4B 5-12-14 **Part 2**

LINK: 3-28-14 (Date of Notes)

supplement:

(ch 7) $\frac{1}{2}kx^2 + \frac{1}{2}mv^2 = \frac{1}{2}kA^2$

(ch 30) $\frac{Q^2}{2C} + \frac{1}{2}LI^2 = \frac{Q_{MAX}^2}{2C}$

ch 30 → ac circuits

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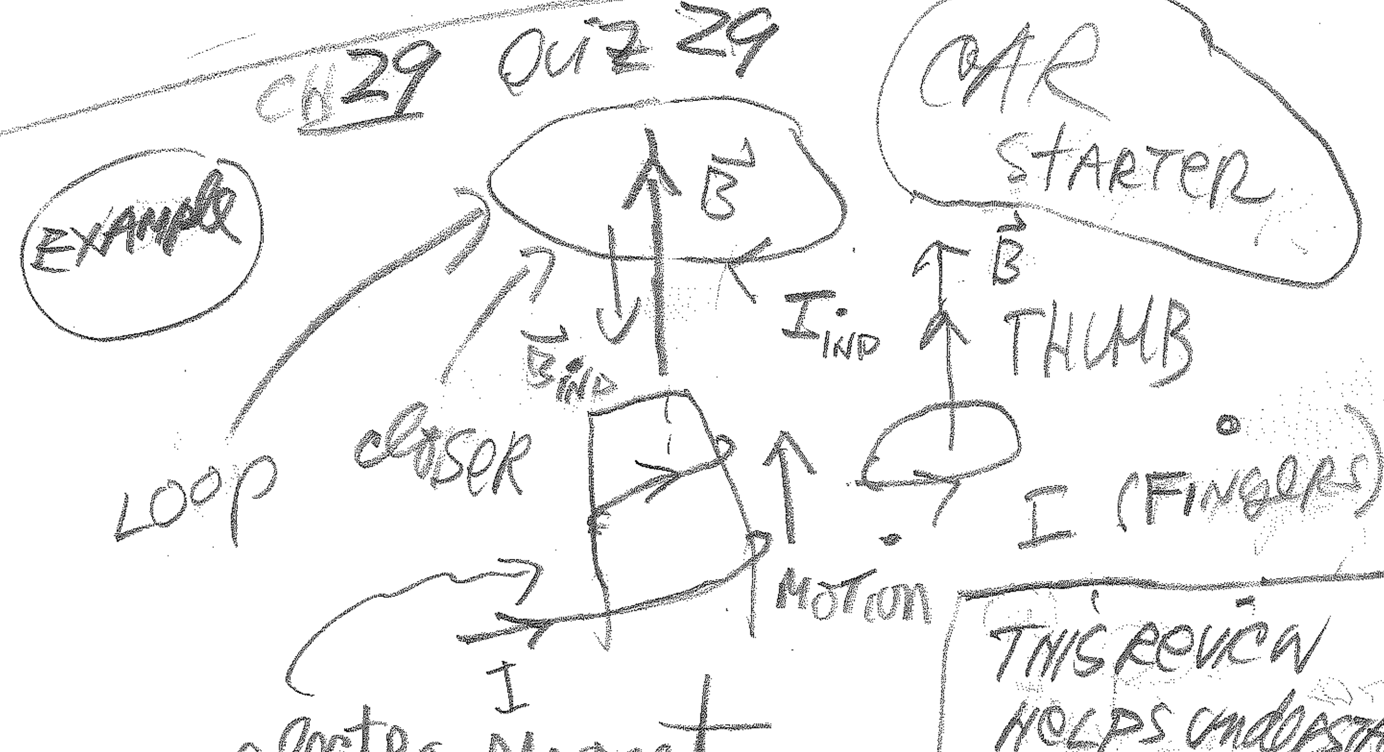
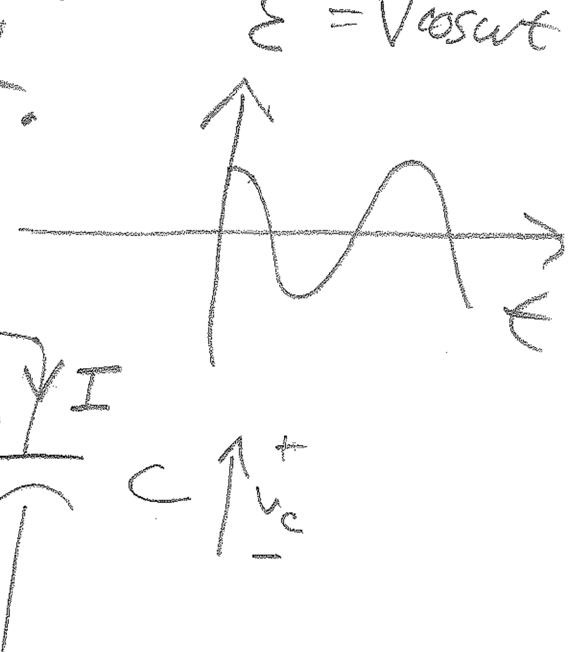
ch 29 quiz 29

