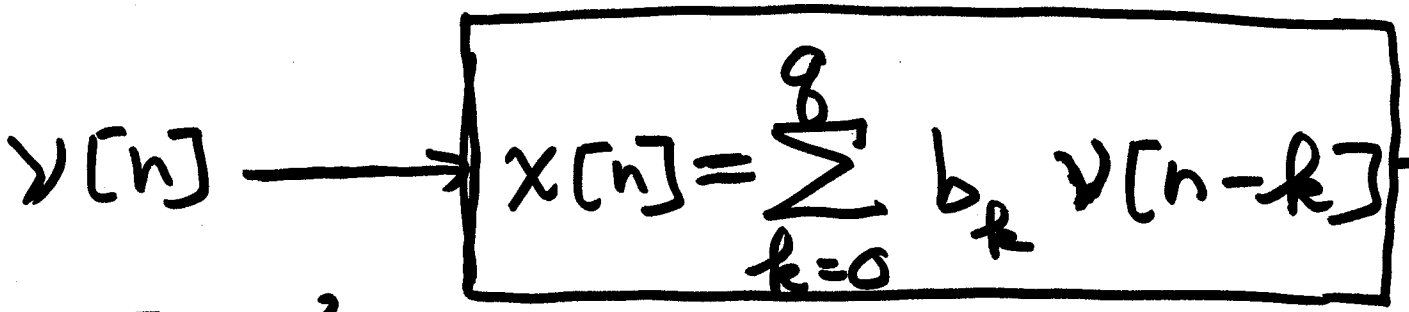
MA(q): Moving Average process of order q

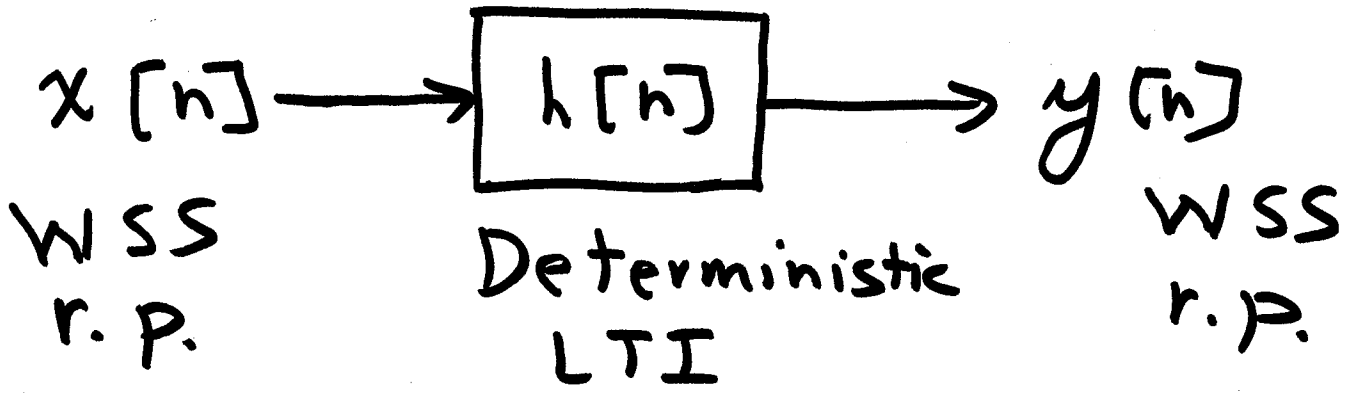
- white noise passing thru an all-zero filter $\Rightarrow q$ zeroes



$$r_{vv}[m] = \sigma_w^2 \delta[m]$$

$$= E\{v[n]\, v^*[n-m]\}$$

Side note:



$$S_{yy}(\omega) = |H(\omega)|^2 \, S_{xx}(\omega)$$

- Inverse Fourier Transforming:

$$r_{yy}[m] = r_{hh}[m] * r_{xx}[m]$$

$$\Updownarrow \qquad \Updownarrow \qquad \Updownarrow$$

$$E\{y[n]y^*[n-m]\} \qquad h[m]*h^*[-m] \qquad E\{x[n]x^*[n-m]\}$$

Second side-note: all-zero (FIR) filter

$$y[n] = \sum_{k=0}^{M} b_k \, x[n-k]$$

$$h[n] = \sum_{k=0}^{M} b_k \, \delta[n-k]$$

$$= \{b_0, b_1, \ldots, b_M\}$$

↑

"length" = M+1

$$r_{hh}[m] = h[m] * h[-m]$$

"length" = 2(M+1)-1 = 2M+1

$\neq 0$ for $|m| \leq M$

$= 0$ for $|m| > M$

THUS: for MA(q) process:

(recall: output is $x[n]$
$\Rightarrow$ input is $v[n]$)

$r_{xx}[m] = 0$ for $|m| > q$