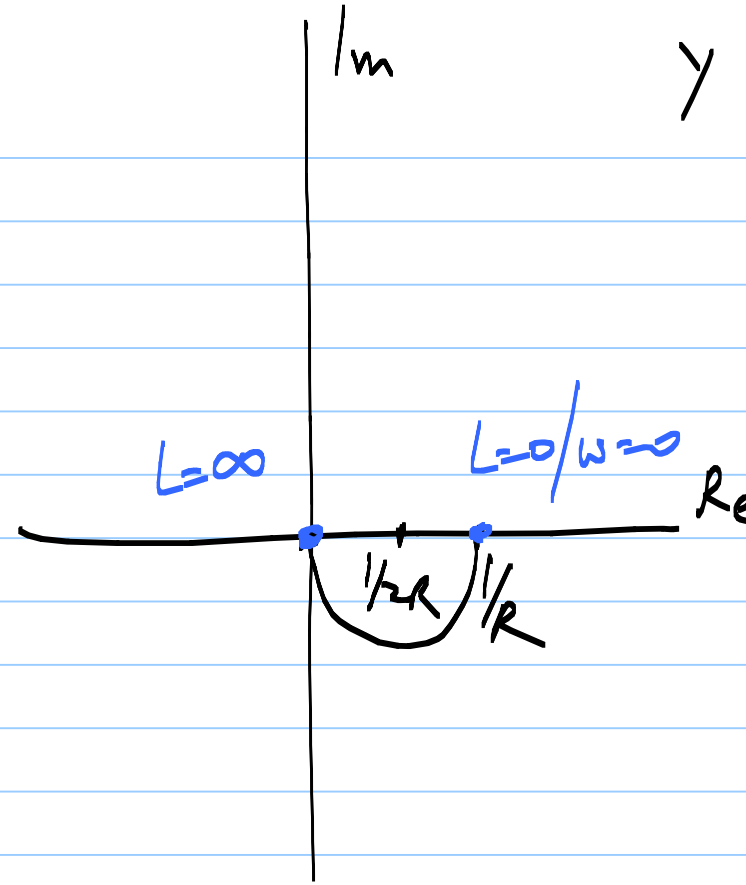
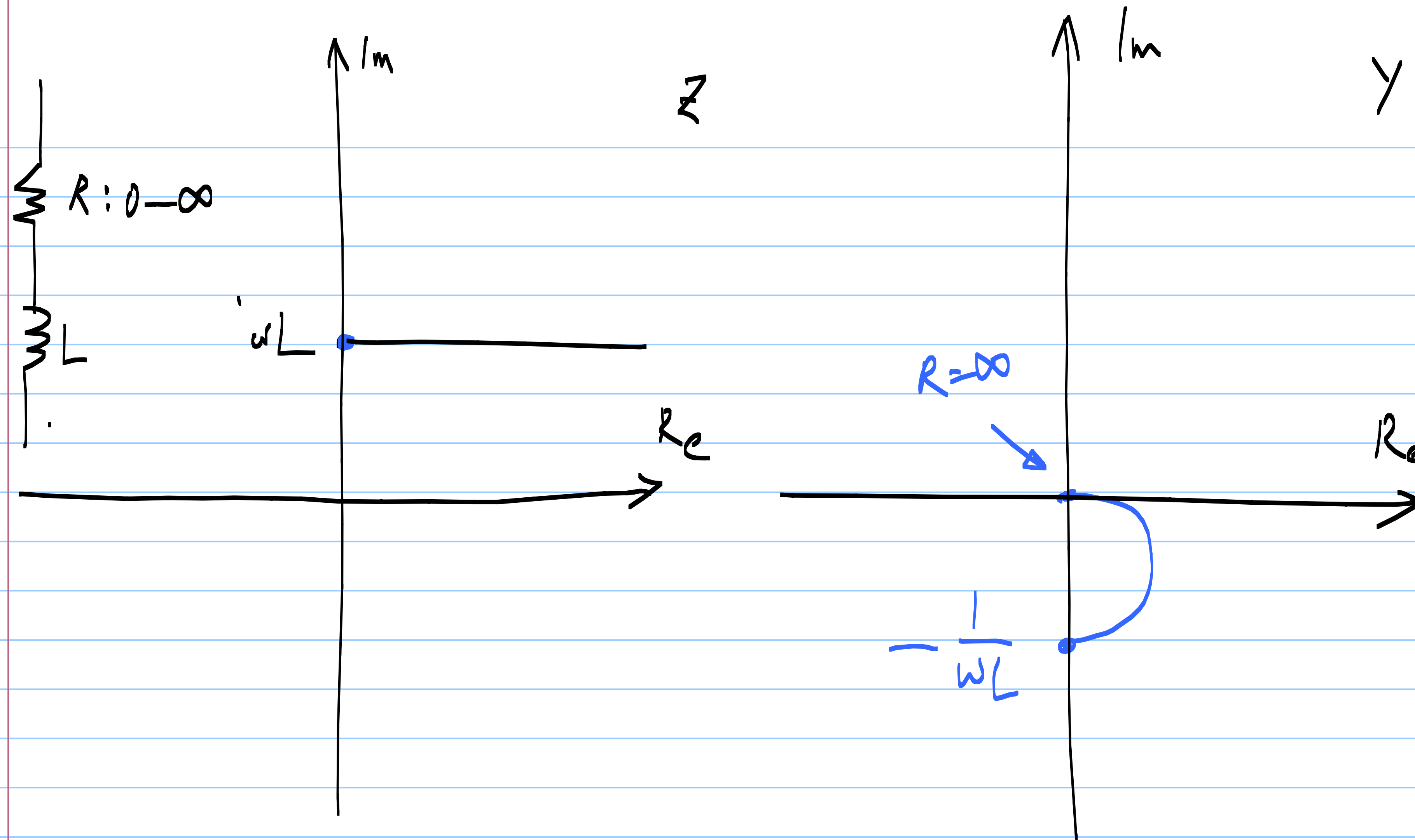
Lecture 33

