ECE 233 Fall 2014 Lec. #23

Announcements

1. MATLAB & Quiz on this Friday from 9:30 to 10:45
2. Retaking Exam 2 " " " " 19:30 to 20:45
3. Midterm 3 " " " 21:00 — 24:00

Review

log-log plot

log-magnitude

all-pass system

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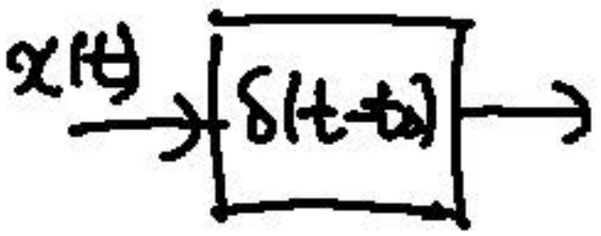
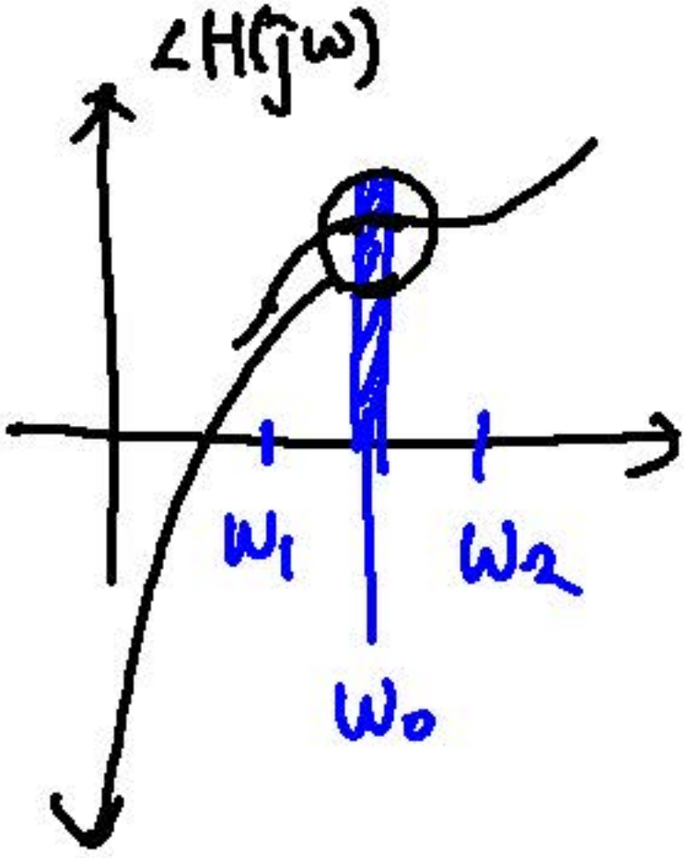
Simplify!



$\Rightarrow H(j\omega) = e^{-j\omega t_0}$

$$\angle H(j\omega) = -\omega t_0$$

$$-\frac{d\angle H(j\omega)}{d\omega} = +t_0$$



$$Y(j\omega) = H(j\omega)\,X(j\omega)$$

$$|Y(j\omega)|\,e^{j\angle Y(j\omega)} = \dots$$

$$\angle Y(j\omega) = \angle H(j\omega) + \angle X(j\omega)$$

$$\angle H(j\omega) \cong \angle H(j\omega_0) + \left.\frac{d\angle H(j\omega)}{d\omega}\right|_{\omega=\omega_0} (\omega-\omega_0)$$

$$\angle Y(j\omega) \cong \angle X(j\omega) + \angle H(j\omega_0) + \left.\frac{d\angle H(j\omega)}{d\omega}\right|_{\omega=\omega_0} (\omega-\omega_0)$$

$$|Y(j\omega)| \cong |H(j\omega_0)|\,|X(j\omega)|$$

$$Y(j\omega) = |Y(j\omega)|\, e^{j\angle Y(j\omega)}$$

$$\approx |H(j\omega_0)|\,|X(j\omega)|\, e^{j\left(\angle X(j\omega) + \angle H(j\omega_0) + \left.\frac{d\angle H(j\omega)}{d\omega}\right|_{\omega=\omega_0}(\omega-\omega_0)\right)}$$

$$= \underbrace{|H(j\omega_0)|\, e^{j\left(\angle H(j\omega_0) + \left.\frac{d\angle H(j\omega)}{d\omega}\right|_{\omega=\omega_0}\cdot(-\omega_0)\right)}}_{\text{1/a } C \in \mathbb{C}} \; X(j\omega)\, e^{j\left.\frac{d\angle H(j\omega)}{d\omega}\right|_{\omega=\omega_0}\omega}$$

$$y(t) \approx C\; x\left(t - \underbrace{\left(-\left.\frac{d\angle H(j\omega)}{d\omega}\right|_{\omega=\omega_0}\right)}\right)$$

lumped circuit
distributed

Q1.

Q2 $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$