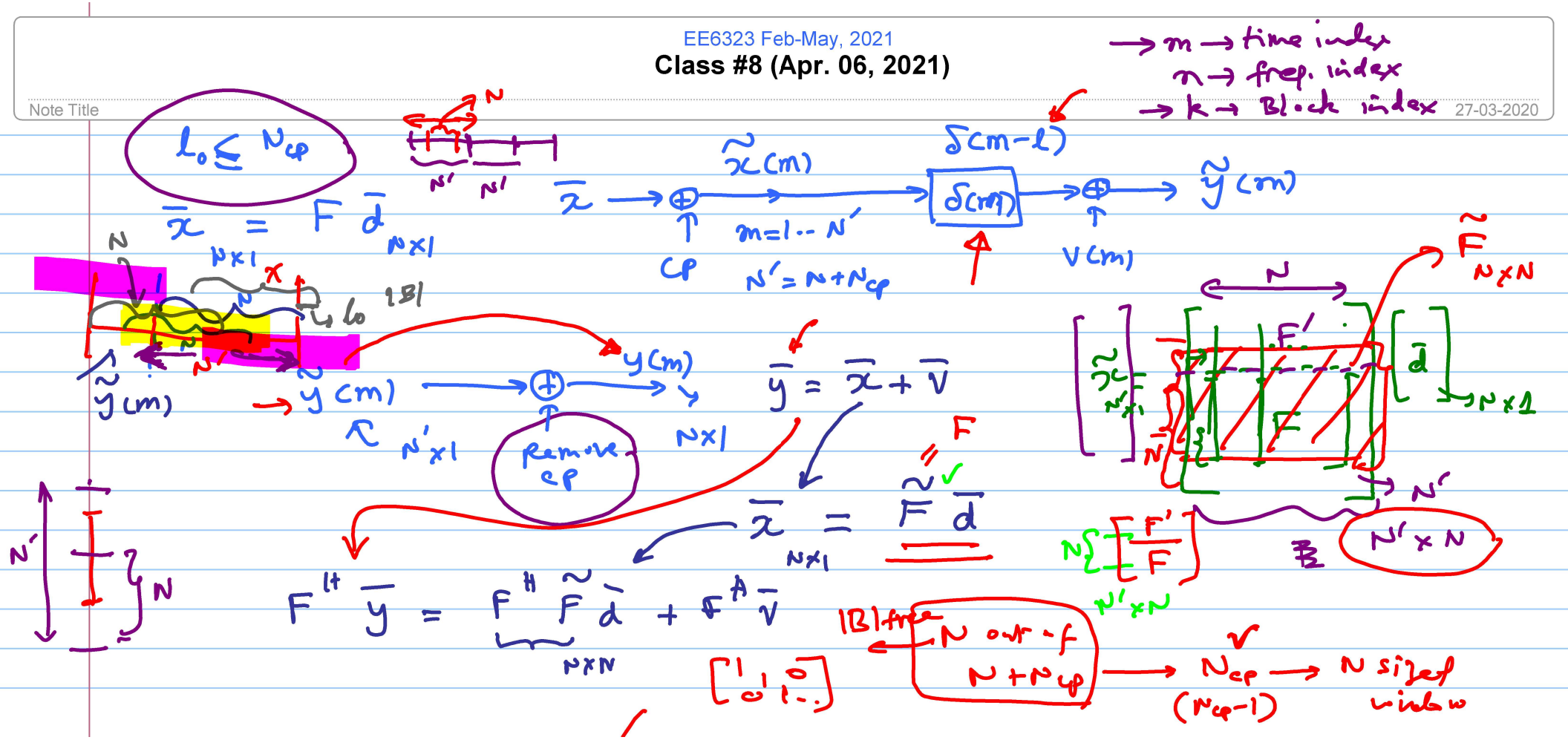
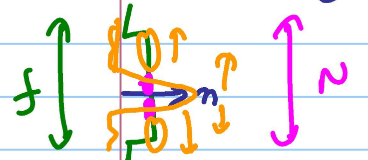
EE6323 Feb-May, 2021

Class #8 (Apr. 06, 2021)

Note Title 27-03-2020



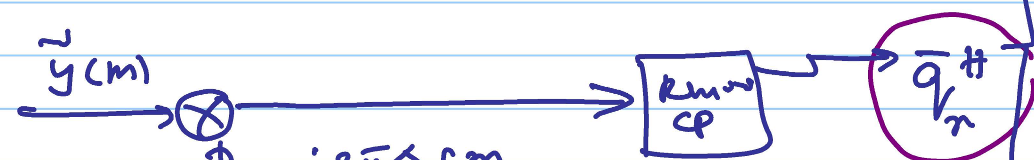


$$F^H \bar{y} = \begin{bmatrix} e^{-j\frac{2\pi}{N}0\cdot l_0} & & & 0 \\ & e^{-j\frac{2\pi}{N}1\cdot l_0} & & \\ 0 & & \ddots & \\ & & & e^{-j\frac{2\pi}{N}(N-1)l_0} \end{bmatrix} \bar{d} + \tilde{v}$$

