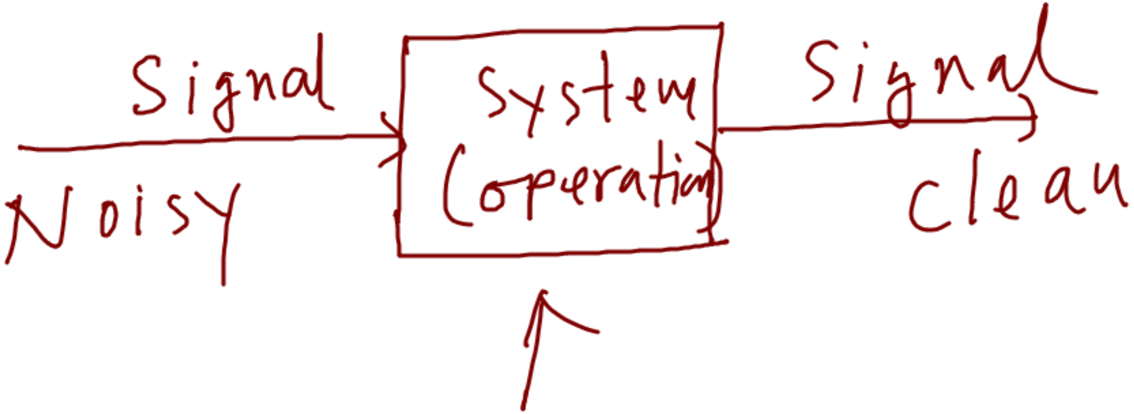
Signals:

1D: speech signal,

2D: image ...

Systems

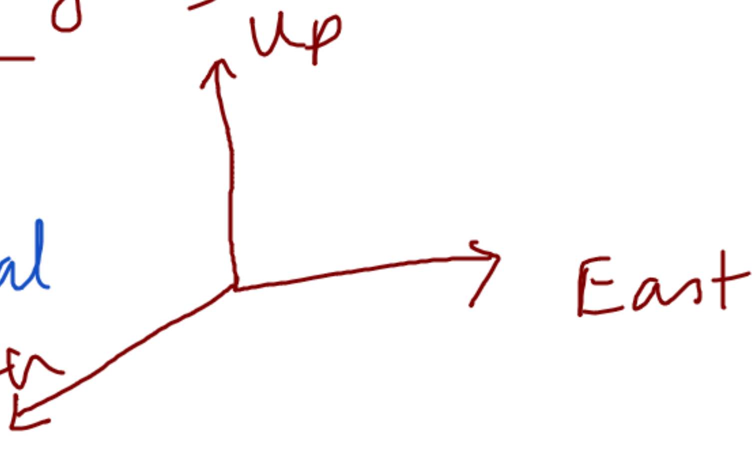


1.2 Classification of Signals

Multichannel:

Earthquake signal

$$\underline{s(t)} = \begin{bmatrix} s_1(t) \\ s_2(t) \\ s_3(t) \end{bmatrix}$$



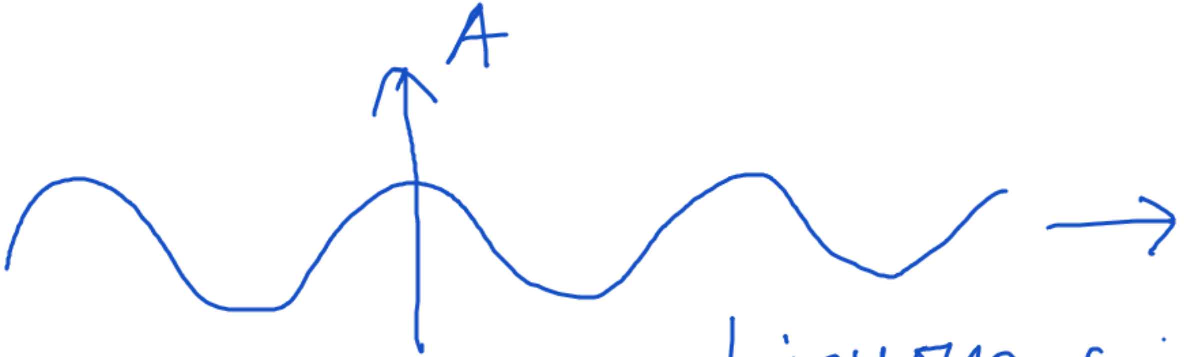
Multidimensional Signa

Image:

Continuous Signal Vs Discrete-time Signal:

Continuous-Time

$x(t) = \sin \omega t \rightarrow$

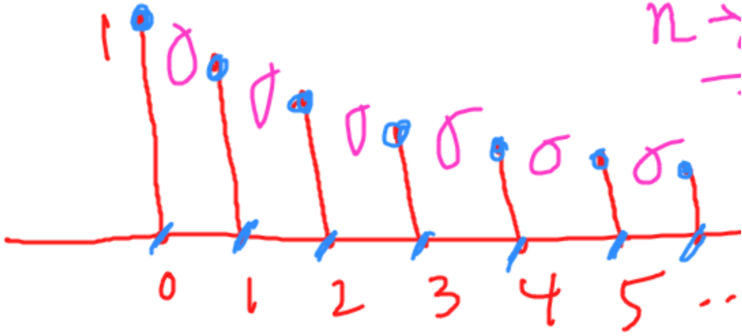


speech signals are continuous si

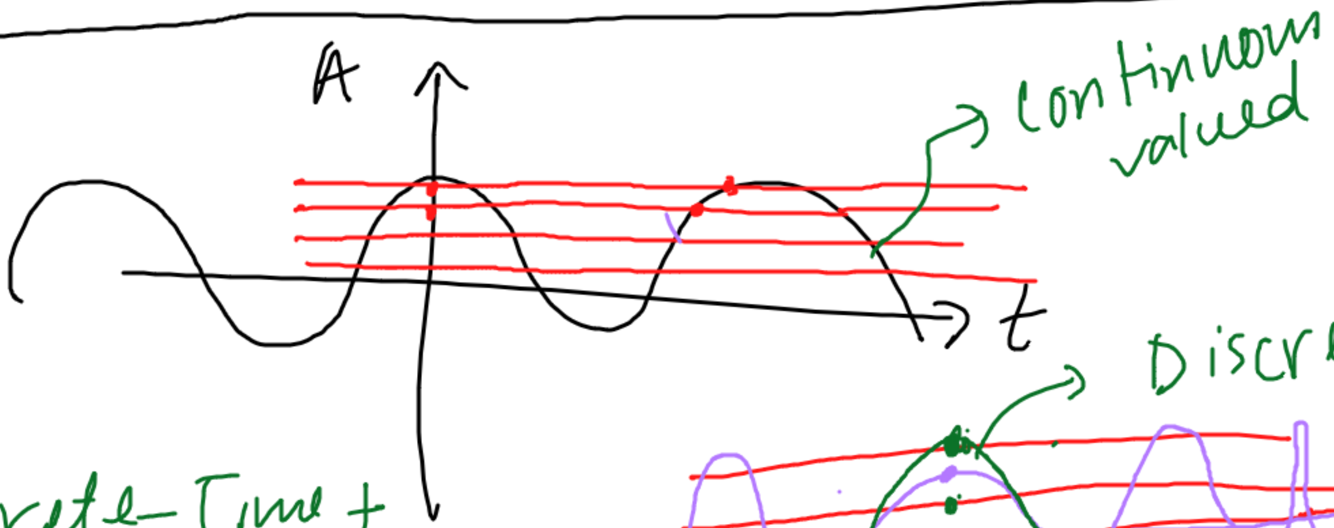
Discrete-Time

$x(n) = 0.8^{n}$

$n \geq 0$



Continuous valued vs Discrete valued Signals



Discrete-Time + Discrete valued
Digital signal

Deterministic vs random signal

Speech Signal: $s = v * p$

defined

Random Signal

$x = \text{random}(n)$

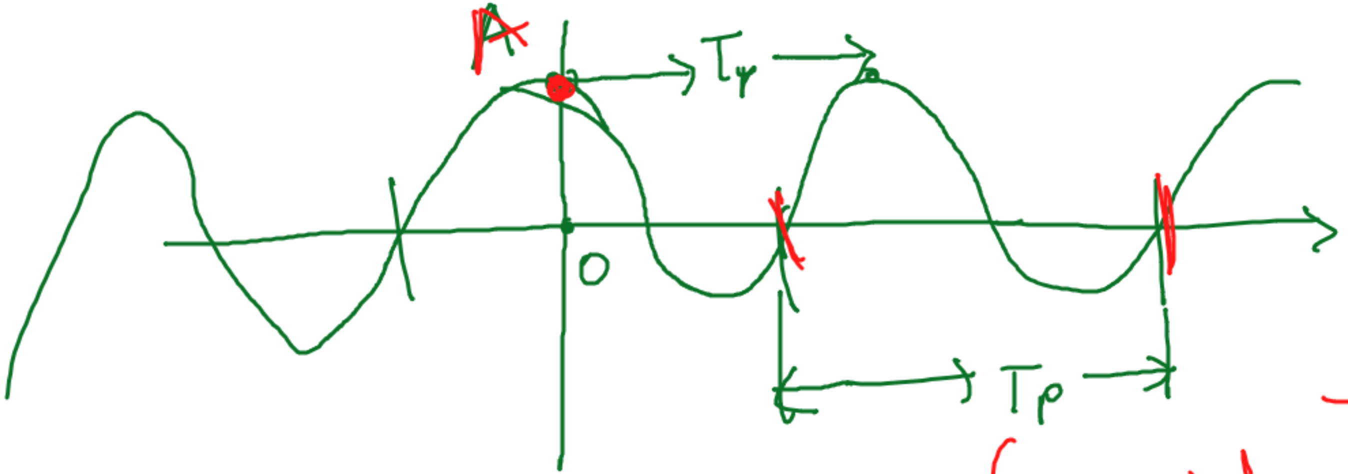
1, 2, 3, 4, 5,

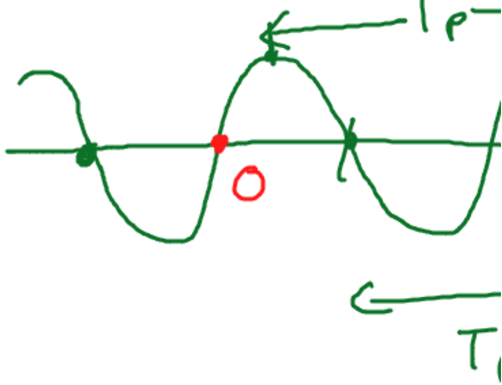
??

1.3

Concept of freq^y in continuous-time and Discrete Sig

1.3.1 $x_a(t) = A\cos(\Omega t + \theta)$ $\quad \Omega = 2\pi F$





