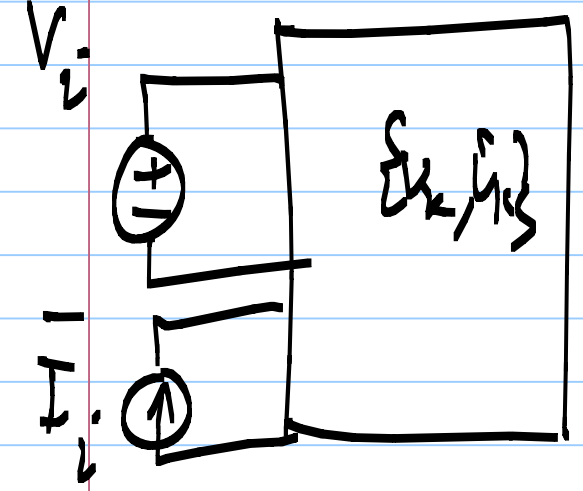
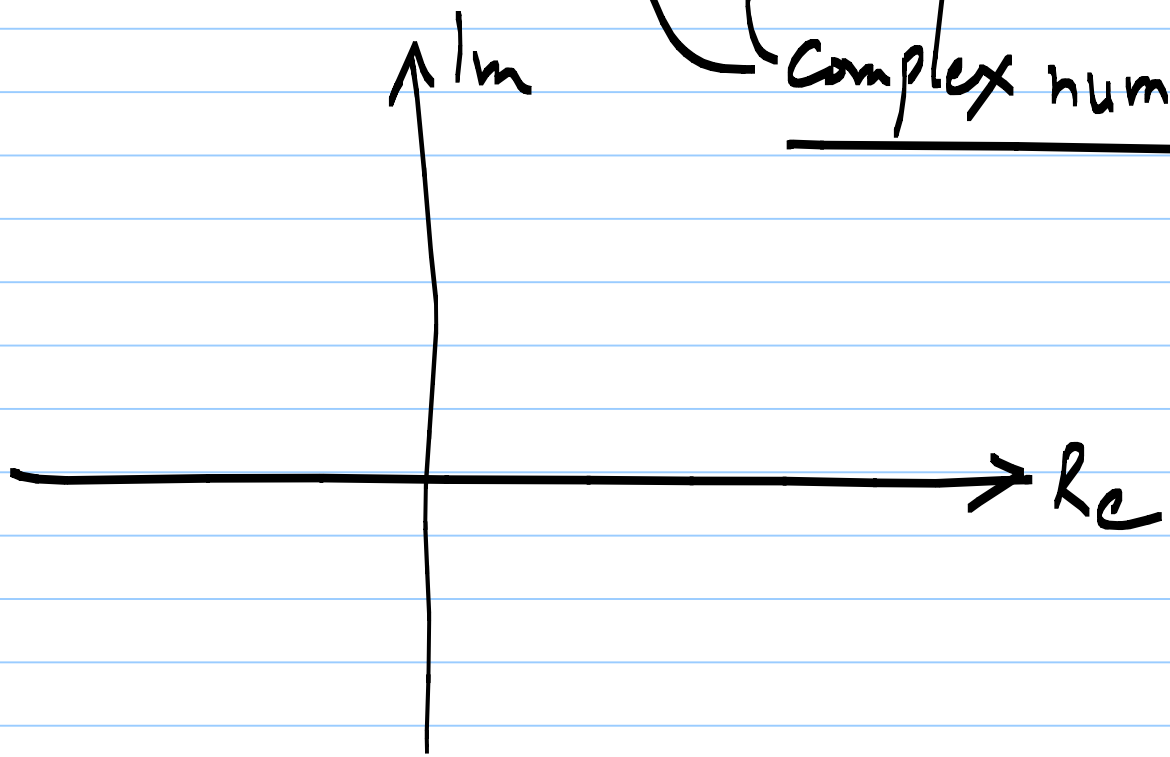
EE 205

