Lecture 1

ECES 301 - Chapter 1

- If a function is finite to infinite, it has finite area under the curve
- If a function is infinite to infinite, it has infinite area under the curve
- Consult lecture notes in this folder
- Can you be a power signal and an energy signal? It needs to be finite in energy and power. Yes, you can. A square pulse is a good example of this.
- If a signal is periodic, can it be an energy signal, no it cannot. It can only be a power signal.
- KNOW TIME SHIFTING
- The sum of periodic signals will always be a periodic signal with a period that can be the same as the longest period or the least common multiple

Lecture 2

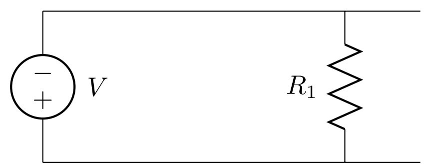
- Consult Chapter 1 notes starting at page 58

Exponential Signals

- Euler's conclusion $e^{j\theta} = \cos(\theta) + j\sin(\theta)$
- $Ae^{j\theta} \to A\angle\theta$
- think if t as continuous and n as discrete when looking at functions for this class
- The delta function (unit step function) δ is where the function is 0 everywhere but one place
- It is important to realize that at 0, the unit step function is undefined
- We define the approximation of the delta function as the derivative of the unit step function
- As the function approaches zero, the area under it's curve is 1
- The delta function is actually called a functional, not a function
- Know the properties of the delta function
- The ramp function is just the unit step function times t

Properties of Systems

- Imagine:



- This perfectly resistive circuit is memoryless

Non-Invertible System

- An example of this is $\sqrt{x}$, this can go in one value and get an output, but the output cannot go back
- The value is positive or negative on output so it cannot go in the output and come out as it was

Causal Systems

- Causal if and only if the system uses only past and present values of the input signal

Non-Causal Systems

- Can use future values

Anti-Causal

- Uses only future values

Time-Invariance

- It doesn't matter when the signal starts, if delays in input cause delays in output
- There are easy ways to test for this, see diagram in Chapter 1.pdf
- Look over testing examples for time-invariance and linear testing examples

Various Tests

- We want linear systems because it allows us to break up signals (periodic) to individual components, put them through a system, and add it up

Purpose of this class

- Decomposing a singal
- Look at examples

QUIZ:

- Explain what linear and time invariant mean
- Look over testing examples for time-invariance and linear testing examples