Lec. 34

$\|\underline{y}-\underline{s}_0\| \gtrless \|\underline{y}-\underline{s}_1\|$

Announcement: Quiz #6 this Friday $\{\underline{Y}=\underline{y}\}$

Review

$H_0 : Y(t) = s_0(t) + N(t)$

vs

$H_1 : Y(t) = s_1(t) + N(t)$

where $s_i(t)$ known deterministic

$N(t)$ WGN.

$P(H_i) = 1/2, \forall i.$ $\int [s_0(t)-s_1(t)]^2 dt > 0$

p.2

$\underline{Y}$	$Y(t)$
$\{\underline{Y}=\underline{y}\}$ $\{\omega\in\Omega : \underline{Y}(\omega)=\underline{y}\}$	$\{Y(t)=y(t)\}$
$\|\underline{y}-\underline{s}_0\|^2 \underset{\text{say } H_0}{\overset{\text{say } H_1}{\gtrless}} \|\underline{y}-\underline{s}_1\|^2$	$\int_{-\infty}^{\infty} \|y(t)-s_0(t)\|^2 dt \underset{\text{say } H_0}{\overset{\text{say } H_1}{\gtrless}} \int_{-\infty}^{\infty} \|y(t)-s_1(t)\|^2 dt$

$\underline{Y} = H\underline{\theta} + \underline{N}$	$Y(t) = \theta\, h(t) + N(t)$ θ: unknown deterministic, $h(t)$: known deterministic, $N(t)$: STOCH
$\{\underline{Y} = \underline{y}\}$	$\theta \in \mathbb{R}$. $\{Y(t) = y(t)\}$
ss. $H^T\underline{y}$	$\int_{-\infty}^{\infty} y(t)\, h(t)\, dt$
$\hat{\underline{\theta}}_{ML}(\underline{y}) = (H^T H)^{-1} H^T \underline{y}$	$\hat{\theta}_{ML}(y(t)) = \dfrac{\int_{-\infty}^{\infty} h(t)\, y(t)\, dt}{\int_{-\infty}^{\infty} \lvert h(t)\rvert^2 dt}$

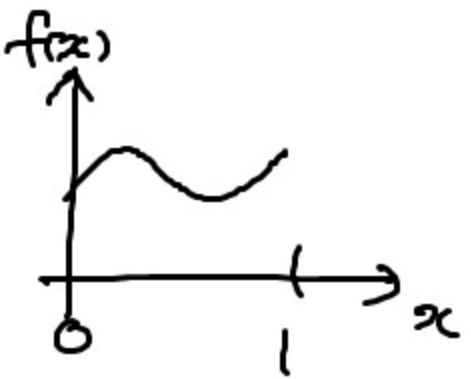
p4

$$f: (0,1) \to \mathbb{R}$$

Def. The graph of a function $f: (0,1) \to \mathbb{R}$ (into)

is defined as

$$\{ (x, f(x)) : x \in (0,1) \}$$

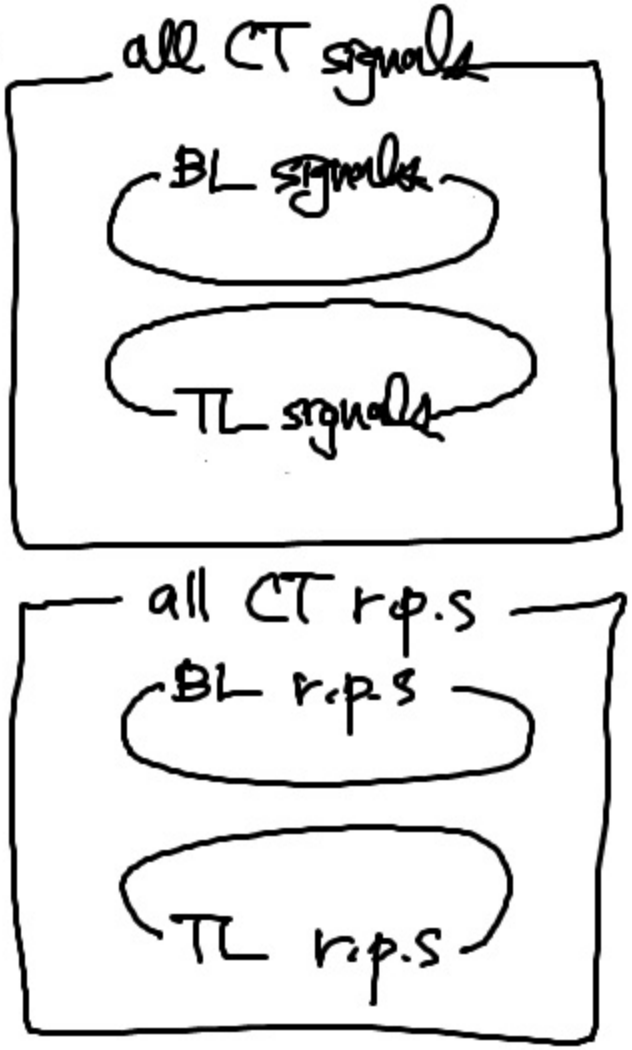


Note. In general,

$$|\{(x, f(x)) : x \in (0,1)\}|$$

The cardinality of a graph is ∞.

p.5



strictly bandlimited

strictly timelimited

cf) confer

Prolate spheroidal wave functions

(PSWFs)

≃ approximately time & bandlimited signal.

Hilbert space ≃ Euclidean space w/ infinite dimension

cf) Luenberger, ↗

p6 periodic extention

piecewise smooth $\Rightarrow$ Lipschitz condition.