6/10/2017

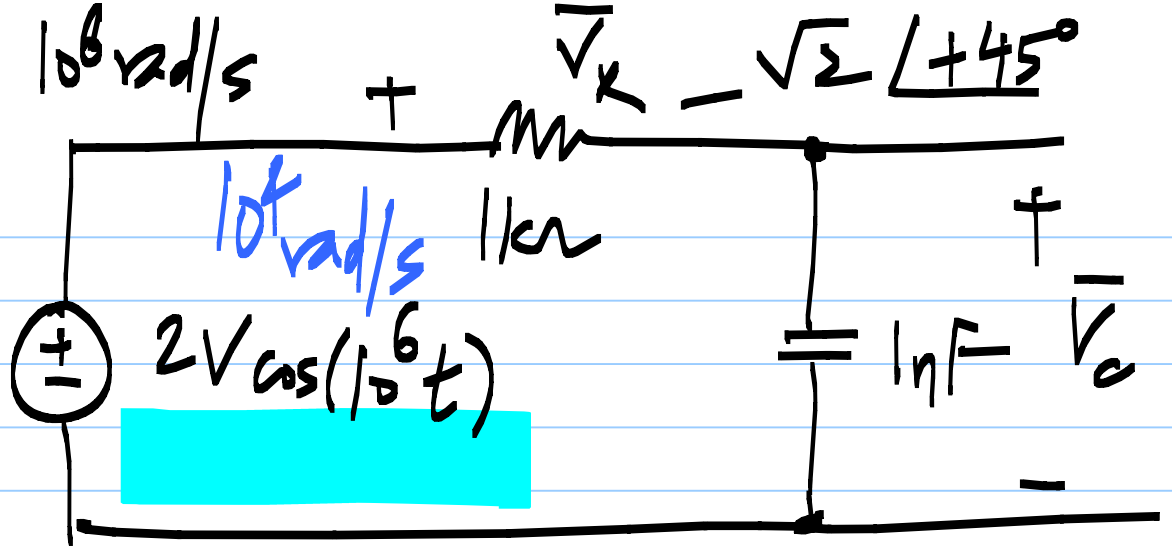


v_k, i_k : → $\bar{V}_k$, $\bar{I}_k$

complex numbers



$\omega = 10^6$ rad/s



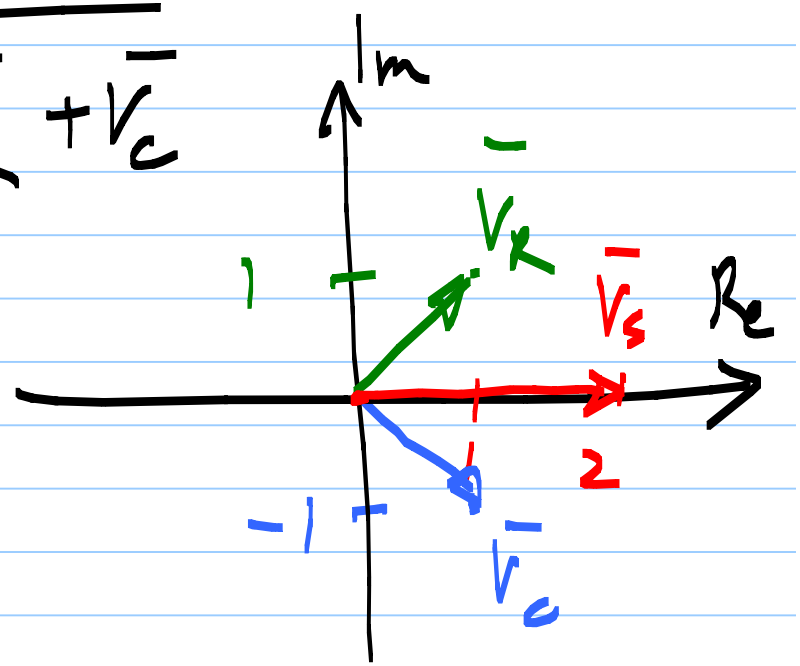
$\bar{V}_R = \sqrt{2}\angle +45°$

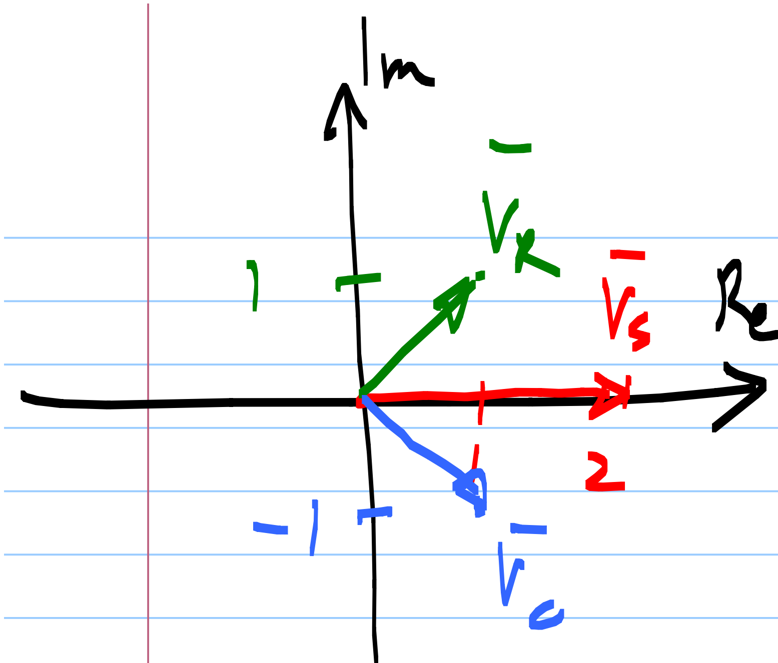
$\frac{2}{1+j1} = \sqrt{2}\cdot\angle -45° \cdot V$