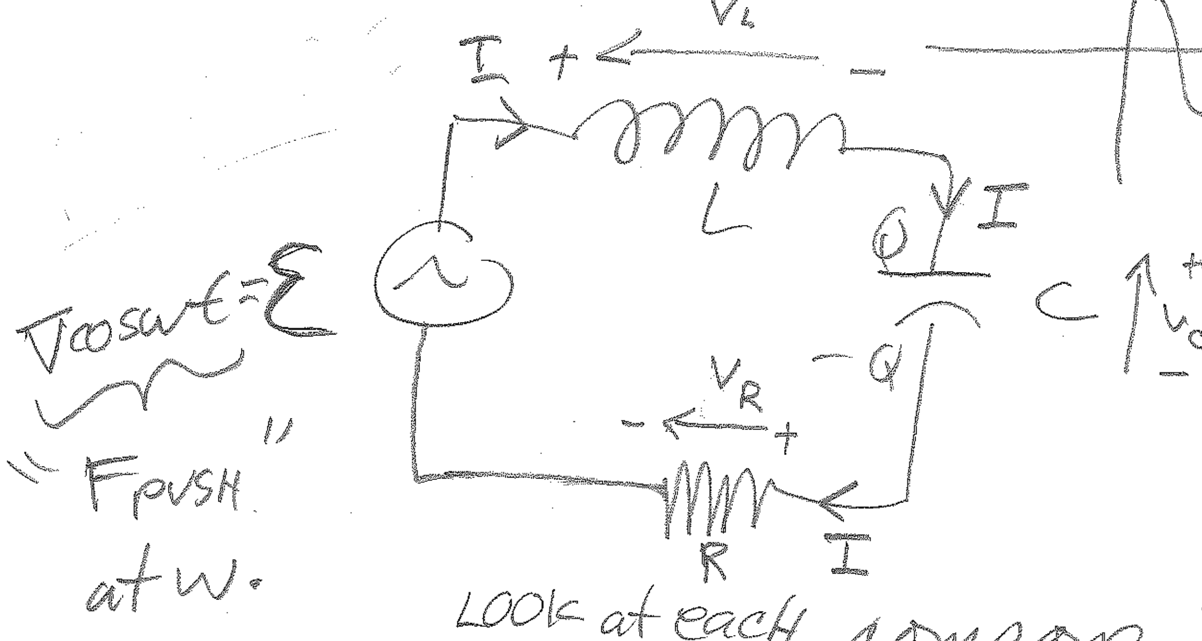


THIS REVIEW HELPS UNDERSTAND Chs. 30, 31

after BREAK

Explain RLC circuit from "bottom up." analyze it.





LOOK at each component.

notes:

(A) V_R and I ARE in PHASE

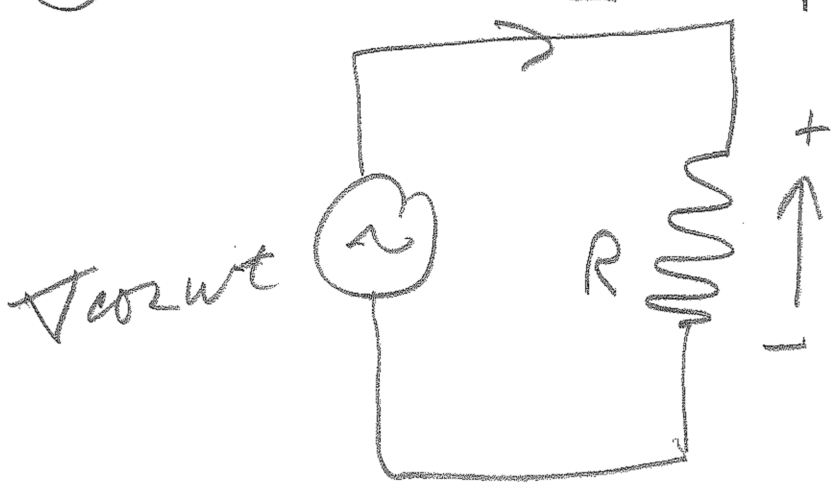
(B) I Lags V_L (90°)

(C) I Leads V_C (90°)

Sec 31.2

(A.) R alone:

$$I = \frac{V}{R}\cos\omega t$$



$$V_R \equiv V_+ - V_-$$

$$V_R = I \cdot R$$

Ohm's Law $\quad I = \frac{V_R}{R}$ CW 19

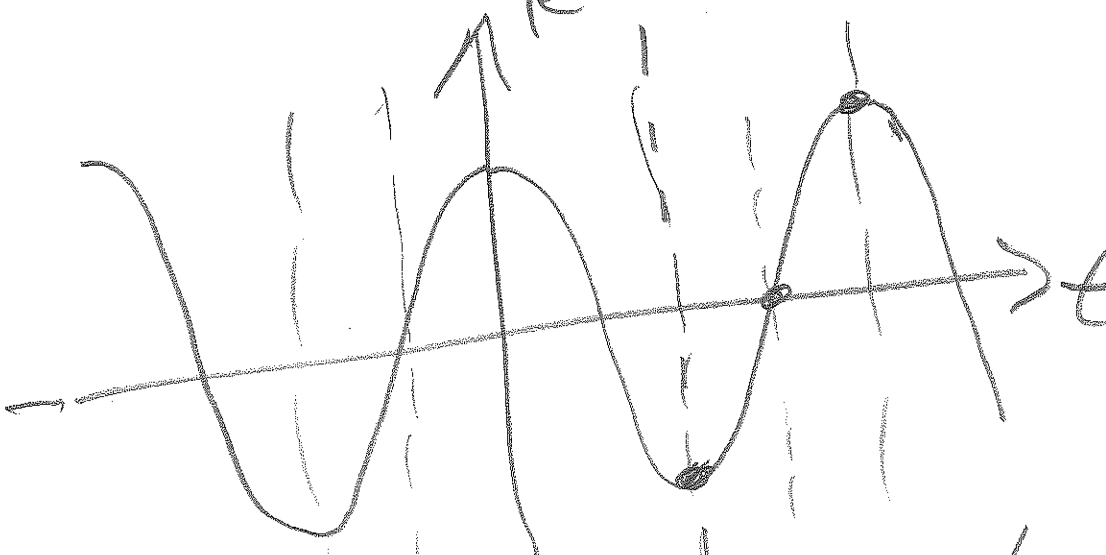
note: $V_R = V\cos\omega t \Rightarrow I = \boxed{\frac{V}{R}\cos\omega t}$