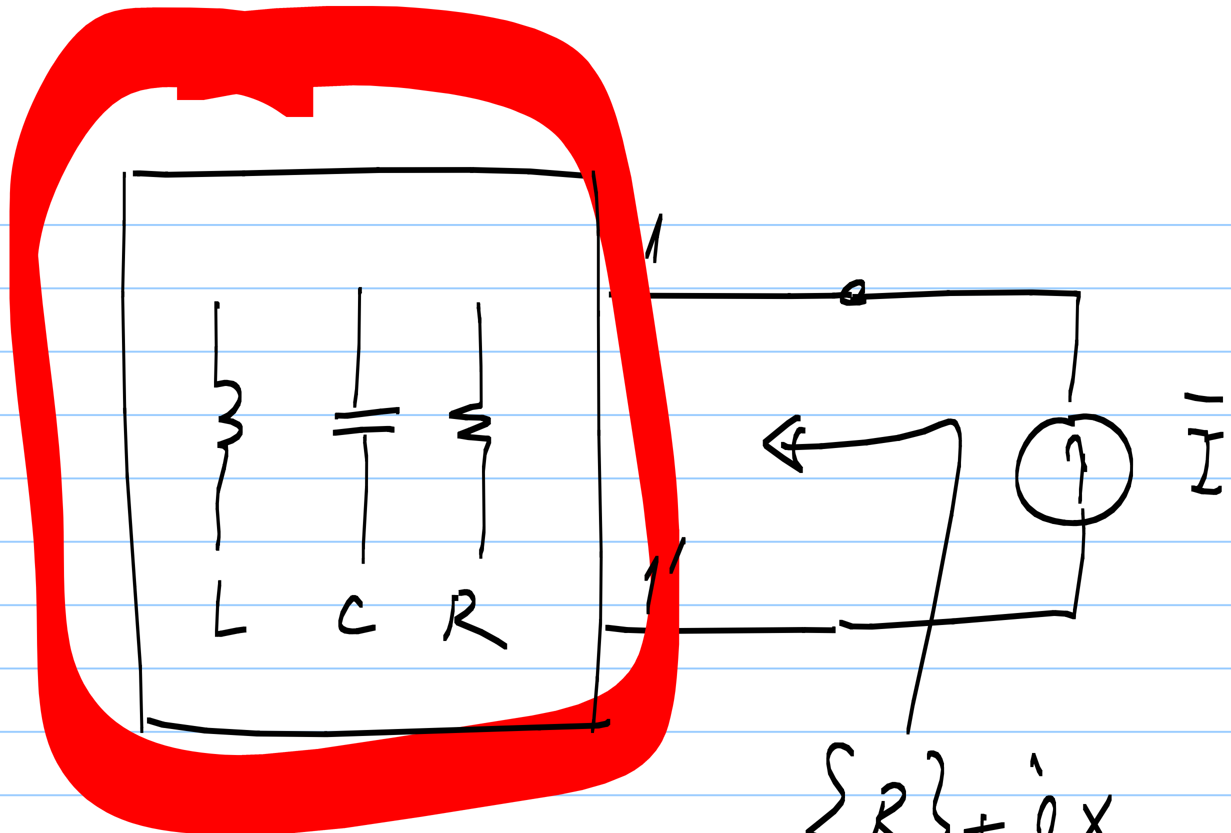



R
L : 0 → ∞
ω : 0 → ∞
Im
L=∞
Z
L=0 | ω=0
R
Re


Im
Y
L=∞
L=0 | ω=0
Re
1/2R
1/R

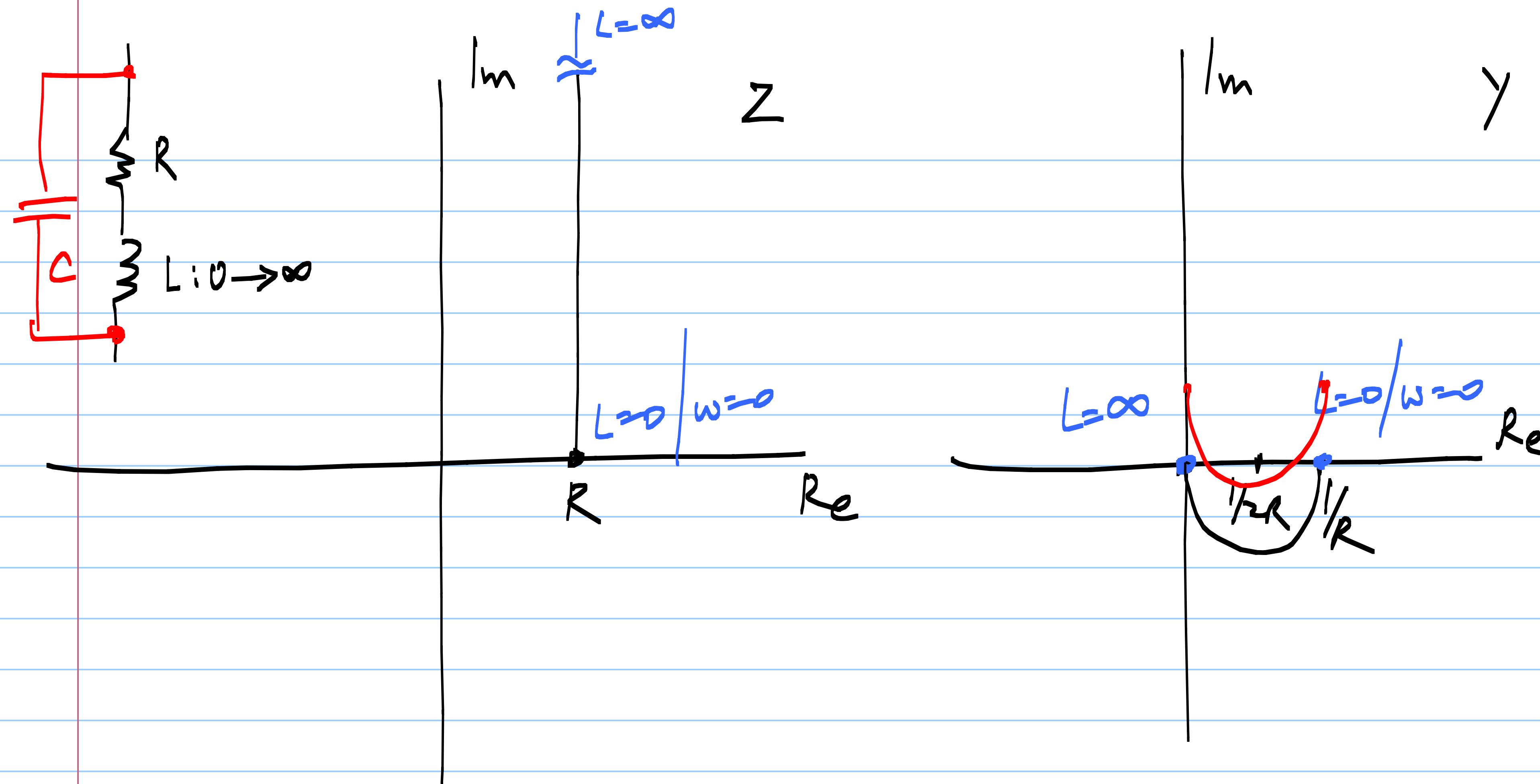


R : 0—∞
L
ωL
Im
Re
Z
Im
Y
R=∞
Re
$-\frac{1}{\omega L}$



$$\{R_o\} + jX_o$$

$$Re\left\{ \frac{\bar{I}\,(R_o + jX_o)\,\bar{I}^*}{2} \right\} = \frac{|\bar{I}|^2 R_o}{2}$$