$$Y(k,n) = e^{-j\frac{2\pi}{N} n l_0} \cdot d(n) + v(n)$$

"l" $\delta(n-l)$

(*) Impact of Frequency offset



$\tilde{y}(m)$, $e^{j2\pi\Delta f \frac{m}{T}}$, Rm CP, $\bar{q}_n^H$

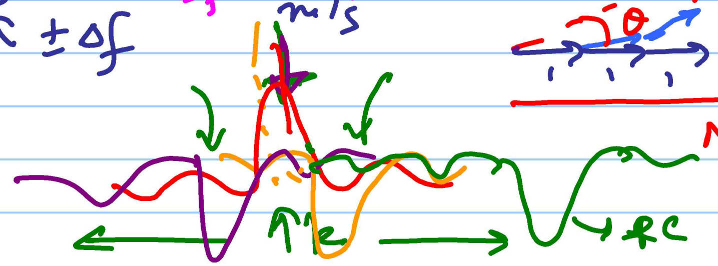
P_n (3) $\rightarrow \frac{1}{\sqrt{N}} d(n) e^{j\frac{2\pi}{N} n l} \cdot \sum_{m=0}^{N-1} e^{j2\pi\Delta f' m} \neq 1$ ✓

$+ \underline{\sqrt{N}\cdot(.)}$

(4) $\frac{1}{\sqrt{N}} d(n) e^{j\frac{2\pi}{N} n l} \sum_{m=0}^{N-1} e^{j2\pi\Delta f' m} \cdot e^{j\frac{2\pi}{N}(n'-n)m} \neq 0$

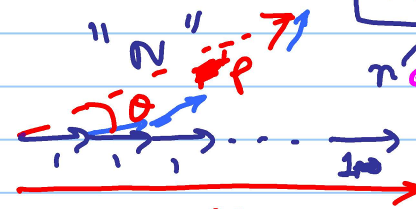
$n' \in \{0, \dots, N-1\}$, $\neq n$

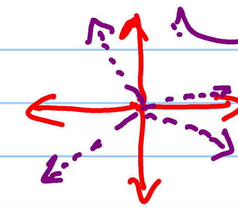
$f_c - f_c' = \Delta f$, $\pm\Delta f$, $\Delta f'$, mT_s