$\Omega \to$ frequency in

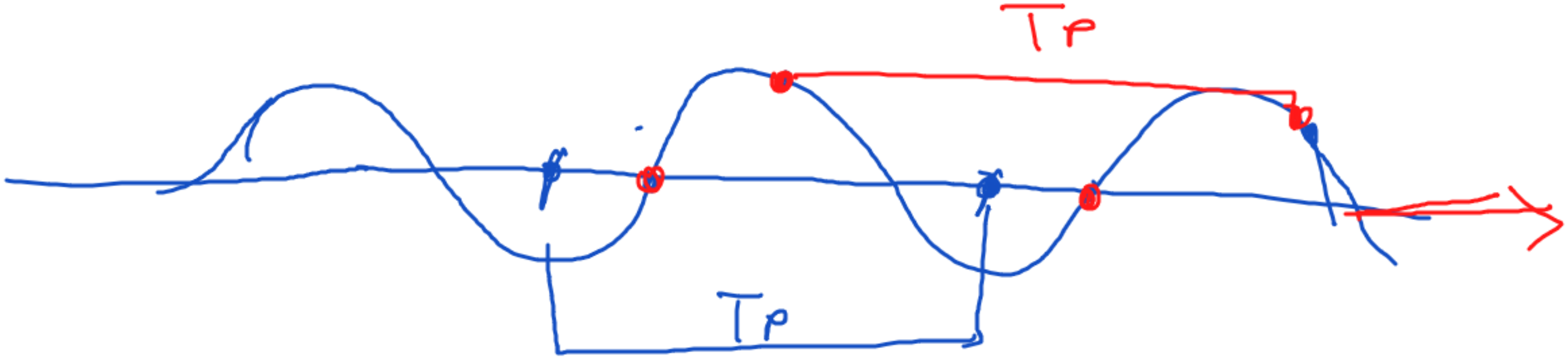
↳ Period $\quad F \to$ freq^y in Hz
cycle /sec

Properties of analog sinusoidal

A1. For every fixed value of the frequency F,

$x_a(t)$ is periodic.

$$x_a(t + T_p) = x_a(t)$$



A2

continuous-time sinusoid signals with distinc
frequencies are themselves distinct.

$$x_1(t) = A_1 \cos(2\pi \cdot F_1 + \theta)$$

$$x_2(t) = A_2 \cos(2\pi \cdot F_2 + \theta)$$

If $F_1 = F_2$, $x_1(t) = x_2(t)$.

if $F_1 \neq F_2$ $x_1(t) \neq x_2(t)$

A3:

Increasing the frequency F results in an in

in the rate of oscillation of the signal.