$$y[n] = x[n] * h[n]$$

$$y[n] = \sum_{m=-\infty}^{\infty} h[m]\, x[n-m]$$

Derivation of

$$\sum_{n=-\infty}^{\infty} |h[n]| < \infty$$

condition

$$|y[n]| = \left| \sum_{m=-\infty}^{\infty} h[m]\, x[n-m] \right|$$

$$\leq \sum_{m=-\infty}^{\infty} |h[m]\, x[n-m]|$$

$$= \sum_{m=-\infty}^{\infty} |h[m]|\, |x[n-m]|$$

Since $|x[n]| \leq B_1$

$$|y[n]| \leq B_1 \sum_{m=-\infty}^{\infty} |h[m]|$$

EE 445S
Real-Time DSP Lab
Prof. Brian L. Evans
The Univ. of Texas at Austin
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Bounded-Input Bounded-Output Stability of a Linear Time-Invariant System. Let input $|x[n]| \leq B_1$ for all n.

Special case: FIR Filter that has M coefficients.

$$\sum_{m=-\infty}^{\infty} |h[m]| = \sum_{m=0}^{M-1} |h[n]| < \infty$$

provided $|h[m]| < \infty$ for all m