Convolution Sum Properties

Causal LTI Systems

\[ y[n] = \sum_{k = -\infty}^{\infty} x[k]h[n-k] = \sum_{k = -\infty}^{\infty} x[n-k]h[k] \quad (1) \]

- From the above we see that for a causal system we must have \( h[n-k] = 0 \) for \( k > n \) or \( h[n] = 0 \) for \( n < 0 \)
Causal Systems and Signals

- Suppose both $x[n]$ and $h[n]$ are causal (sequence and system respectively)

\[ y[n] = \begin{cases} 0, & n < 0 \text{ and } y[n] = \sum_{k=0}^{n} x[k]h[n-k], & n \geq 0 \end{cases} \]