EECS 16B
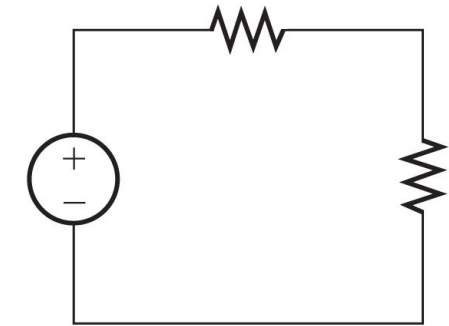# Designing Information Devices and Systems II
Lecture 7

Prof. Sayeef Salahuddin

Department of Electrical Engineering and Computer Sciences, UC Berkeley,
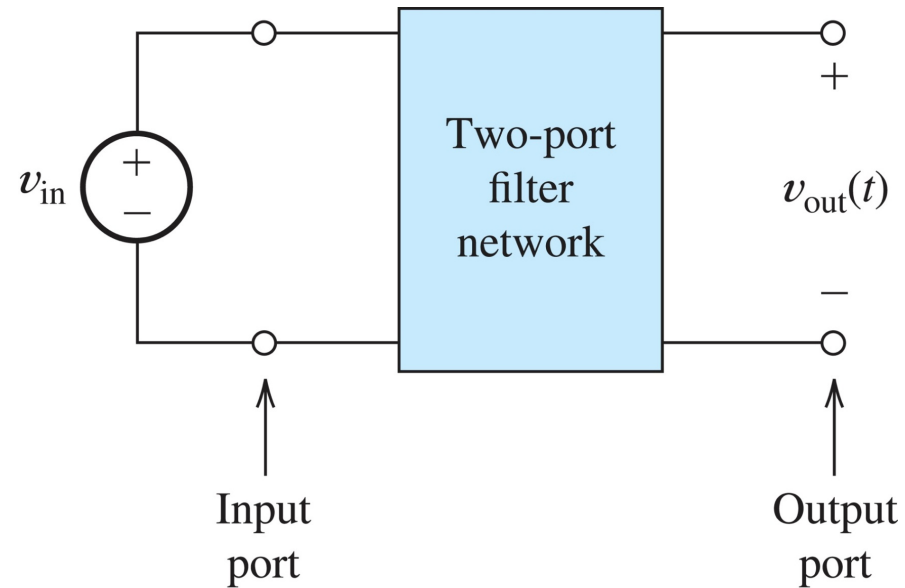
sayeef@eecs.berkeley.edu

Transient Response

- Outline
  - Power in the AC circuits
  - Transfer Function and Filters

- Reading- Hambley text sections 5.6, 6.1, 6.2, 6.3 slides
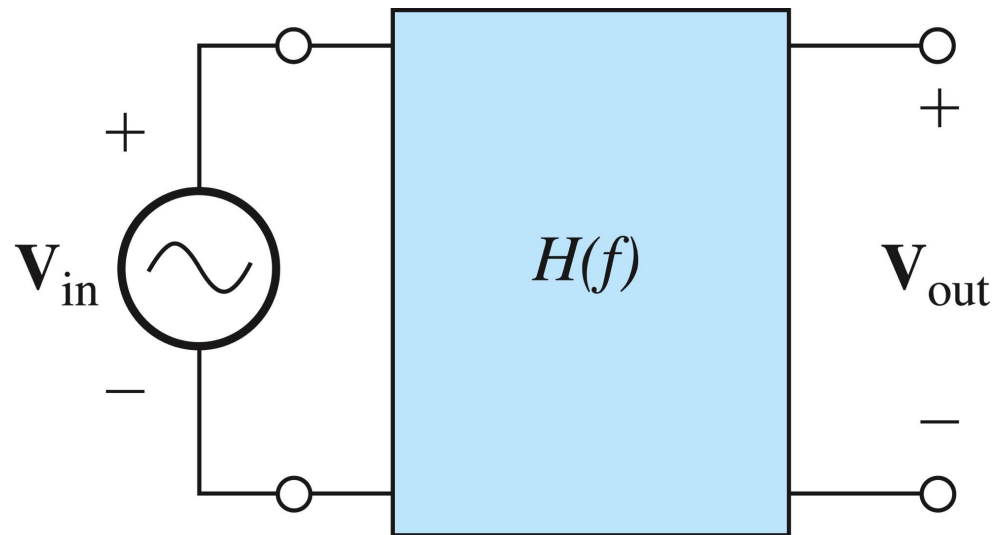
Maximum Power Transfer