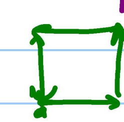


"N" θ, p, $|p| < N$

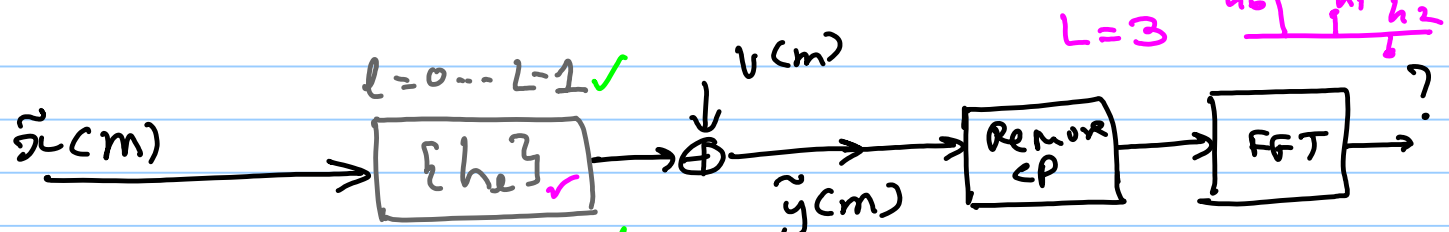
ICI





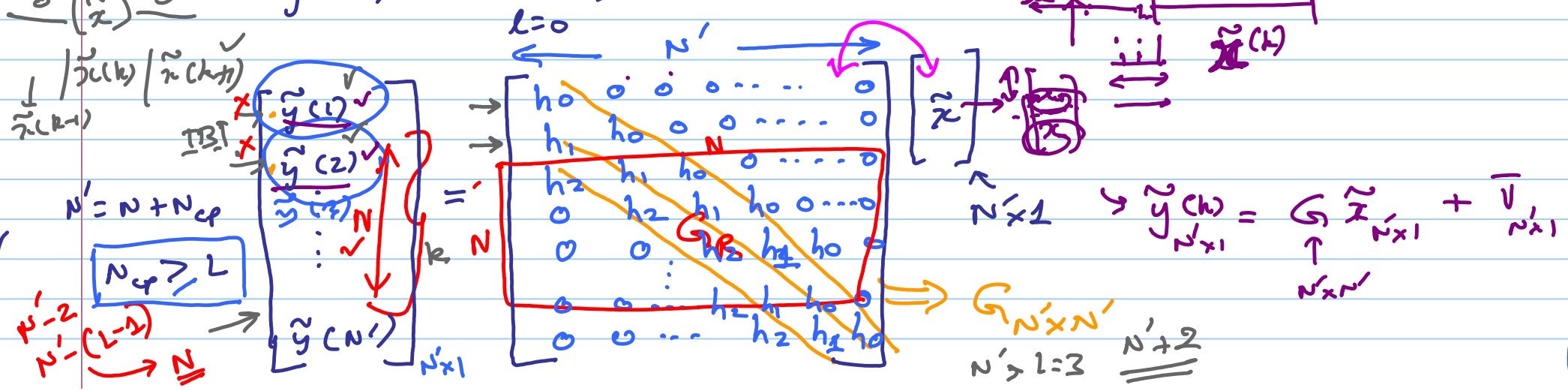


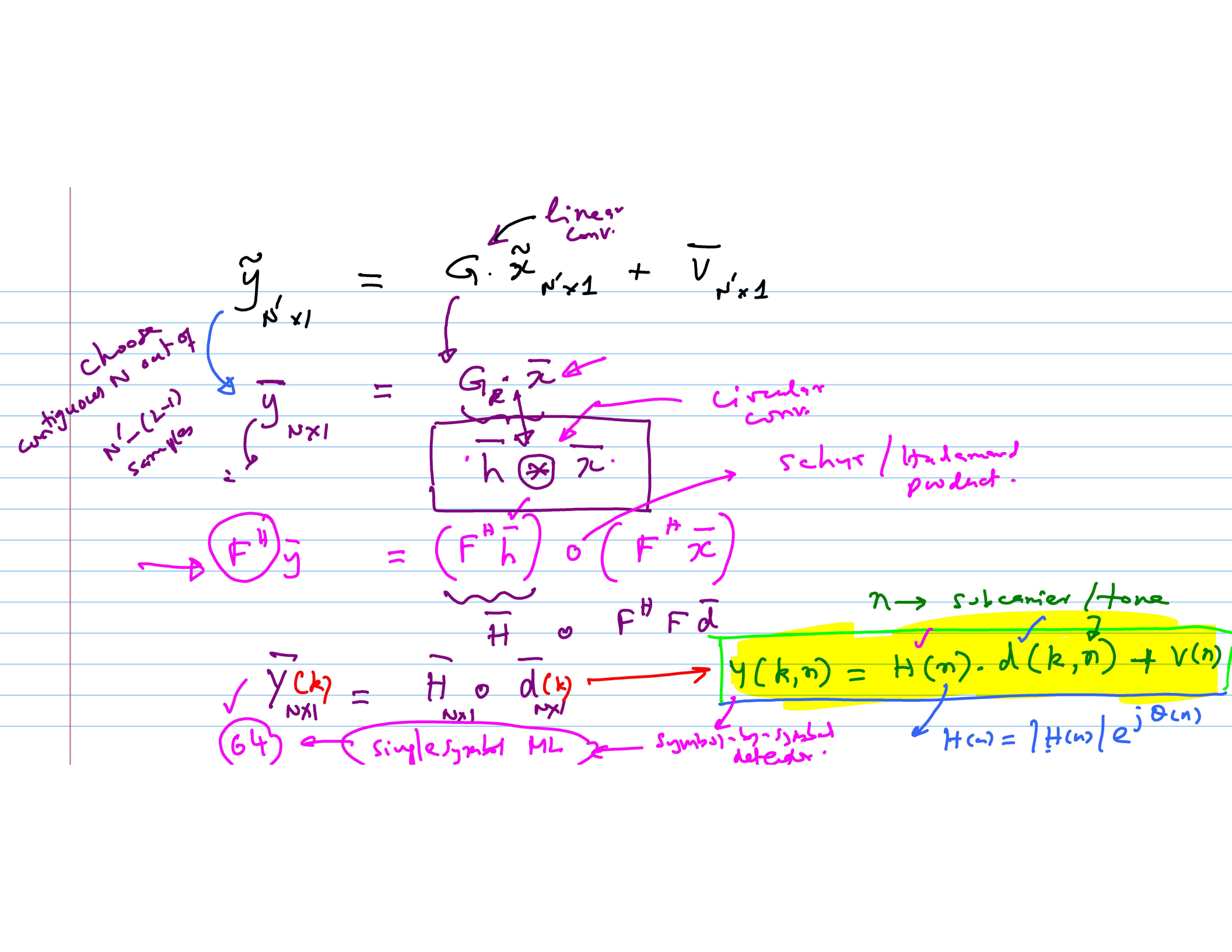
Block modulation for ISI channels (Delay-Spread, Multi-tap channels)



$L=3 \rightarrow$ linear conv.

$$\tilde{y}(m) = \sum_{l=0}^{2} h_l \tilde{x}(m-l) + v(m)$$




linear conv.
choose contiguous N out of N'-(L-1) samples
circular conv.
Schur / Hadamard product.
n → subcarrier / tone
symbol-by-symbol detector.
single symbol ML
64

$$H(n) = \sum_{l=0}^{L-1} h_l \, e^{j\frac{2\pi}{N} n l}$$

$L \leq N_{cp}$

$L-1 \leq N_{cp}$

L_{max}

$N_{cp} \geq 2L$

b

$N_{cp} \geq L$ → ISI-free window of N samples

$N+N_{cp}$

1 2 3 4 5 .....

N_{cp}

N

M^{L-1} ← MLSE ← Sequence (stimuli)

$64^{3-1} = 4^2 \times$