C
R
L: 0 → ∞
Im
L=∞
Z
L=0 / ω=0
R
Re
Im
Y
L=∞
L=0 / ω=0
Re
1/2R
1/R

$$y = \frac{1}{z}$$

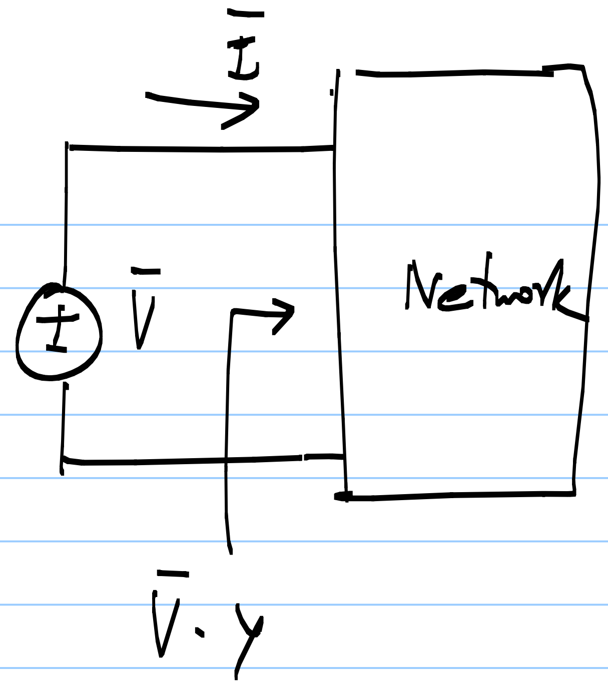
$$|z - z_0| = r_{z_0}$$

$$(z - z_0)(z^* - z_0^*) = r_{z_0}^2$$

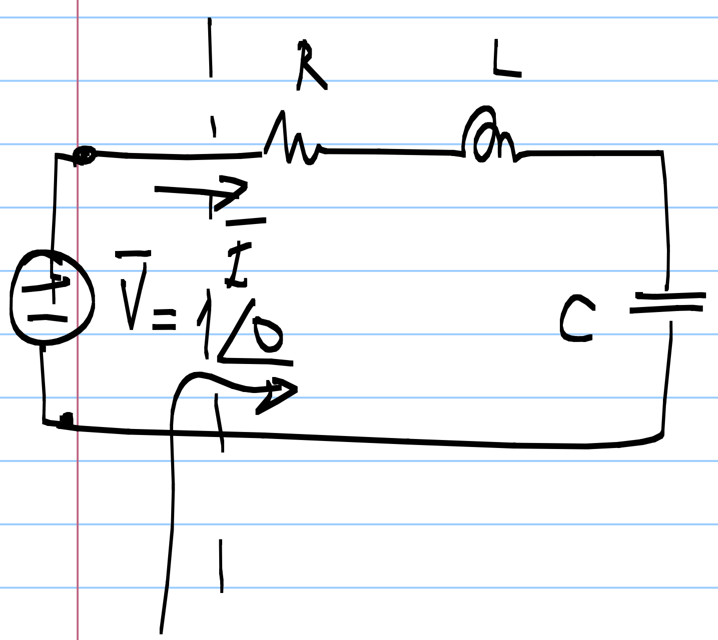
$$\left(\frac{1}{y} - z_0\right)\left(\frac{1}{y^*} - z_0^*\right) = r_{z_0}^2$$

