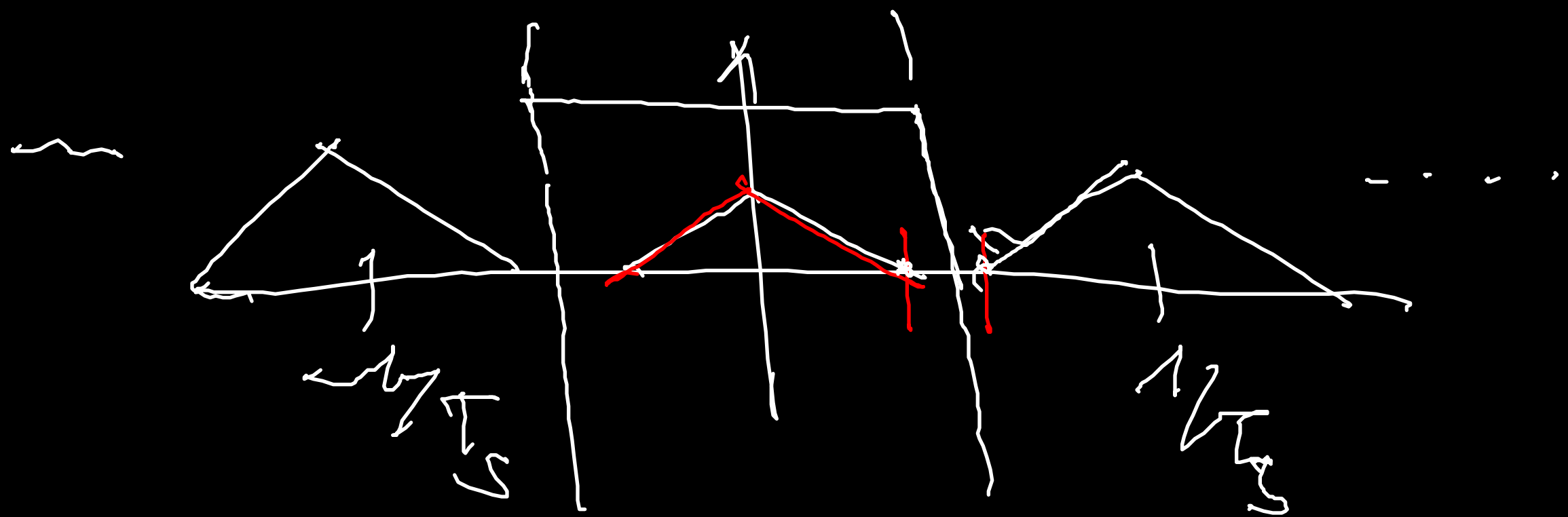
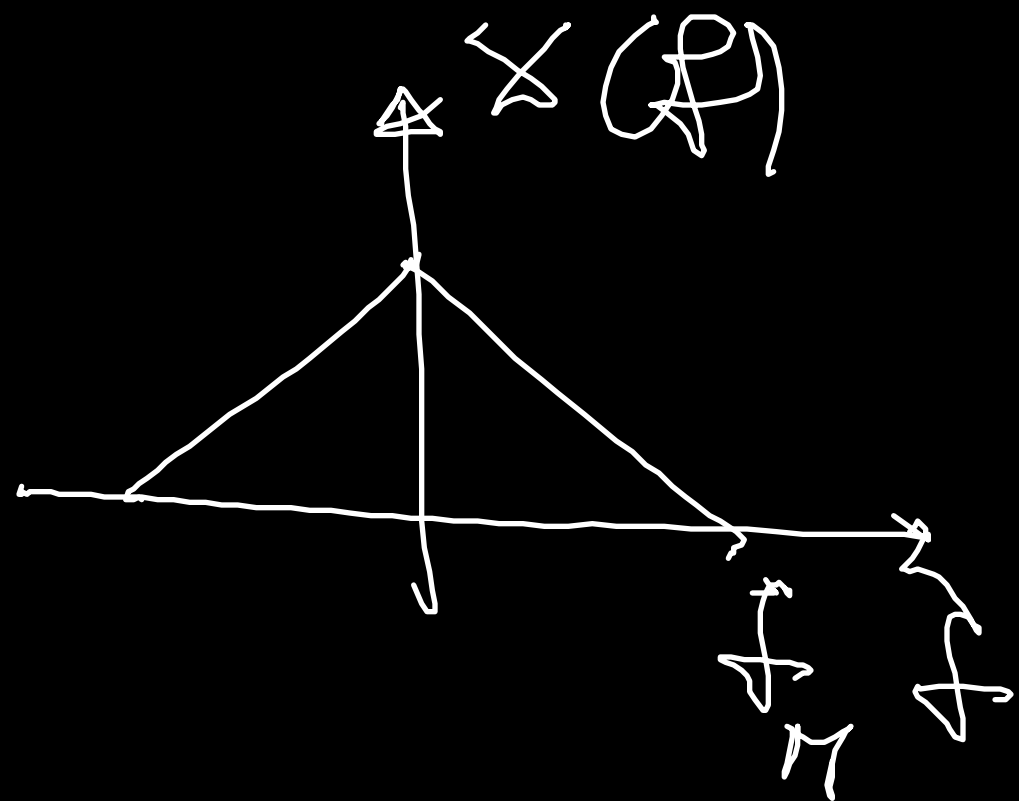


