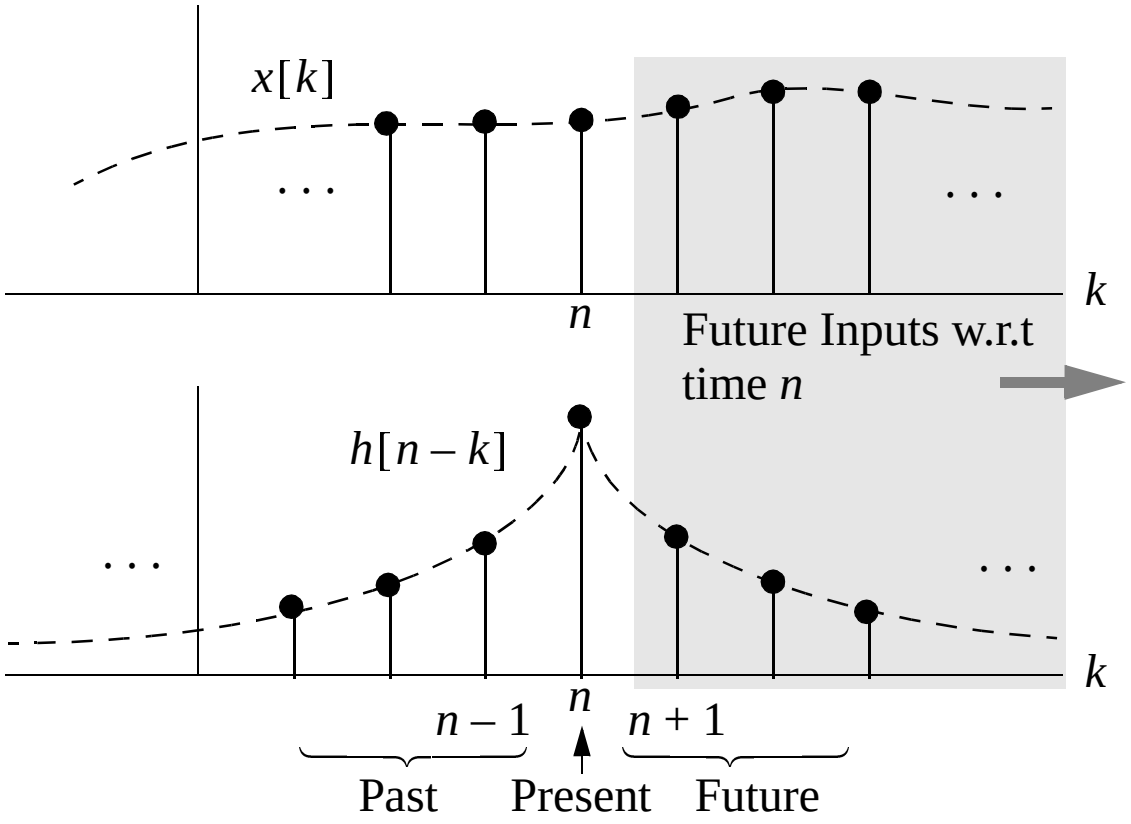
Convolution Sum Properties

Causal LTI Systems

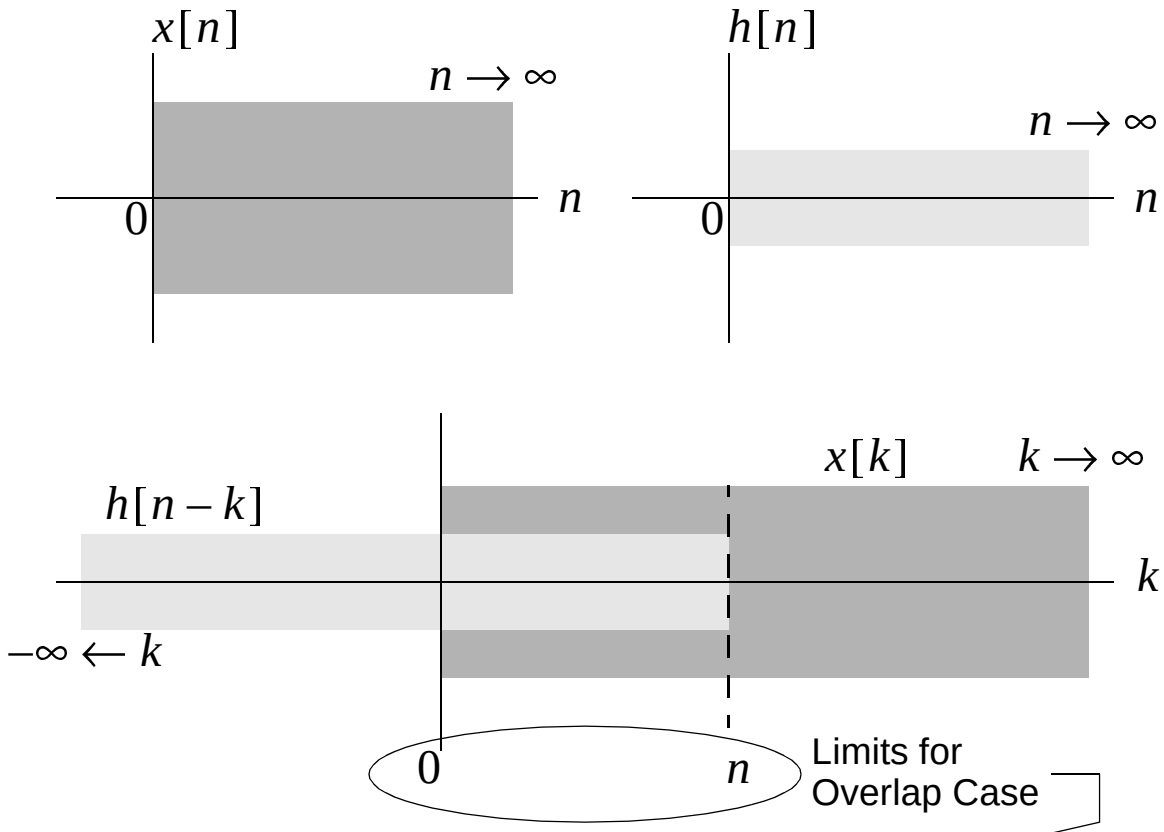
$$y[n] = \sum_{k=-\infty}^{\infty} x[k]h[n-k] = \sum_{k=-\infty}^{\infty} x[n-k]h[k] \qquad (1)$$



- 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)



$$y[n] = 0, n < 0 \text{ and } \quad y[n] = \sum_{k=0}^{n} x[k]h[n-k], n \geq 0$$