EE313 Lecture 8

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Midterm 1 no continuous time convolution

0.1 Ch2

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

Continuous Time Convolution $t \leftarrow n, \tau \leftarrow k, \int \leftarrow \sum$
$\int_{\tau=-\infty}^{\infty} x[\tau] \cdot h[t-\tau]$

0.2 LTI

LTI system are compelety characterized by their impulse response. Thus, you can find the output to any input if you know the impulse response. (This is not true if the system is not LTI.)

Example Consider a discrete time system that has the following proprty:
$\delta[n] \xrightarrow{S} Bob[n] = \begin{cases} 0 & n \in \{0,1\} \\ 0 & otherwise \end{cases}$

Is the system LTI? not enough information. If LTI:

1. Find the description equation y[n] = f(x[n]) LTI uniqueness property, start guessing.
   Try: $y[n] = x[n] + x[n+1]$
   Then $y[-5] = 0, y[-1] = 1, y[0] = 1, y[1] = 0$.

   Try: $y[n] = x[n] + x[n-1]$
   Then $y[-1] = 0, y[0] = 1, y[1] = 1, y[2] = 0$.
   This is the correct output.

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