$\bar{V}_s = \bar{V}_R + \bar{V}_C$

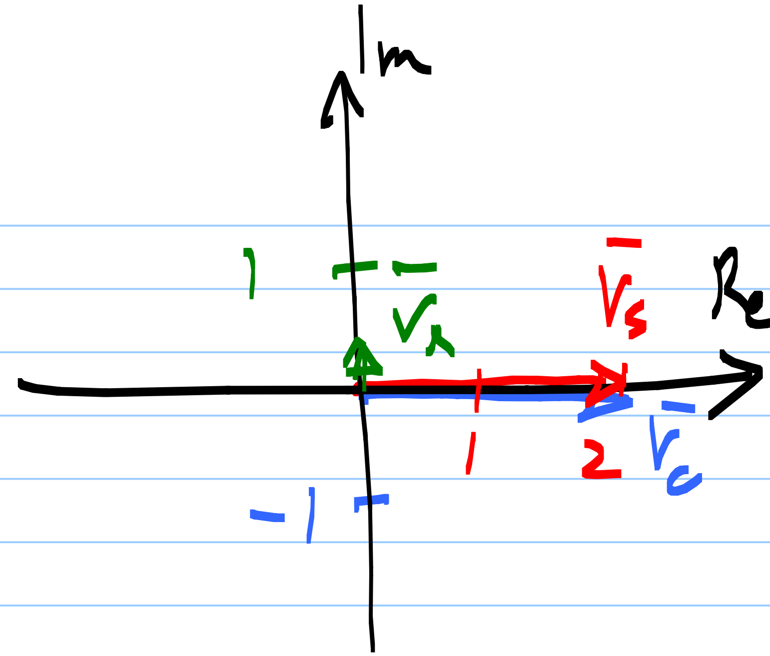
$2\angle 0° V$

Amplitude — phase (refers to cos( ))