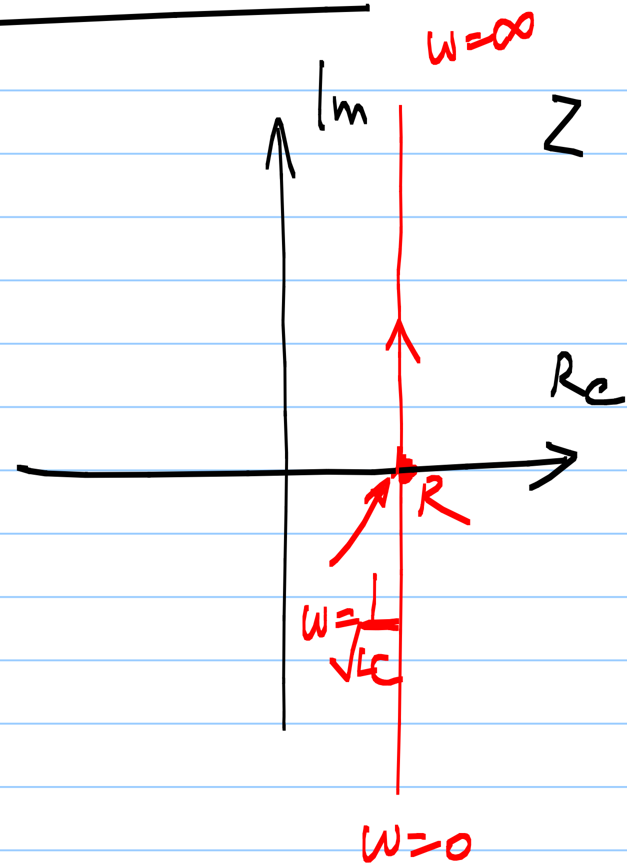
$$\left| y - \frac{1}{\alpha z_0} \right| = \frac{\sqrt{1-\alpha}}{\alpha |z_0|}$$

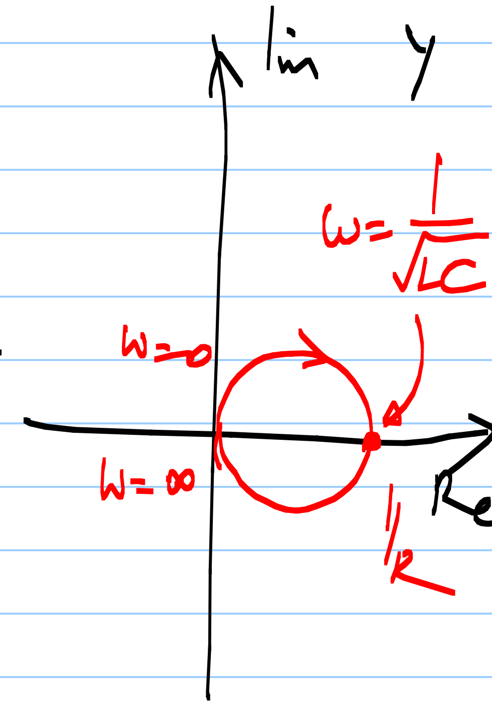
$$\alpha = \left[1 - \frac{r_{z_0}^2}{|z_0|^2} \right]$$

