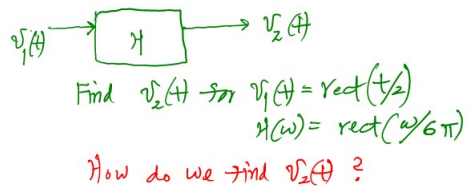


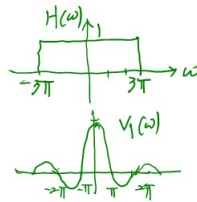
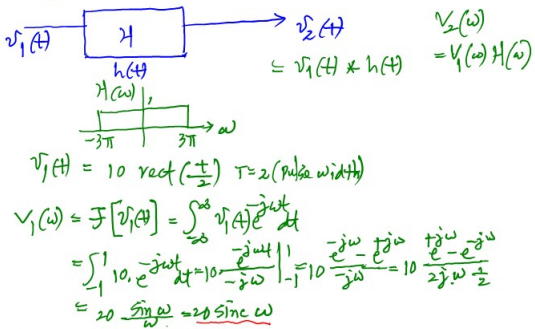
ECE 103 Fall 2018 Lecture 16 Nov 5, 2018

Quiz 4 Average = 6.71 (of papers)  
= 2.13

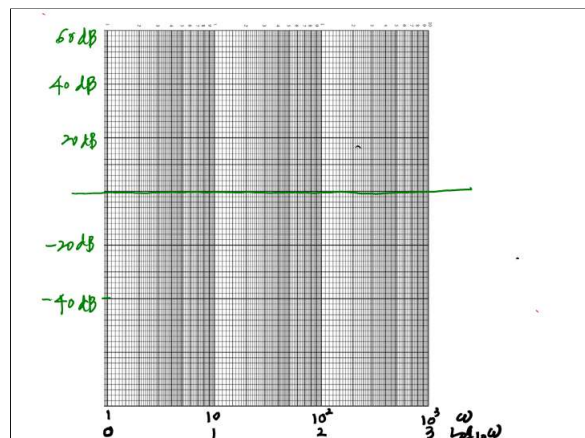
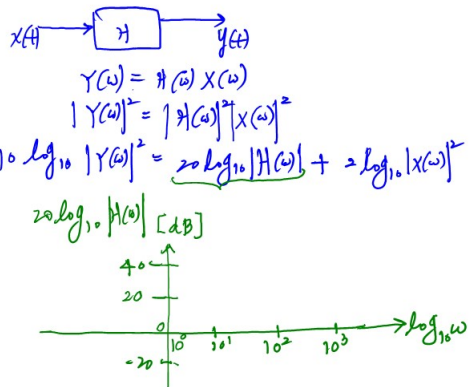
HW # 6 assigned today  
Quiz 5 Today



Prob 5.26



$y(t) = \frac{1}{2\pi} \int H(\omega) V_1(\omega) d\omega =$



(e.g.)

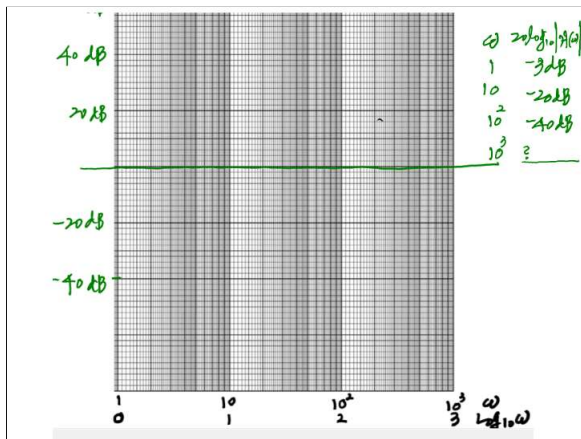
$$H(\omega) = \frac{R}{j\omega C + R} = \frac{1}{1 + j\omega RC}$$

$$RC = (10 \times 10^3)(0.1 \times 10^{-6}) = 10^2 \cdot 10^{-7} = 10^{-5} = 1$$

$$H(\omega) = \frac{1}{1 + j\omega \cdot 1}$$

$$|H(\omega)| = \frac{1}{\sqrt{1 + \omega^2}}$$

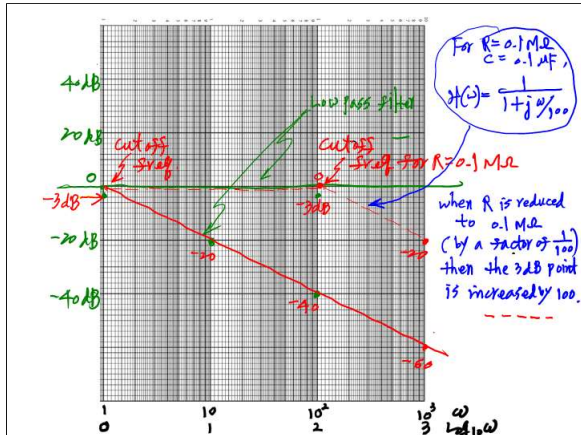
- $\omega = 1 \rightarrow \frac{1}{\sqrt{2}} \rightarrow 20 \log_2 2^{-\frac{1}{2}} = -10 \log_2 2 = -3 \text{ dB}$
- $\omega = 10 \rightarrow \frac{1}{10} \rightarrow 20 \log_{10} 10^{-1} = -20 \text{ dB}$
- $\omega = 10^2 \rightarrow \frac{1}{10^2} \rightarrow 20 \log_{10} 10^{-2} = -40 \text{ dB}$



$R = 1\text{M} \rightarrow 0.1\text{M}$   
 $RC = 0.1\text{M} \times 0.1\mu\text{F} = 0.01$   
 $\omega RC = \frac{\omega}{100}$

$$H(\omega) = \frac{1}{1 + j\omega/100}$$

$\omega = 1 \rightarrow 0 \text{ dB}$   
 $\omega = 10 \rightarrow -20 \text{ dB}$   
 $\omega = 10^2 \rightarrow -40 \text{ dB}$



In general

$$H(\omega) = K \frac{(1 + \frac{\omega}{\omega_{z1}})(1 + \frac{\omega}{\omega_{z2}}) \dots (1 + \frac{\omega}{\omega_{zn}})}{(1 + \frac{\omega}{\omega_{p1}})(1 + \frac{\omega}{\omega_{p2}}) \dots (1 + \frac{\omega}{\omega_{pn}})}$$

$$20 \log_{10} |H(\omega)| = 20 \log_{10} |K| + \sum_{j=1}^m 20 \log_{10} |1 + \frac{\omega}{\omega_{zj}}| - \sum_{k=1}^n 20 \log_{10} |1 + \frac{\omega}{\omega_{pk}}|$$

Example

$$H(\omega) = 100 \frac{(1 + \frac{\omega}{100})}{(1 + \frac{\omega}{10})(1 + \frac{\omega}{1000})}$$

$$20 \log_{10} |H(\omega)| = 20 \log_{10} 100 + 20 \log_{10} |1 + \frac{\omega}{100}| - 20 \log_{10} |1 + \frac{\omega}{10}| - 20 \log_{10} |1 + \frac{\omega}{1000}|$$

$H(\omega) = 100 \times \frac{(1 + \frac{\omega}{100})}{(1 + \frac{\omega}{10})(1 + \frac{\omega}{1000})}$