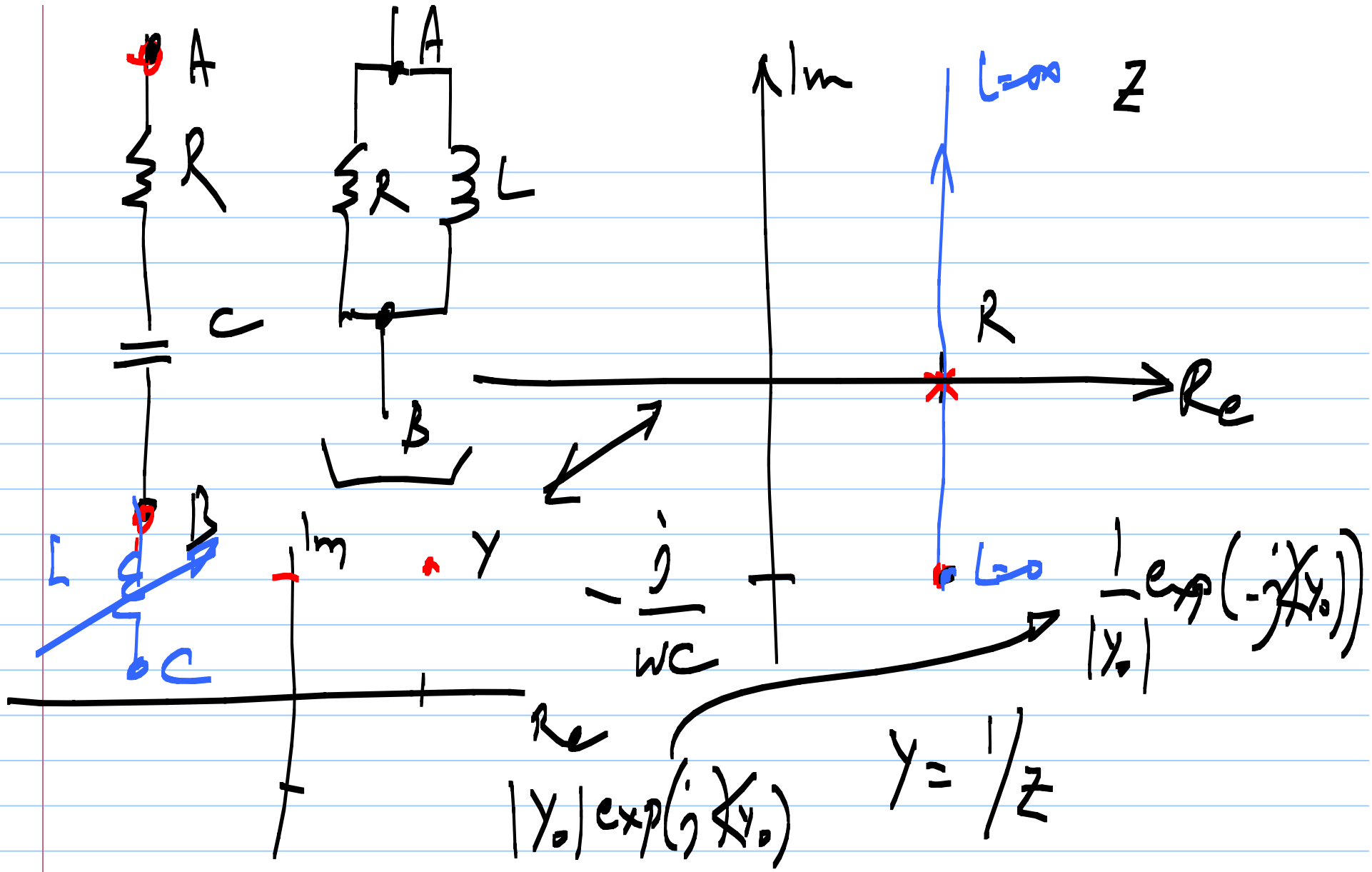
@ 10^6 rad/s

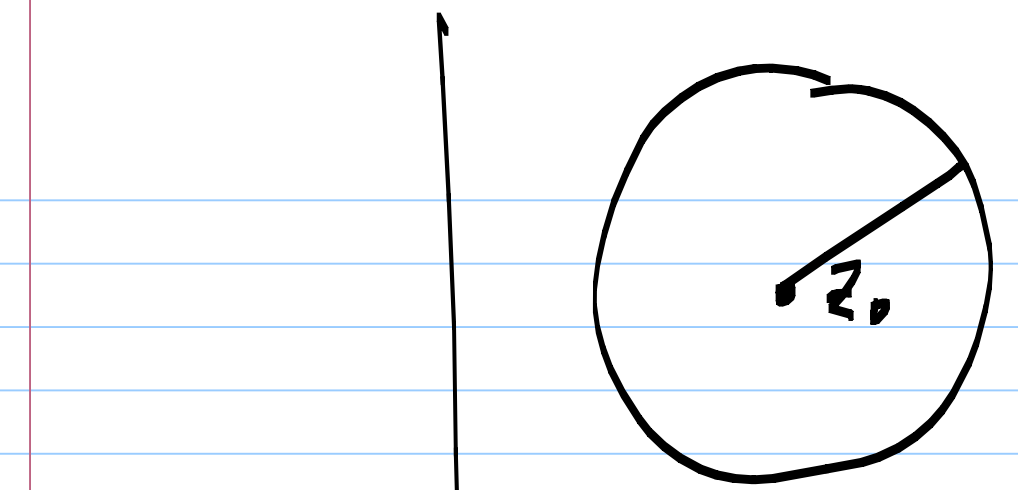


@ 10^4 rad/s

Summary Phasor Diagrams

$\textcircled{3}$ $10\sin(\omega t)$ V


A
R
C
B
A
R
L
B
Im
Re
R
Z
Im
Y
$-\frac{j}{\omega C}$
$|Y_0|\exp(j\chi_{Y_0})$
$\frac{1}{|Y_0|}\exp(-j\chi_{Y_0})$
$Y = 1/Z$



