

Announcements:

1. Final HW due Friday of 10th week
2. Professor Burke's office hours this week:
Tu 9:30-11:30 (EH 2230)
Th 9:30-11 (EG 2232)
Th 2-3:30 (EH 2230)
3. Exam will cover all of Ch. 9 (not delta-Y),
and part of Ch. 14 (14.1 14.2 14.3 14.5 14.6 14.7)

EECS 70A: Network Analysis

Lecture 15

Conversion procedures

$$\mathbf{i}(t) \rightarrow \mathbf{I}$$

$$i(t) = I_m \cos(\omega t + \phi) \Rightarrow \mathbf{I} = I_m e^{j\phi}$$

$$\mathbf{v}(t) \rightarrow \mathbf{V}$$

$$v(t) = V_m \cos(\omega t + \phi) \Rightarrow \mathbf{V} = V_m e^{j\phi}$$

$$\mathbf{I} \rightarrow \mathbf{i}(t)$$

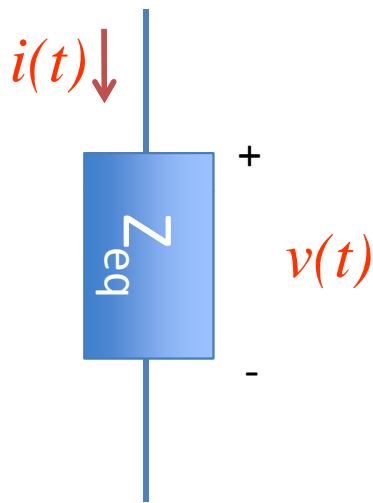
$$i(t) = \operatorname{Re}(\mathbf{I} e^{j\omega t})$$

$$\mathbf{V} \rightarrow \mathbf{v}(t)$$

$$v(t) = \operatorname{Re}(\mathbf{V} e^{j\omega t})$$

For the exam, you should know how to carry out these procedures.

Conversion procedures



Given $i(t)$ find $v(t)$:

$$i(t) \rightarrow \mathbf{I} \rightarrow \mathbf{V} = \mathbf{I} Z_{eq} \rightarrow v(t)$$

Given $v(t)$ find $i(t)$:

$$v(t) \rightarrow \mathbf{V} \rightarrow \mathbf{I} = \mathbf{V} / Z_{eq} \rightarrow i(t)$$

For the exam, you should know how to carry out these procedures.

Complex numbers

Euler's relationship:

$$e^{j\phi} = \cos \phi + j \sin \phi$$

Memorize

Need to be able to manipulate complex numbers, e.g. given:

$$u = \frac{A + jB}{C + jD} \quad (A, B, C, D \text{ all real})$$

- Find $\text{Re}(u)$, $\text{Im}(u)$
- Express u as $x + jy$, $re^{i\phi}$
- Find $\text{Re}(u e^{j\omega t})$

Did some of this in office hours..

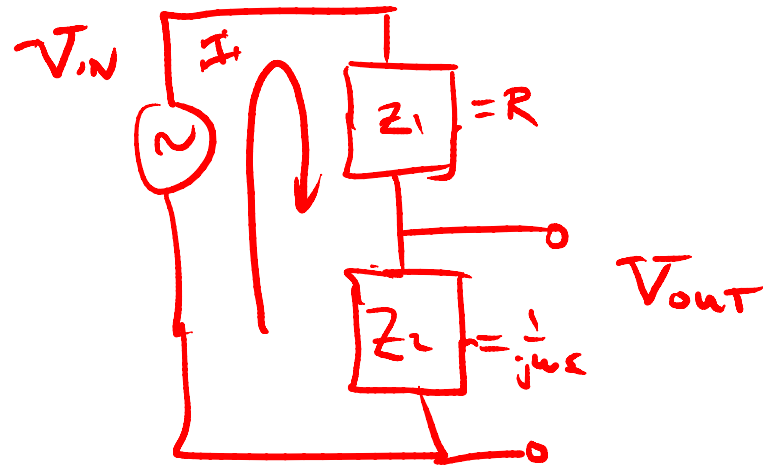
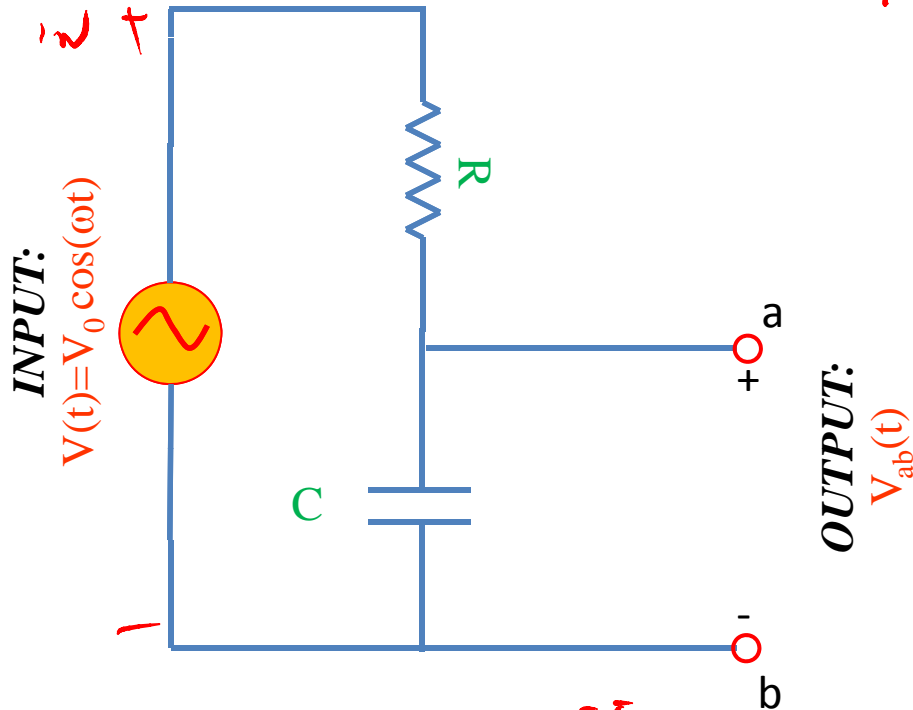
“Transfer Function”