$$\sum_{\text{Loop}} \Delta V = 0$$

$$\sum_{\text{Loop}} \Delta V = V\cos\omega t - V_R = 0$$

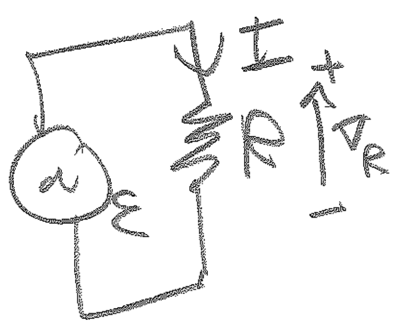
C10

$V_R = V \cos \omega t$



$I = I_m \cos \omega t$, $I_m = \frac{V}{R}$

$\mathcal{E} = V \cos \omega t$

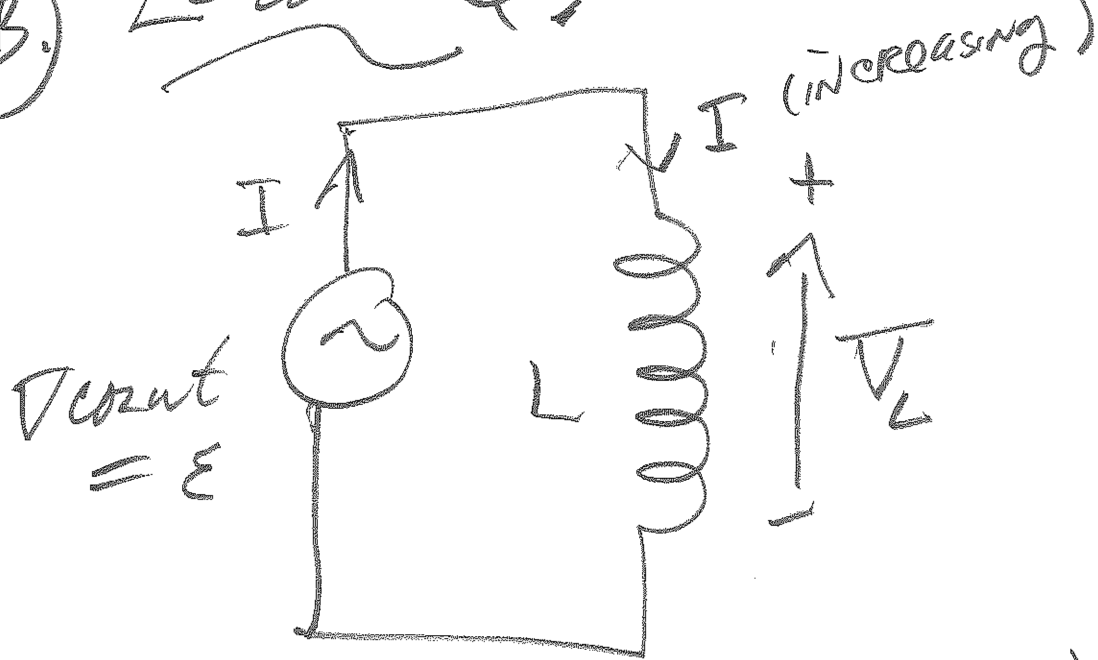


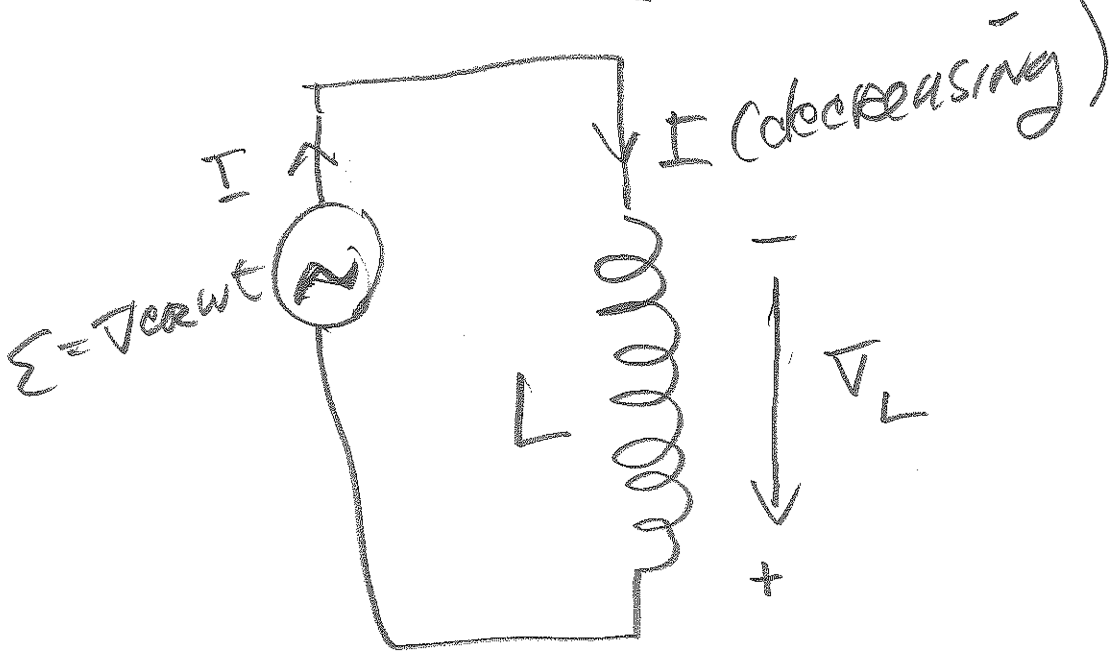
I and V_R are in <u>PHASE</u>

CCV

sec 31.2

(B.) L-alone:

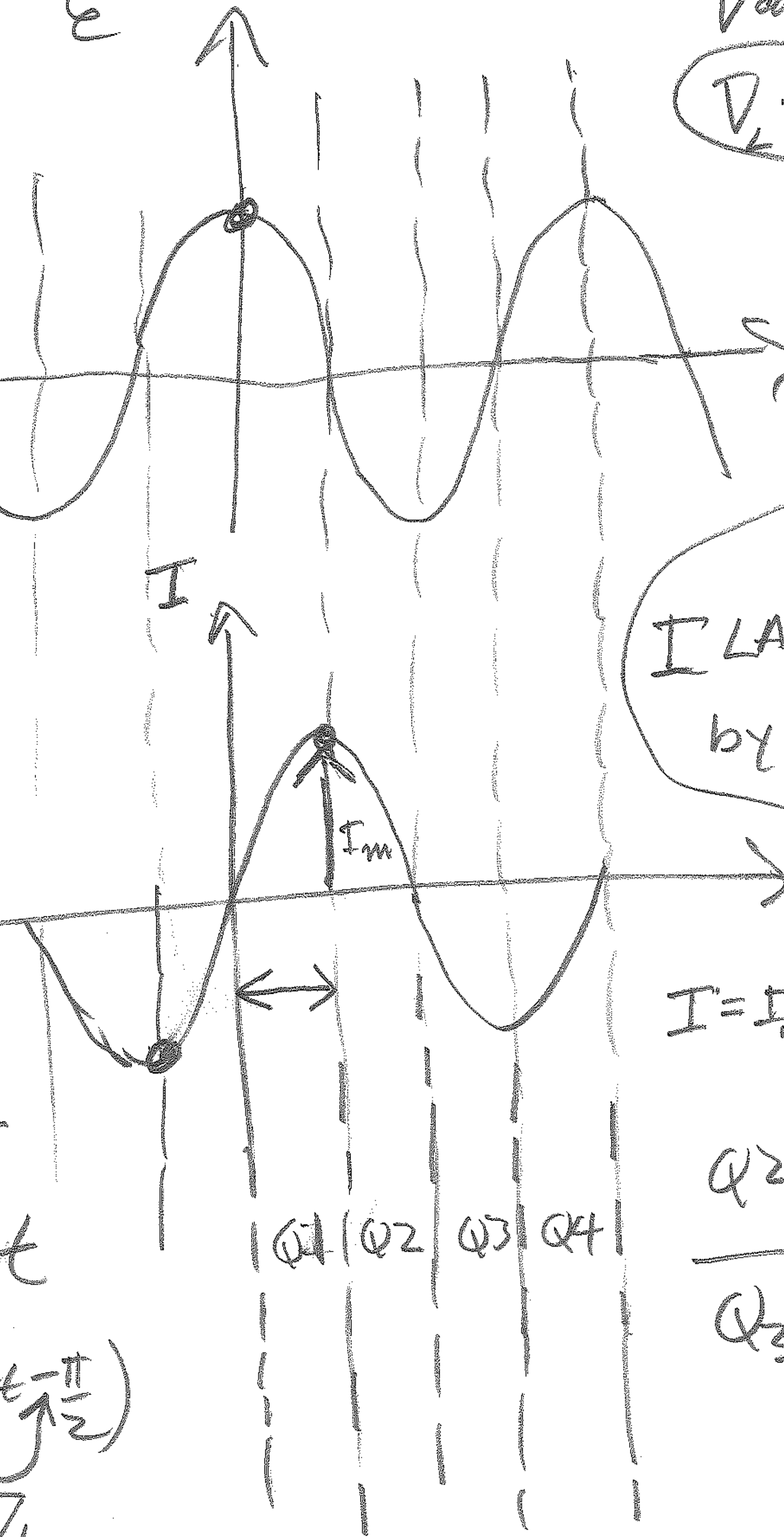


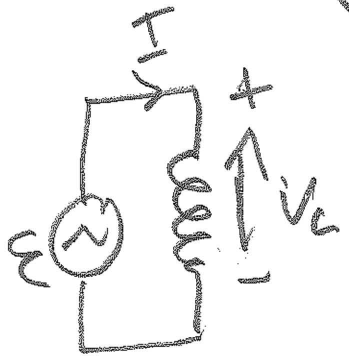


$\mathcal{E} = V_L = V\cos\omega t \Longleftrightarrow \sum \Delta V = 0$ (L2

$V\cos\omega t - V_L = 0$

$V_L = V\cos\omega t$





I LAGS V_L by $90^\circ = \frac{\pi}{2}$.