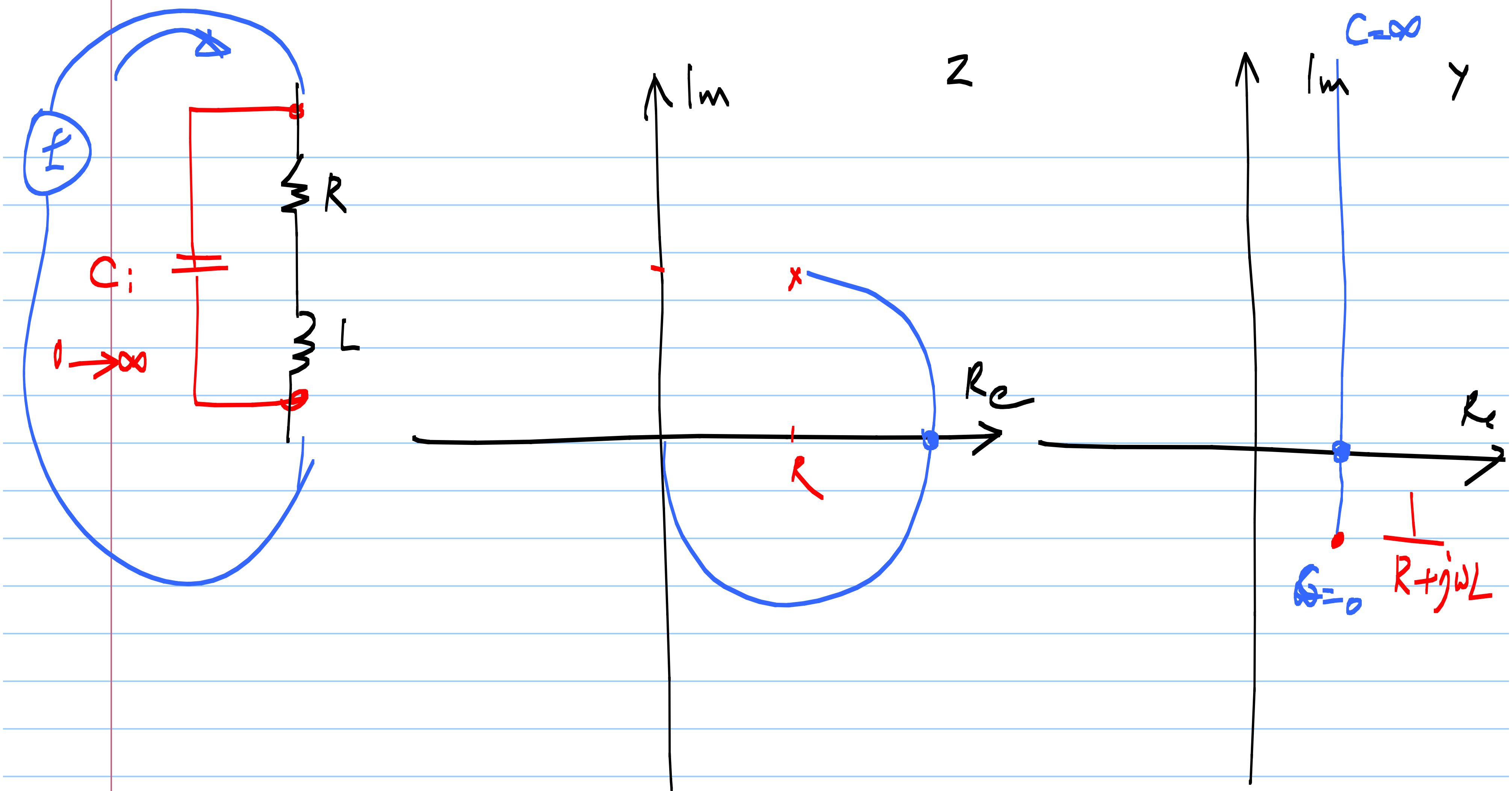

Network

2^{nd} order network: Series RLC $\omega: 0 - \infty$





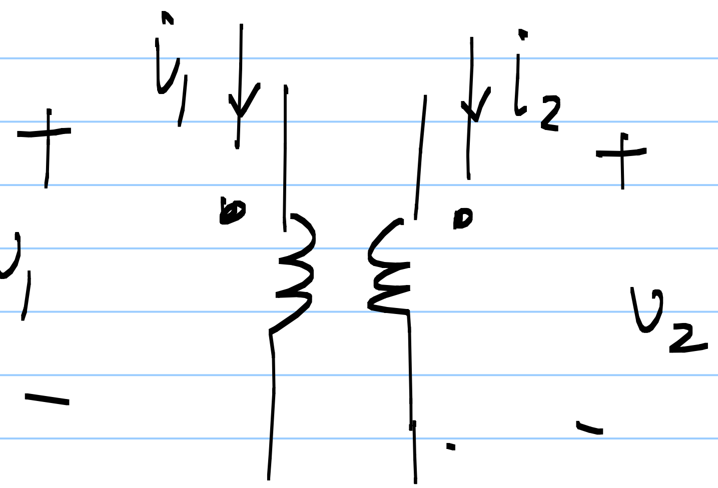




R
L
C :
0 → ∞
Im
Z
Re
R
Im
Y
C=∞
Re
C=0
1/(R+jωL)

Mutual inductance

$\bar{V}_1 \quad \bar{V}_2 \quad \bar{I}_1 \quad \bar{I}_2$



$v_1 = \bar{V}_1 \exp(j\omega t)$

$v_2 = \bar{V}_2 \exp(j\omega t)$

$i_1 = \bar{I}_1 \exp(j\omega t)$

$i_2 = \bar{I}_2 \exp(j\omega t)$

$$\begin{bmatrix} \bar{V}_1 \\ \bar{V}_2 \end{bmatrix} = \begin{bmatrix} j\omega L_1 & j\omega M \\ j\omega M & j\omega L_2 \end{bmatrix} \begin{bmatrix} \bar{I}_1 \\ \bar{I}_2 \end{bmatrix}$$