Significance of $H(\omega)$

RC transfer function

FIND $H(\omega)$



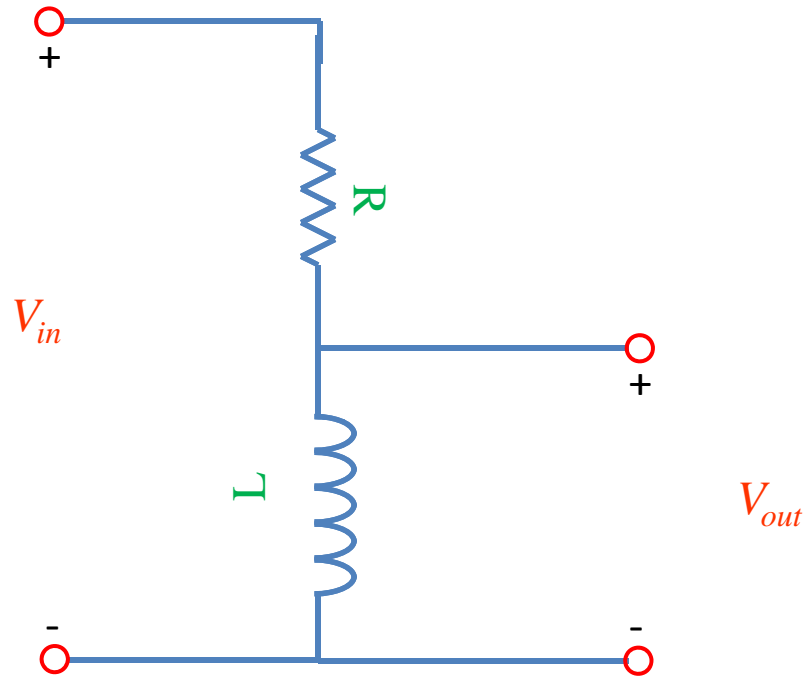
$$I = \frac{V_{IN}}{Z_1 + Z_2}$$

$$V_{OUT} = I Z_2 = \frac{V_{IN}}{Z_1 + Z_2} Z_2$$

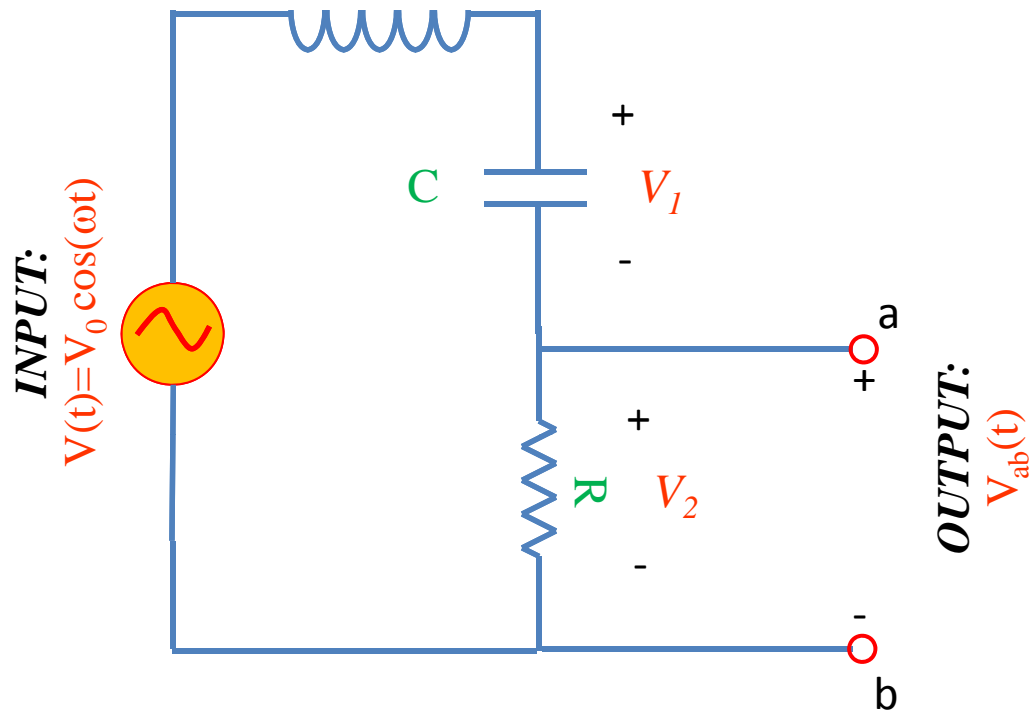
$$\Rightarrow \frac{V_{OUT}}{V_{IN}} = \frac{Z_2}{Z_1 + Z_2} = \frac{1}{1 + j\omega RC} = \underline{\underline{H(\omega)}}$$

Example problem

Find $H(\omega)$ for this circuit, then sketch the magnitude of $H(\omega)$ vs ω : (students)



Band pass filter (RLC)



*Goals rest of quarter:
Understand these knobs!*



<http://www.peachparts.com/shopforum/showthread.php?t=256624>