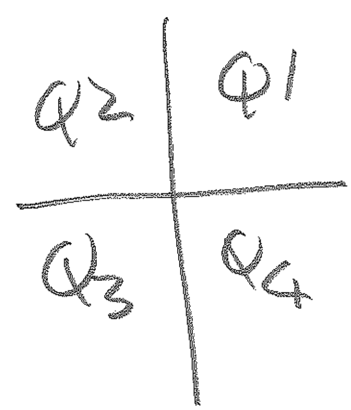
$I = I_m \sin\omega t$

$I = I_m = \frac{V}{\omega L}$

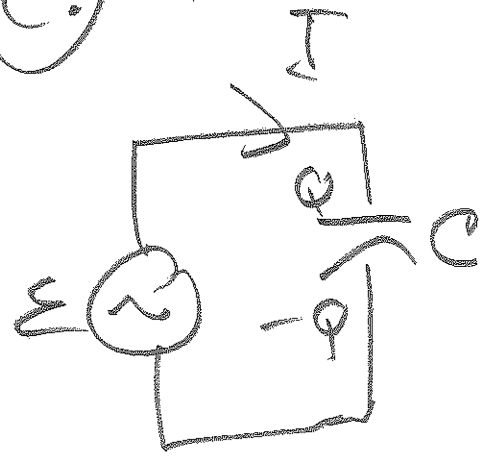
$I = I_m \sin\omega t$

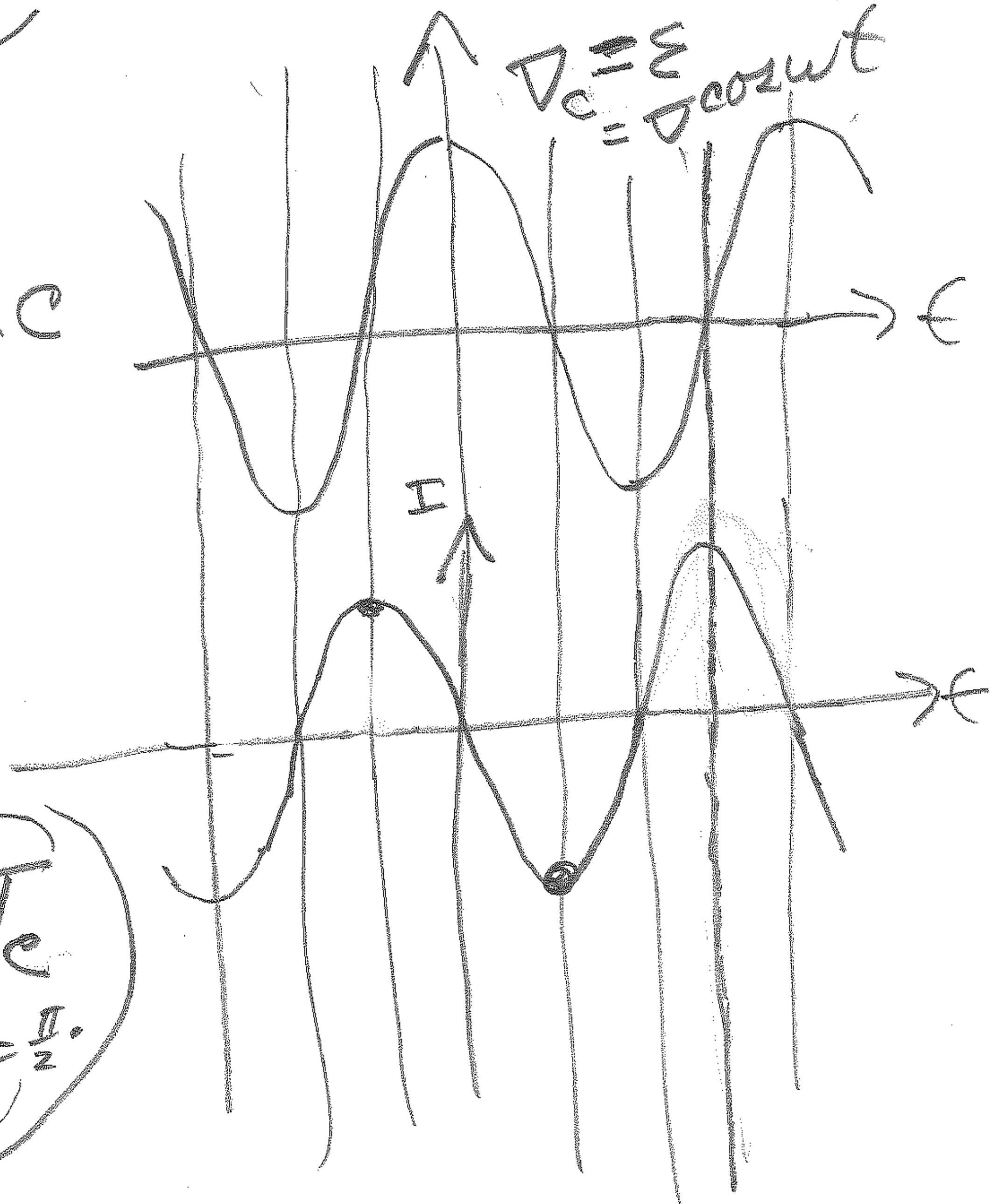
$= I_m \cos(\omega t - \frac{\pi}{2})$

I LAGS V_L



(C.) C-alone:





I leads V_C by $90° = \frac{\pi}{2}$.

$$I = I_m \cdot \sin\omega t$$

$$= I_m \cos\left(\omega t + \frac{\pi}{2}\right)$$

I leads V_C.

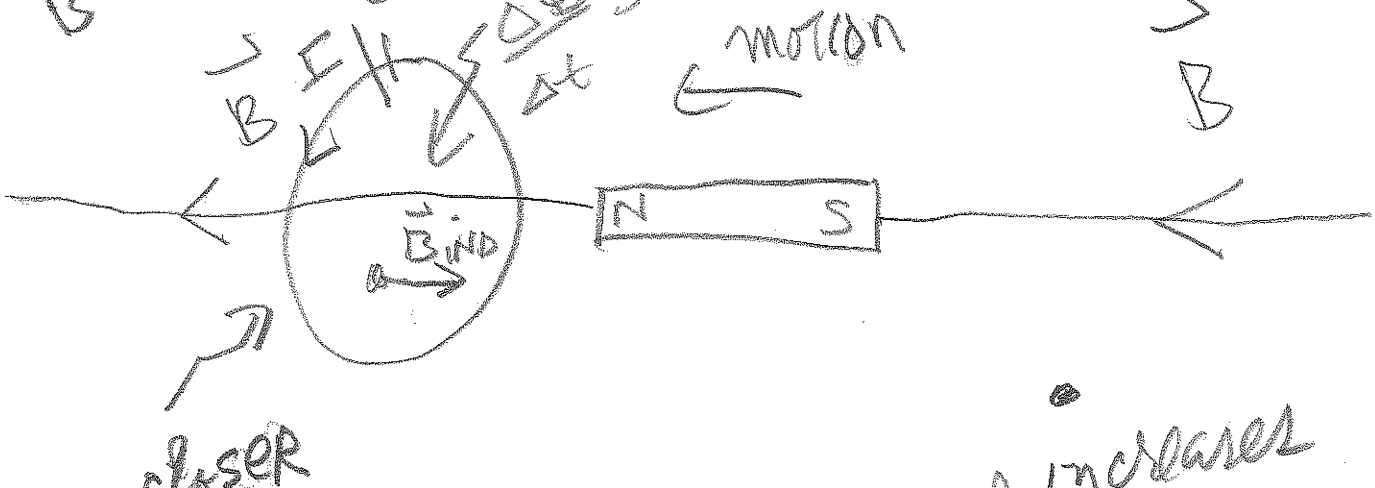
Ch29 Notes

[changing flux via changing $\vec{B}$ or changing area A.]

