Lecture 7 Discrete-Time Systems

The University of Texas at Austin
EE 313 Linear Systems and Signals
Prof. Brian L. Evans Fall 2018
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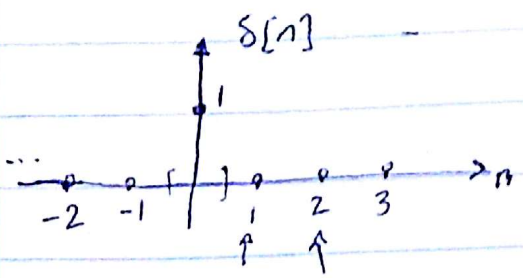
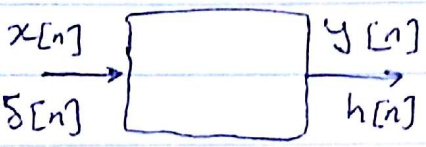


(T_s) $(2T_s)$ → in continuous time

A discrete-time impulse models an "instantaneous" event .

$$x[n] = x(t)\Big|_{t = nT_s}$$

The "instantaneous" event occurs at the origin in discrete time (n=0), or equivalently between -Ts/2 and Ts/2
in continuous time and captured via sampling



A discrete-time impulse is called a Kronecker delta which helps
explain why it is denoted as delta[n].

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Response (output) of a system to an impulse (input) is called the impulse response, denoted here as h[n].

Finite Impulse Response [FIR] filter

number of coefficients = M+1

A Finite Impulse Response filter has an impulse response that is of finite duration/length.

→ Averaging filter $b_k = \frac{1}{M+1}$

where $y[n] = \sum_{k=0}^{M} b_k x[n-k]$

for a discrete-time signal → $\omega_s = 2\pi \frac{N}{L}$ → L is discrete-time period