$$(z-z_0)(z-z_0)^* = r^2$$

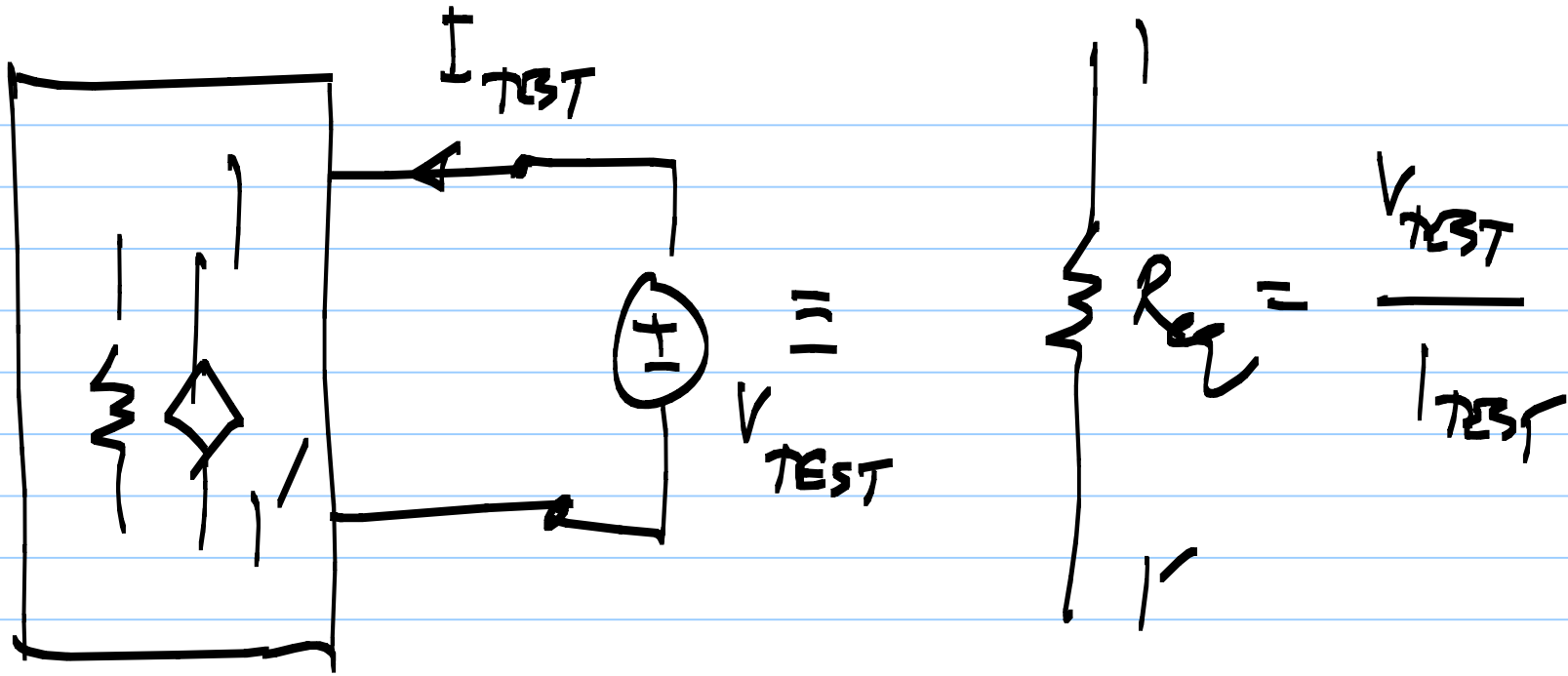
$$|z-z_0| = r$$

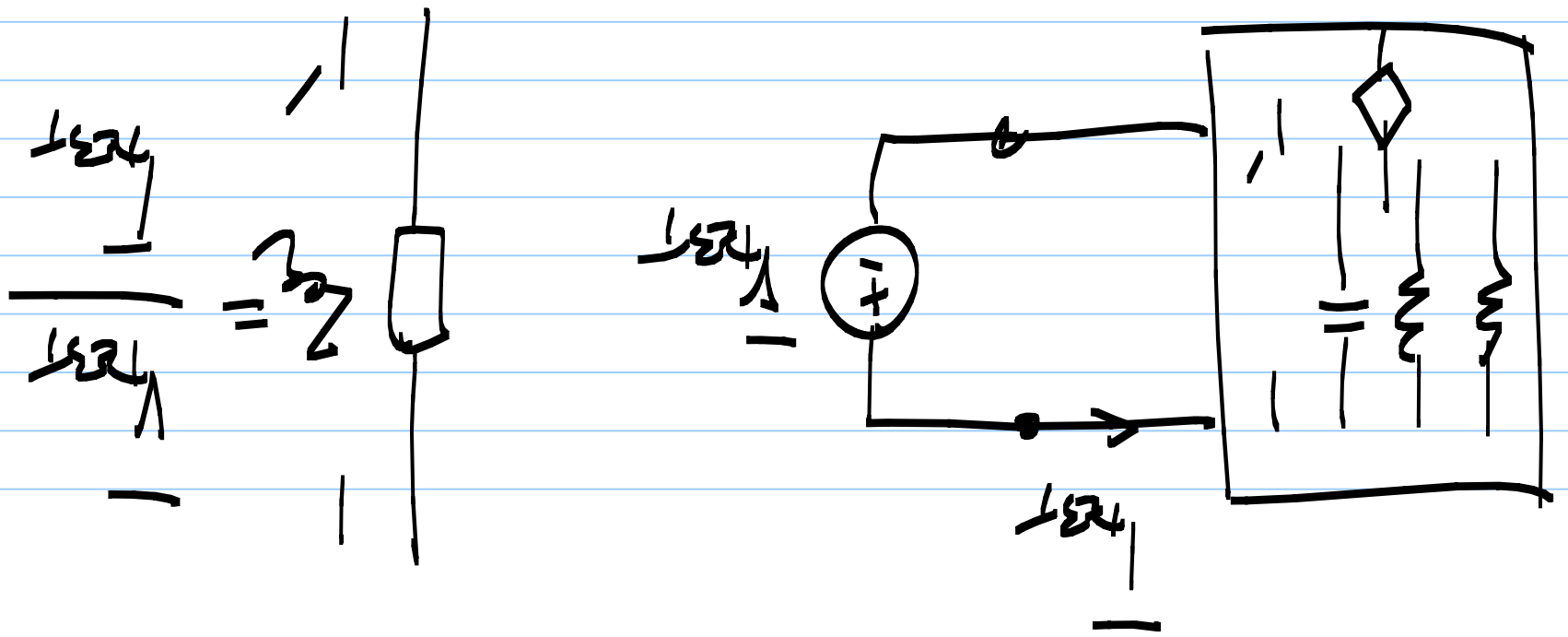
$$y = mx + c$$

$$z = x + jy$$

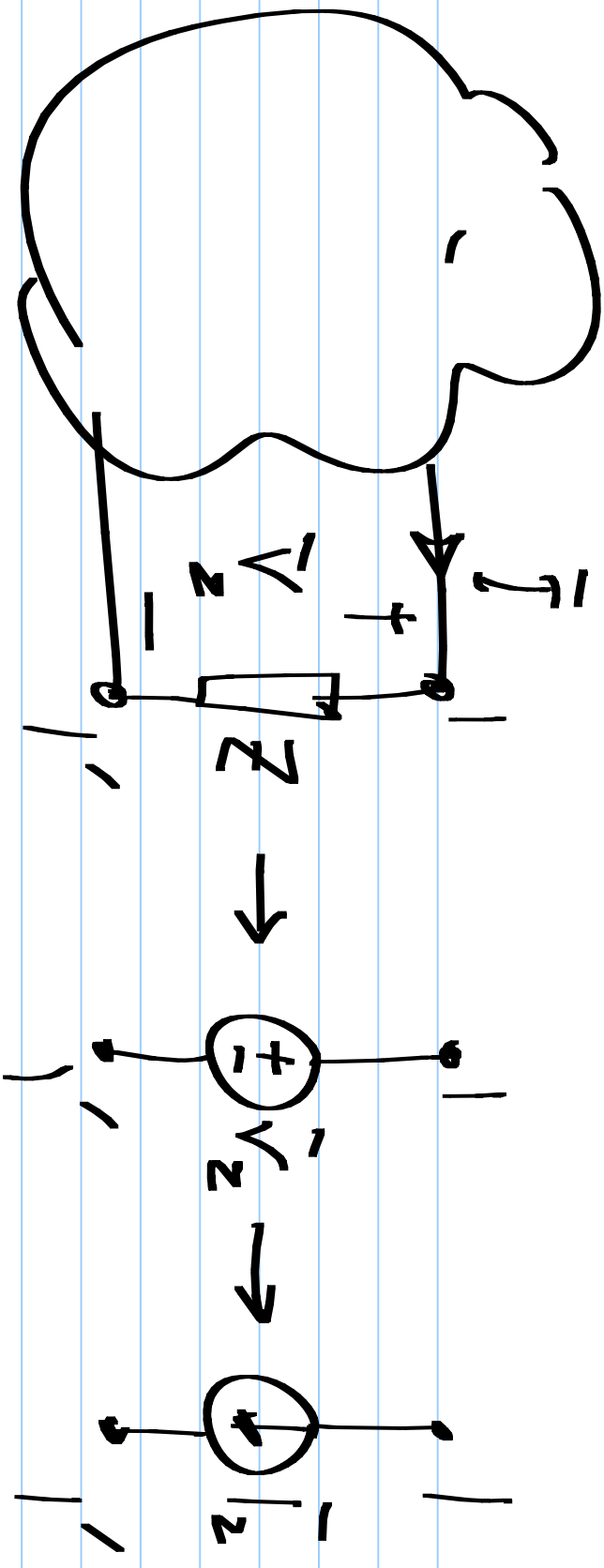