Concept of Transfer Function

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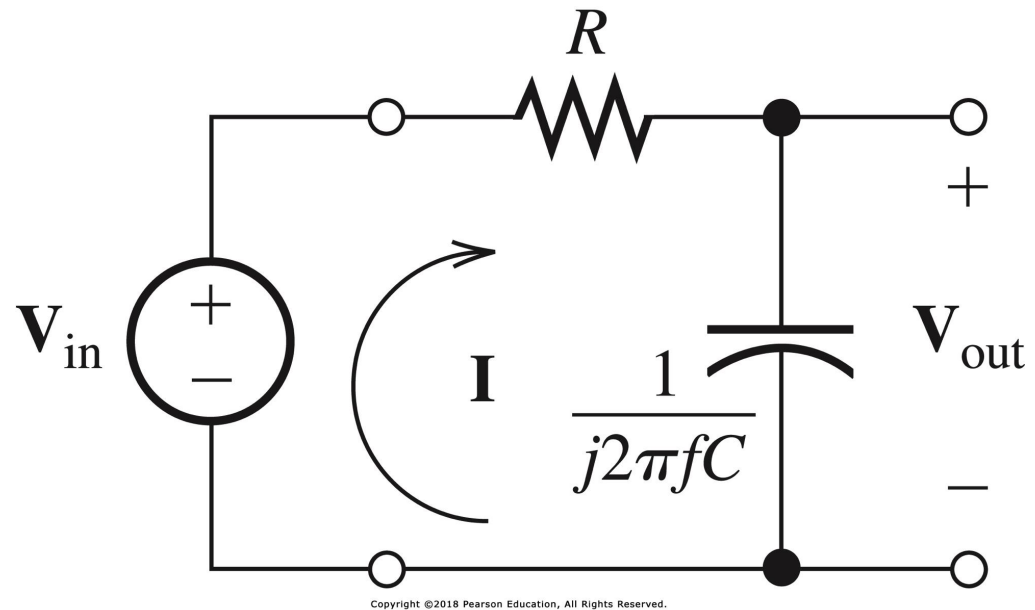Two port Filter Network or more generally Two port network
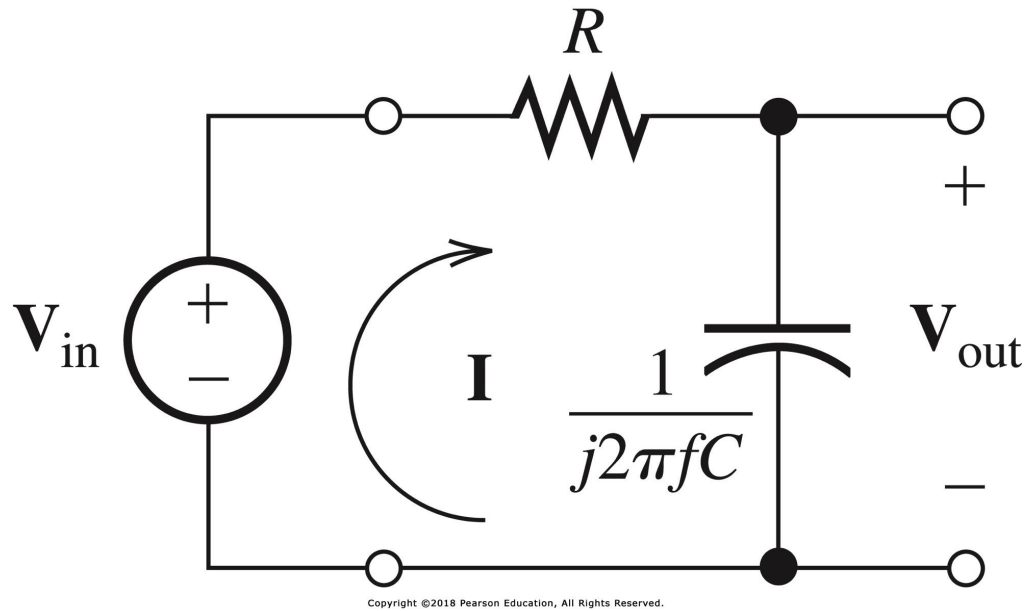
Concept of Transfer Function

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$$H(f) = \frac{V_{out}}{V_{in}}$$