$$|\mathcal{E}| = \left|\frac{\Delta\Phi_B}{\Delta t}\right|$$

I. Changing $\vec{B}$:

$$\frac{\Delta\Phi}{\Delta t} = A\cdot\frac{\Delta B}{\Delta t}.$$

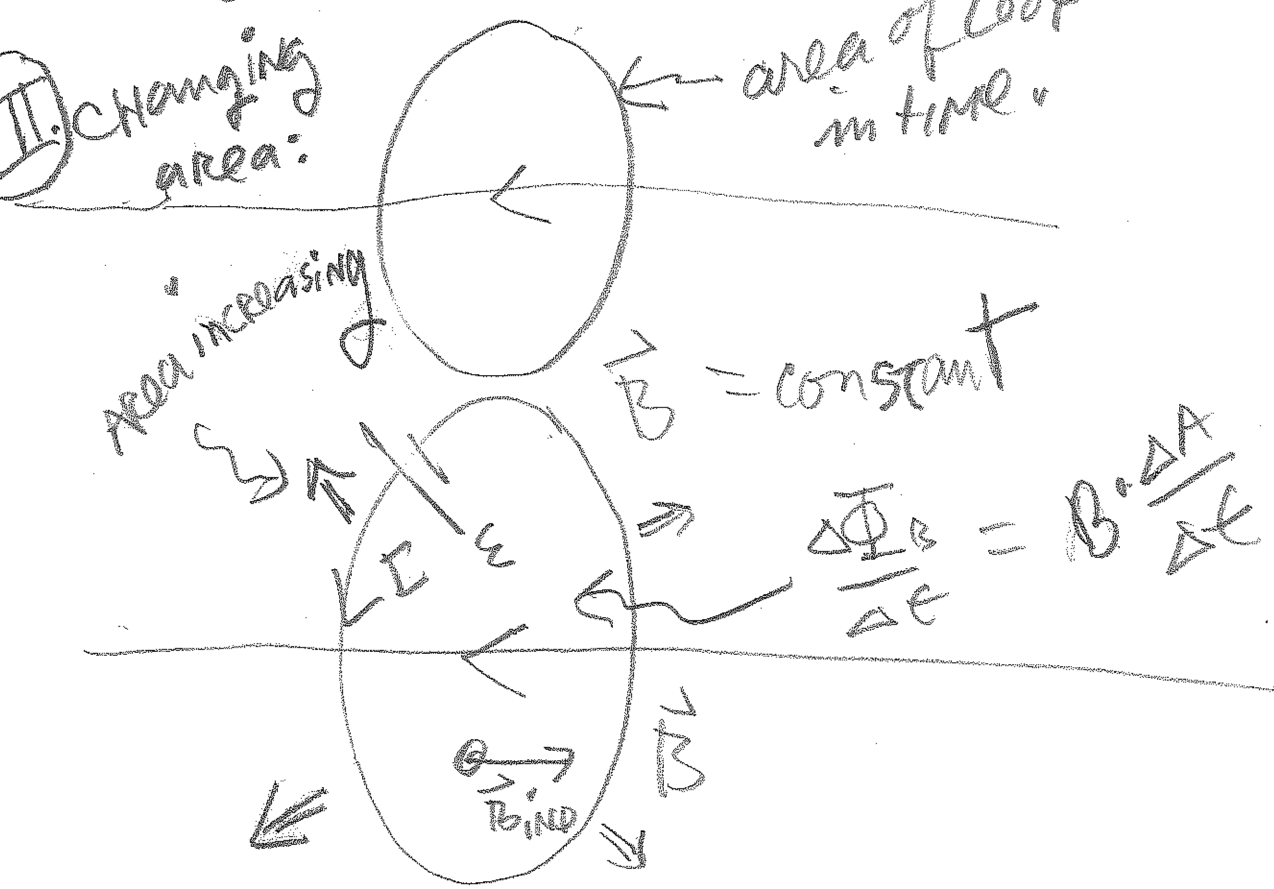


II. Changing area:

area of loop increases in time.

