

EE313 Lecture 7

Joshua Dong

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1. Midterm October 1 (chapter 1, 2)
2. Homework 3 from 2.1

0.1 Recap

Last time proved LTI property: convolution on $h[n - k]$
 $h[n - k] \rightarrow$ know if LTI.

0.2 Convolutions

New operator: $x[n] * h[n] = \sum_{k=-\infty}^{\infty} x[k] \cdot h[n - k]$

Note: convolution is commutative.

Example:

An LTI system has impulse response $h[n] = \delta[n] + \delta[n - 1]$. Find the response to the input $x_1[n] = \delta[n]$.

Impulse response

output $y[n] = h[n] = \delta[n] + \delta[n + 1]$ by definition of impulse response.

$y[n] = \sum_{k=-\infty}^{\infty} x[k] \cdot h[n - k] = x[0] \cdot h[n - 0]$. (See image, $x[n]$ is zero everywhere but when $n = 0$)

Example2:

Find the response to the input $x_2[n] = \delta[n - 2]$.

Example3:

An LTI system has an impulse response $h[n] = \delta[0] + \delta[1] + \delta[2]$

Find output when $x[n] = 0.5\delta[0] + 2\delta[1]$.