$$\frac{x}{X_0} + \frac{y}{Y_0} = 1$$

$$\frac{z+z^*}{2X_0} + \frac{z-z^*}{j2Y_0} = 1$$


I_{TEST}
$\equiv$
V_{TEST}
$R_{eq} = \frac{V_{TEST}}{I_{TEST}}$



Complex



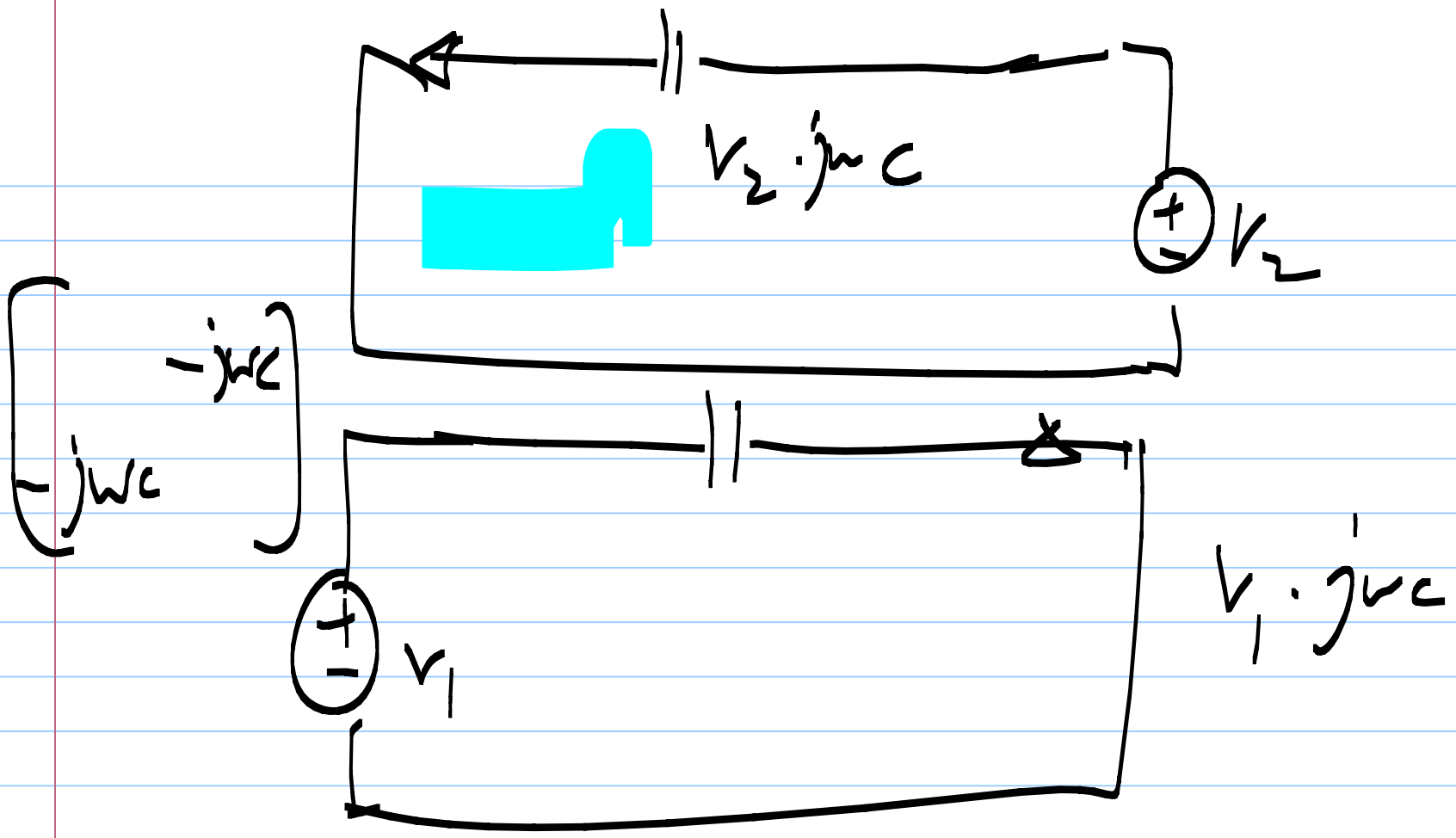