$H(f)$ is a complex number

A simple RC Circuit

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A simple RC Circuit

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First Order low pass filter
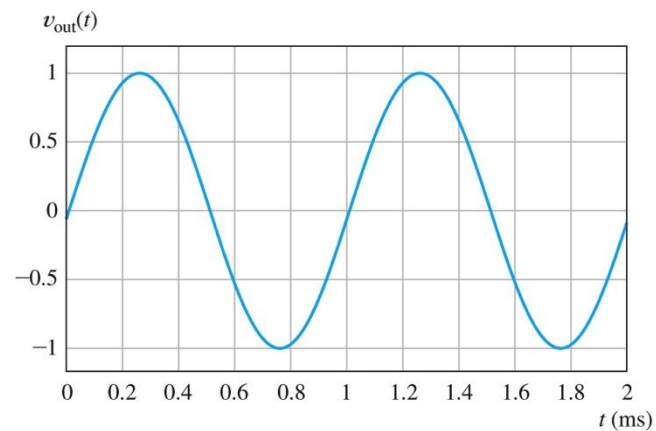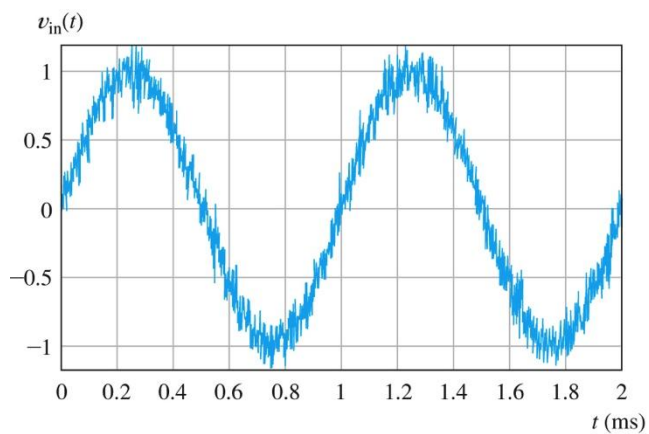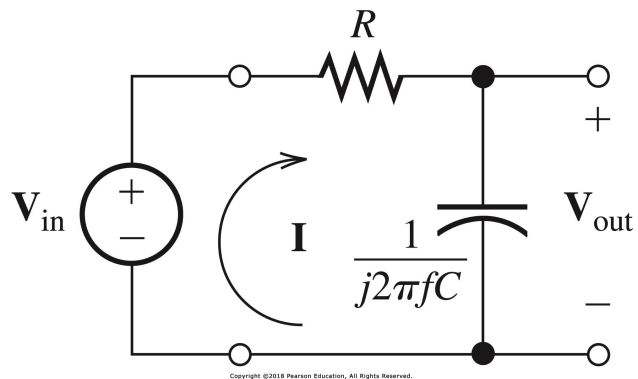
Decibels

Decibel:

$$|H(f)|_{dB} = 20\log_{10}|H(f)|$$

Table 6.2 Transfer-Function Magnitudes and Their Decibel Equivalents

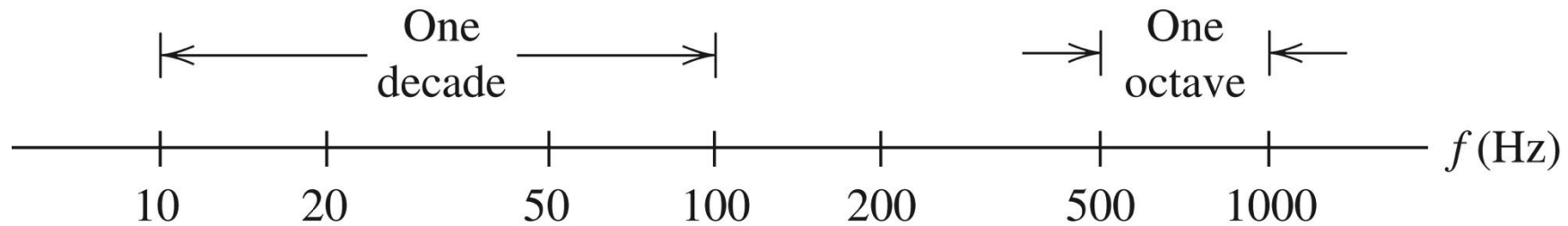| $\left|H(f)\right|$	$\left|H(f)\right|_{dB}$
100	40
10	20
2	6
$\sqrt{2}$	3
1	0
$1/\sqrt{2}$	-3
1/2	-6
0.1	-20
0.01	-40