$$P(f) \xrightarrow{\int_{-\infty}^{\infty}} \frac{1}{T_s} \sum_{k=-\infty}^{\infty} \delta(f - \frac{k}{T_s})$$

$$\frac{1}{T_s} - f_M > f_M$$

$$P(f) \cdot X(f) \xrightarrow{\int_{-\infty}^{\infty}} P(f) \otimes \frac{1}{T_s} \sum_{k=-\infty}^{\infty} \delta(f - \frac{k}{T_s})$$

$$\Rightarrow \frac{1}{T_s} \sum_{k=-\infty}^{\infty} X(f - \frac{k}{T_s})$$



$$f_s = \frac{1}{T_s} > 2f_m \quad \text{Hz}$$

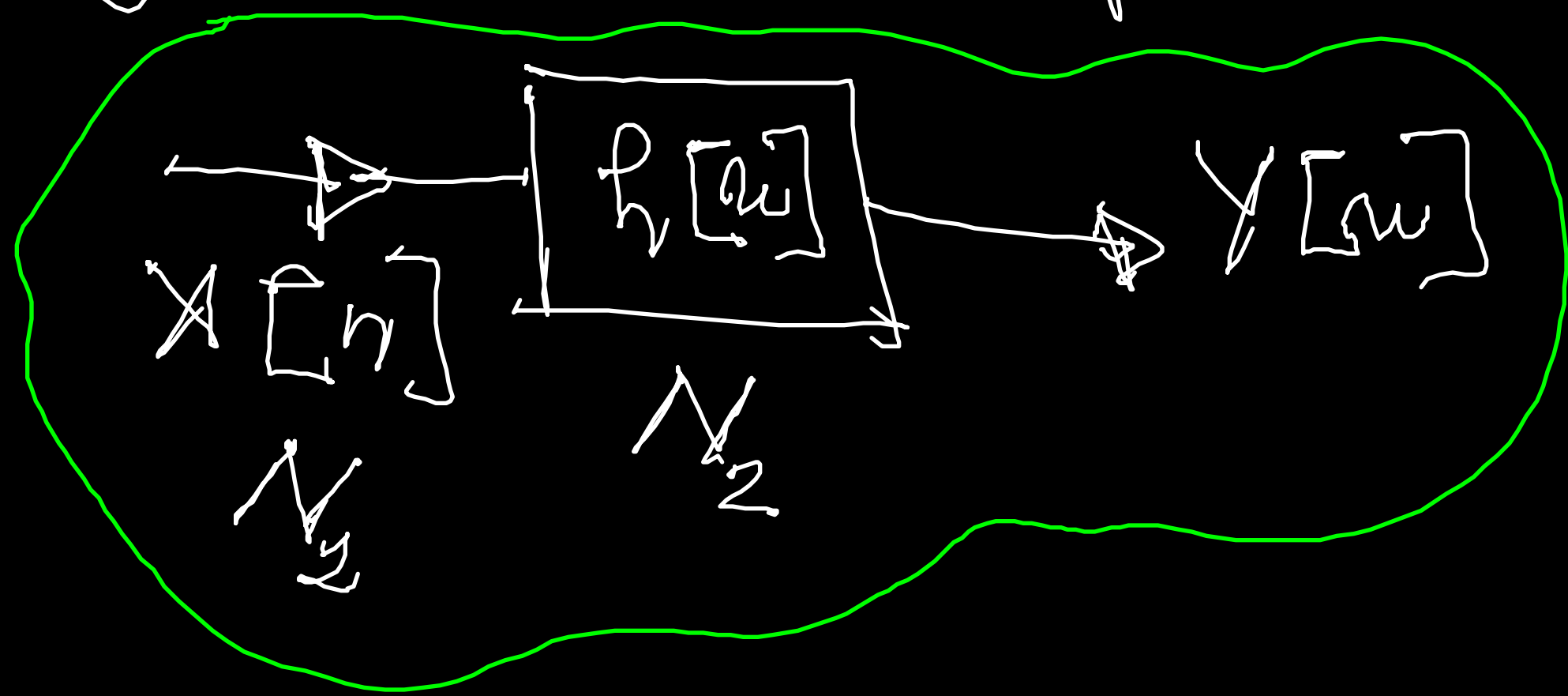
Voce tel 3,4 kHz

$$f_s = 8 \text{ kHz} \quad T_s = 125 \mu\text{s}$$

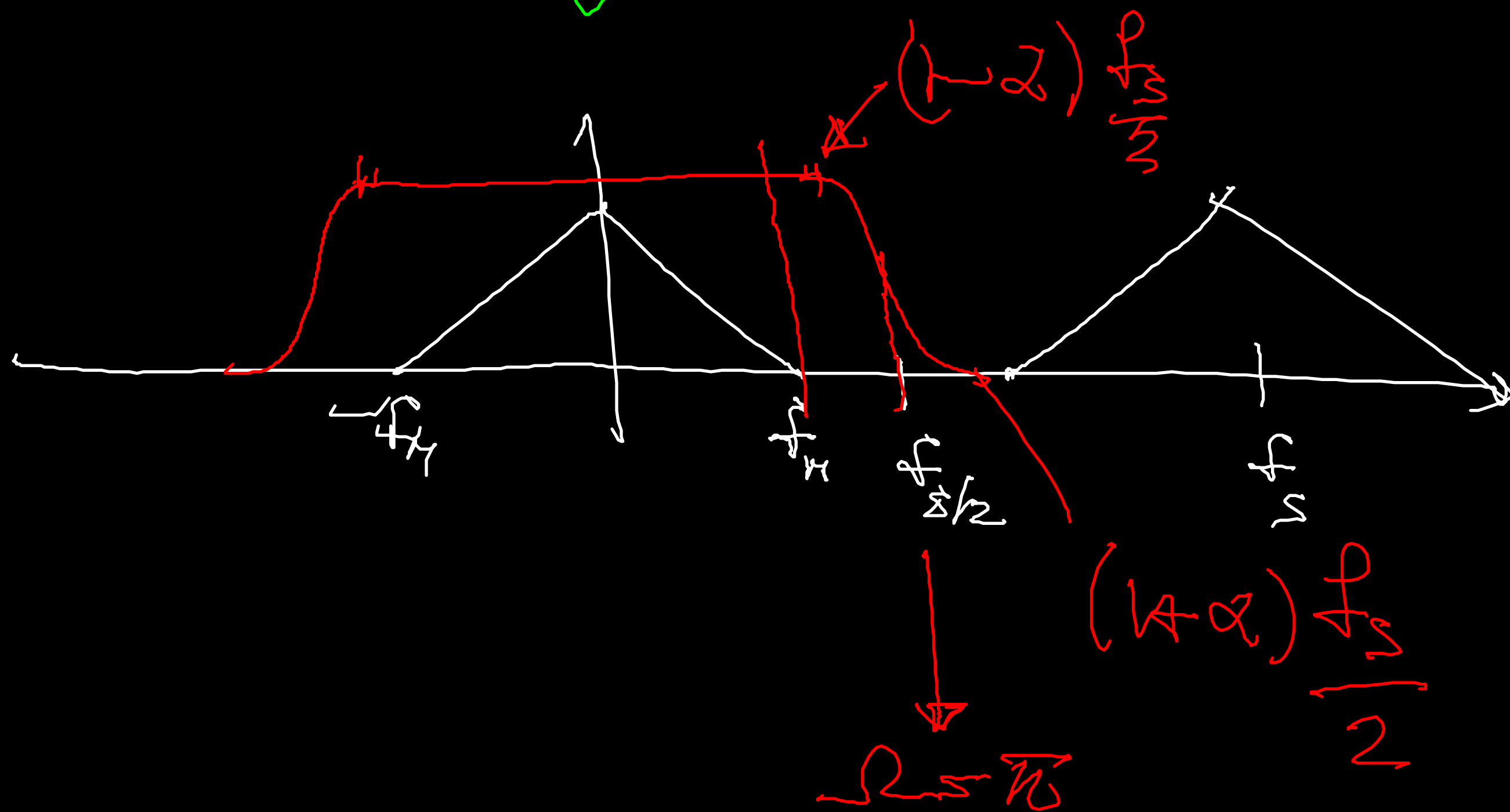
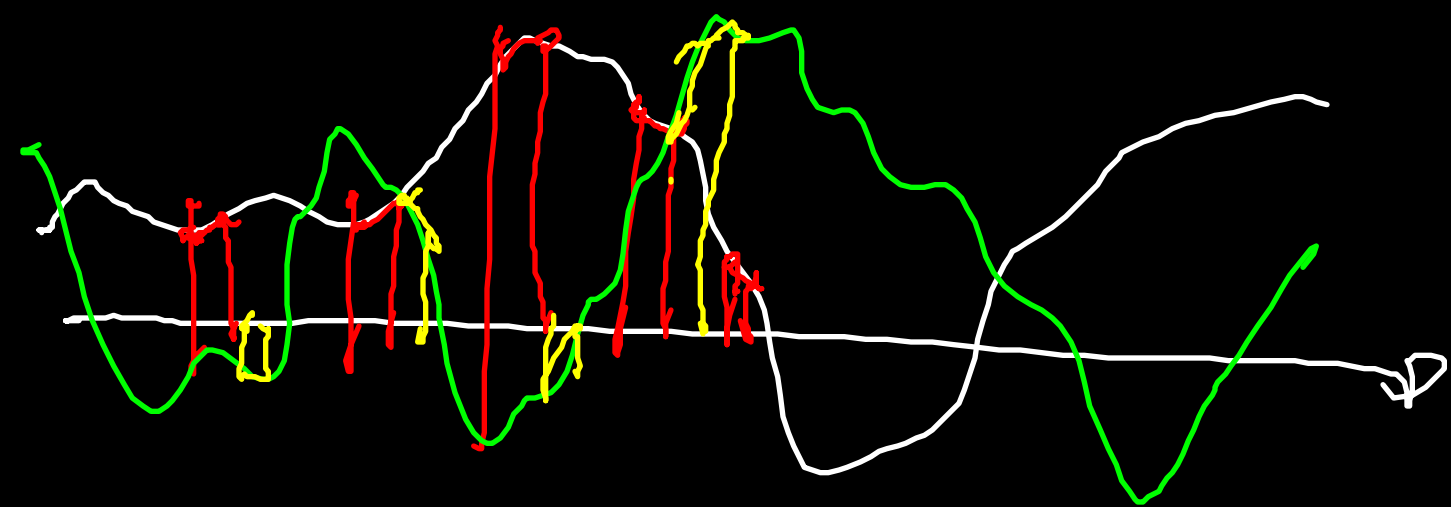
Trasformata di Fourier a tempo continuo
(Periodica: Serie di Fourier)