$v_1 = V_{p1} \cos(\omega t + \phi_1)$ $\qquad V_{p1} \angle \phi_1$

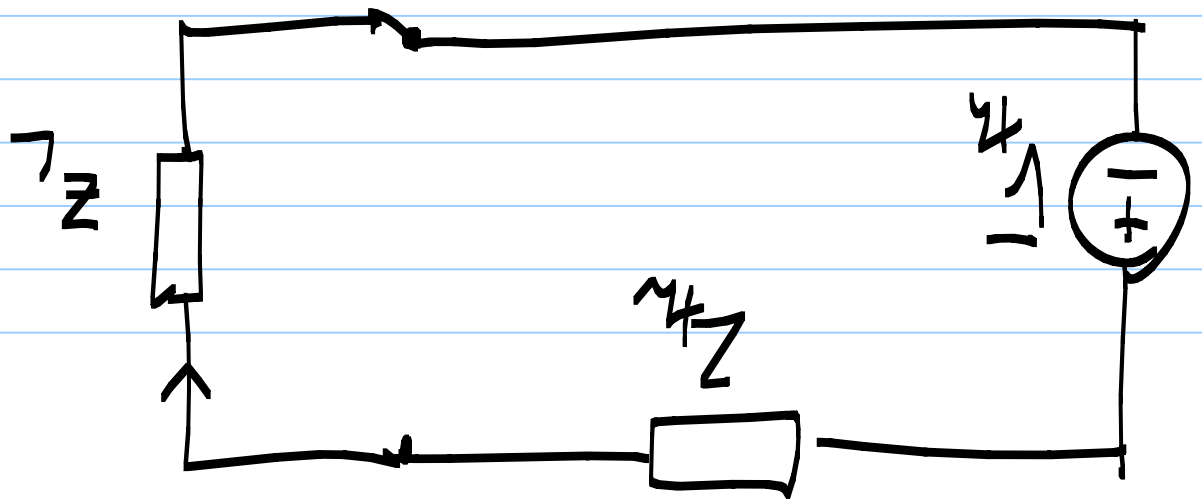
$v_2 = V_{p2} \cos(\omega t + \phi_2)$ $\qquad V_{p2} \angle \phi_2$

