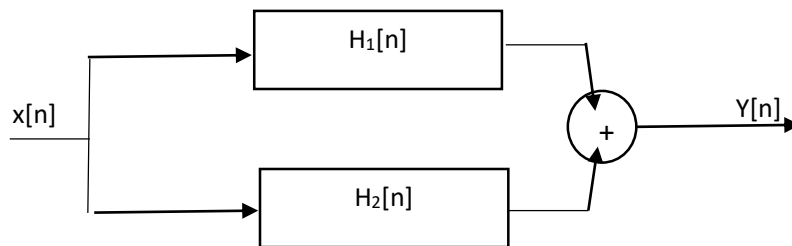


Properties of LTI System:

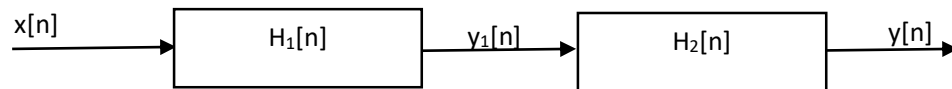
1. All LTI systems are convolution system.
 $y[n] = x[n] * h[n]$
2. Commutative
 $x[n] * y[n] = y[n] * x[n]$
3. Distributive
 $x[n] * \{h_1[n] + h_2[n]\} = x[n] * h_1[n] + x[n] * h_2[n]$

The distributive property has implication for LTI system connected in parallel



4. Associative
 $x[n] * (h_1[n] * h_2[n]) = \{x[n] * h_1[n]\} * h_2[n]$

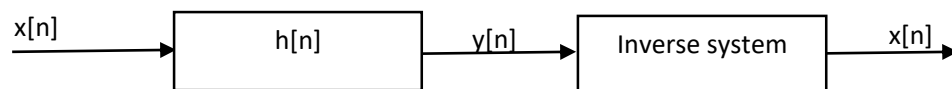
The associative property has implication for LTI system connected in cascade



5. Memory less

$$Y[n] = \sum_{k=-\infty}^{\infty} x[k]h[n-k] = \sum_{k=-\infty}^{\infty} x[n-k]h[k]$$

6. Invertibility



7. Casuality

$$Y[n] = \sum_{k=-\infty}^{\infty} x[k]h[n-k] = \sum_{k=-\infty}^{\infty} x[n-k]h[k]$$

The LTI system is casual if and only if its impulse response $h[n]$ is zero for all $n < 0$

8. Stability

$$Y[n] = \sum_{k=-\infty}^{\infty} x[k]h[n-k]$$

A LTI system is stable if and only if $\sum_{k=-\infty}^{\infty} |h[k]| < \infty$