TF Tempo discreto

Segnali di durata finita: TFD $N_2 \rightarrow N \geq N_1$



DFT
(FFT)
↑
fast



Segnali elementari e loro proprietà

Sistemi e loro proprietà

{ memoria
causalità
stabilità
tempo invariante
linearità

LINEARI (TEMPO INVARIANTI)

Trasformata di Fourier e le sue proprietà

Segnali elementari

tempo continuo, tempo discreto

{ infinite
finita
DFT

Campionamento

$$f_s \geq 2 f_M$$

$$X^+(t) = X(t) + j\hat{X}(t)$$

$$\tilde{X}(t) = X_c(t) + jX_s(t) = X^+(t) e^{-j2\pi f_0 t}$$

$$= (X(t) + j\hat{X}(t)) (\cos(2\pi f_0 t) - j \sin(2\pi f_0 t))$$

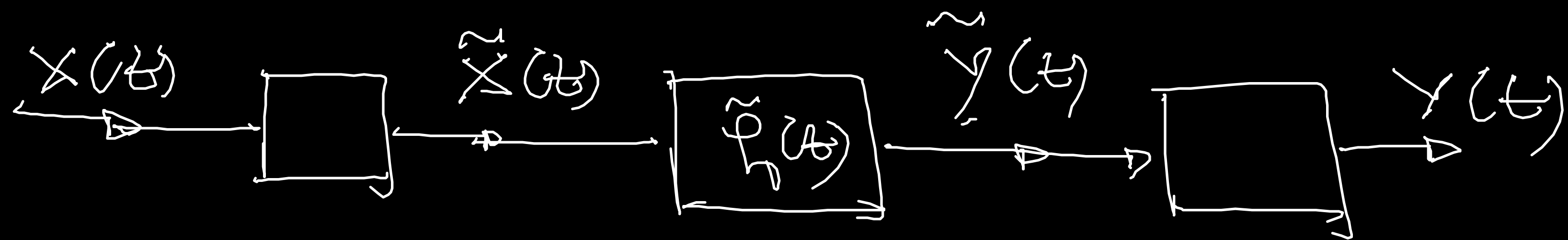
$$X_c(t) = X(t) \cos(2\pi f_0 t) + \hat{X}(t) \sin(2\pi f_0 t)$$

$$X_s(t) = \hat{X}(t) \cos(2\pi f_0 t) - X(t) \sin(2\pi f_0 t)$$

$$X(t) = \operatorname{Re} \{ X^+(t) \} = \operatorname{Re} \{ \tilde{X}(t) e^{j2\pi f_0 t} \}$$

$$= \operatorname{Re} \{ (X_c(t) + jX_s(t)) (\cos 2\pi f_0 t + j \sin(2\pi f_0 t)) \}$$

$$X(t) = X_c(t) \cos(2\pi f_c t) - X_s(t) \sin(2\pi f_c t)$$



BASSA FREQUENZA

MERCOLEDÌ PROSSIMO 8:30

Z, PROCESSI ALEATORI