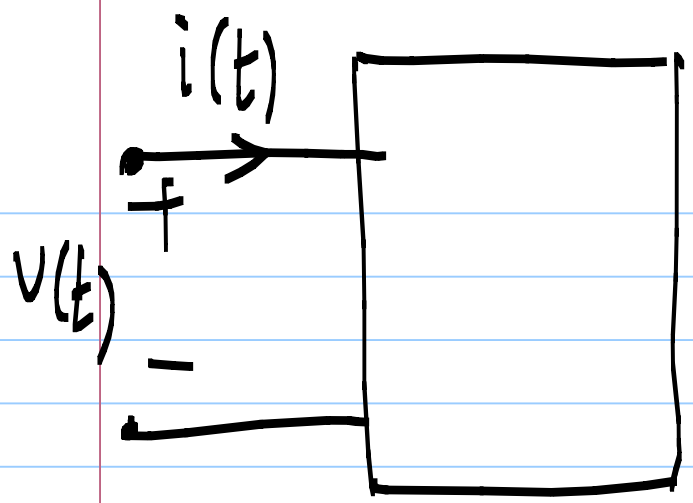
$\bar{I}_1 = \boxed{Y_{11} \cdot V_{p1} \angle \phi_1 + Y_{12} V_{p2} \angle \phi_2}$

$\bar{I}_2$

$i_1(t): \quad Re\left[\bar{I}_1 \exp(j\omega t)\right] = |\bar{I}_1| \cdot \cos(\omega t + \measuredangle \bar{I}_1)$


$V_2 \cdot j\omega C$
V_2
$-j\omega C$
$-j\omega C$
V_1
$V_1 \cdot j\omega C$

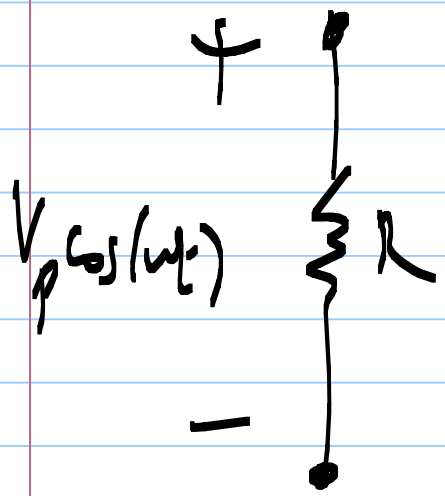

Z
V1
V2



$p(t) = v(t) \cdot i(t)$

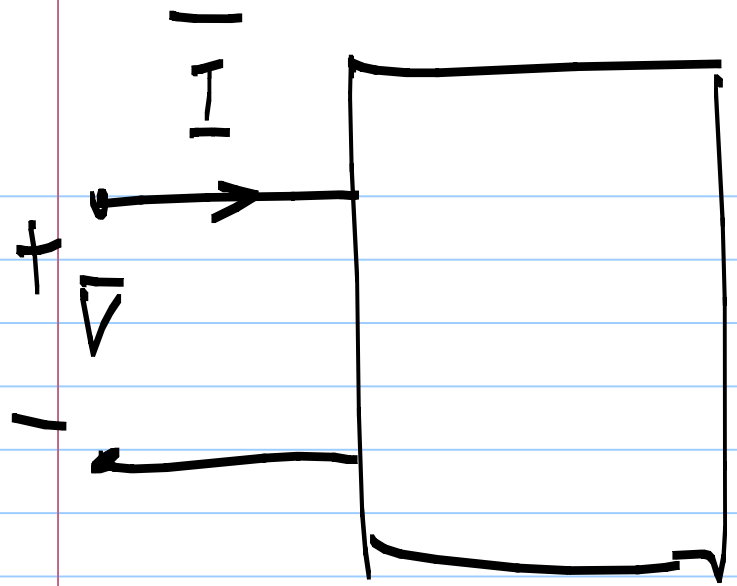
$= \frac{2\pi}{\omega}$

$v(t)$, $i(t)$ are periodic period T



$$p(t) = \frac{V_p^2 \cos^2 \omega t}{R}$$

$$\frac{1}{T} \int_{-T/2}^{T/2} p(t)\, dt = P_{av}$$



$$v(t) = |\bar{V}| \cdot \cos(\omega t + \angle \bar{V})$$

$$i(t) = |\bar{I}| \cdot \cos(\omega t + \angle \bar{I})$$

$$\frac{1}{T} \int_{-T/2}^{T/2} v(t)\, i(t)\, dt$$