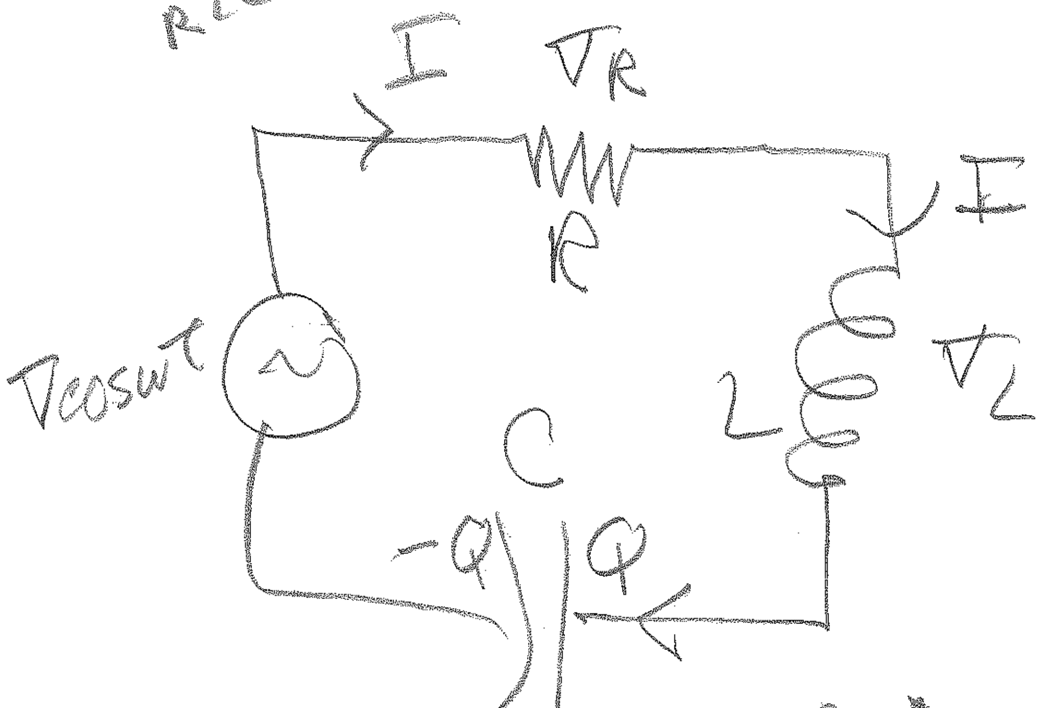
$\vec{B}$ = constant

$$\frac{\Delta\Phi_B}{\Delta t} = B\cdot\frac{\Delta A}{\Delta t}$$

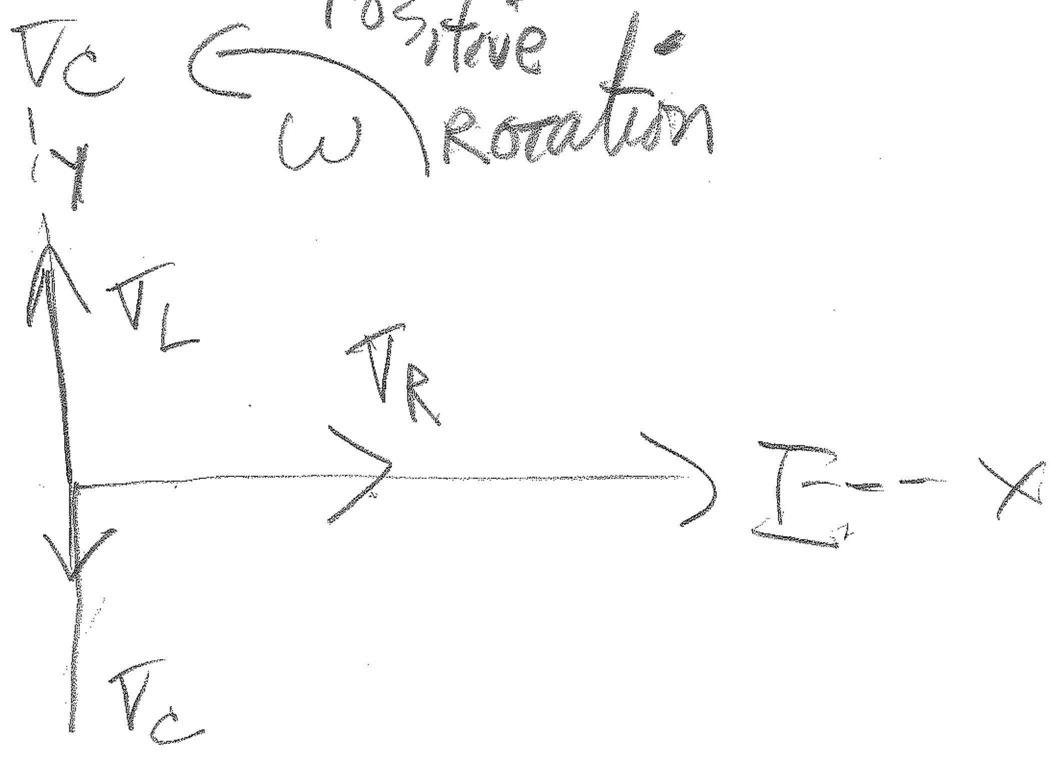


Finish ch 31, RLC circuits?

4-4-14

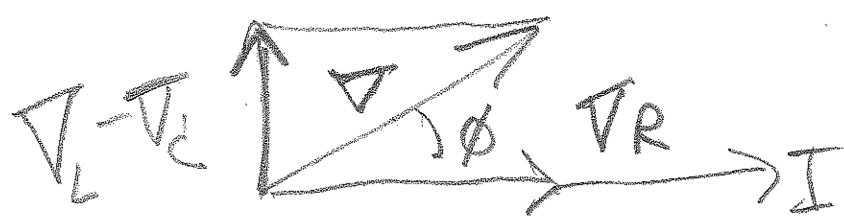


PHASOR Diagram



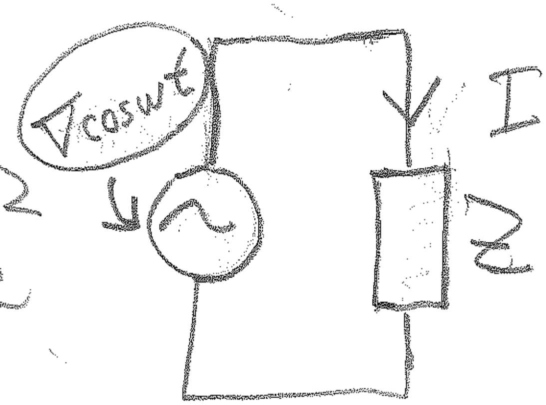
Ch 31

rewrite:



Pythagorean Theorem:

$$V^2 = (V_L - V_C)^2 + V_R^2$$



use:

$$I = \frac{V_L}{\omega L}$$

$$I = \frac{V_C}{(1/\omega C)}$$

$$I = \frac{V_R}{R}$$ ohm's LAW

$$(I\cdot Z)^2 = \left(I\cdot \omega L - I\cdot \frac{1}{\omega C}\right)^2 + I^2 R^2$$

$$Z = \sqrt{\left(\omega L - \frac{1}{\omega C}\right)^2 + R^2}$$

$$I = \frac{V}{Z} = \frac{V}{\sqrt{\left(\omega L - \frac{1}{\omega C}\right)^2 + R^2}}$$