Cascaded Networks
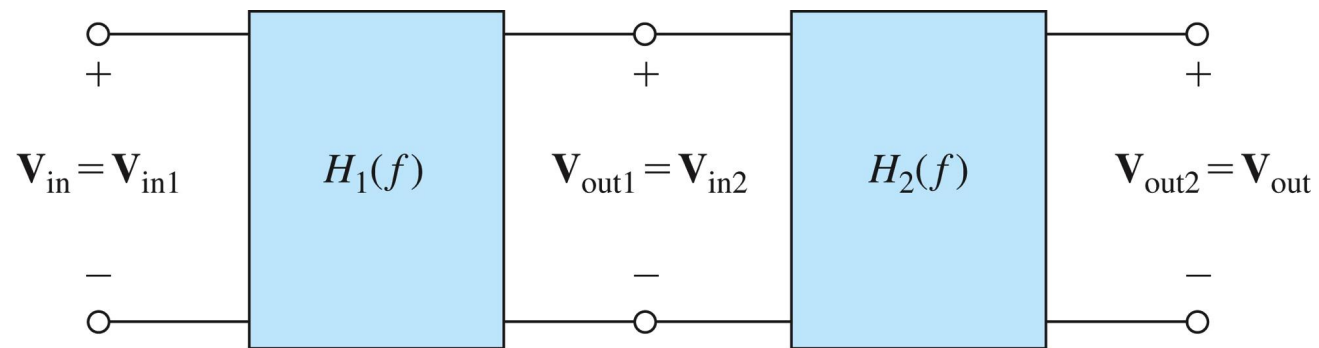
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Logarithmic Frequency Scales

- A **decade** is a range of frequencies for which the ratio of the highest frequency to the lowest is **10**

- An **Octave** is a range of frequencies for which the ratio of the highest frequency to the lowest is **2**
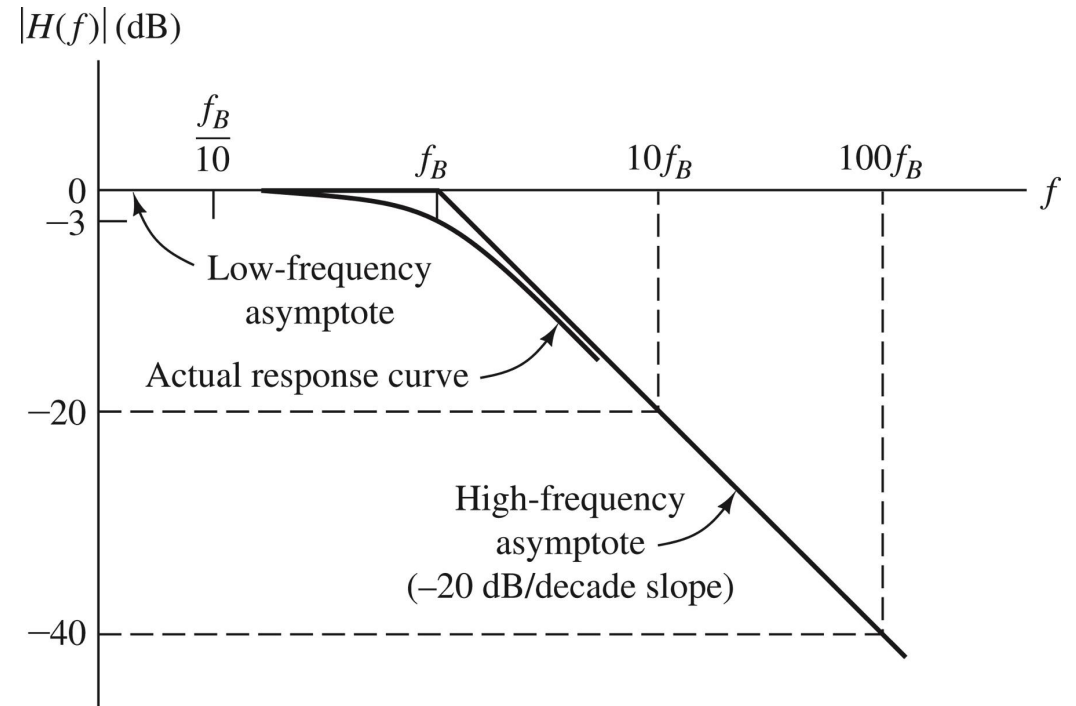

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Logarithmic Frequency Scales

Bode Plots

A **Bode** plot is a plot of the decibel magnitude of a newtwork function versus log-scale frequency

Bode Plots

Phase Plot