

# What is a signal?

Note Title

6/24/2011

A Signal is a function of an independent variable (time) that carries some information or describes some physical phenomena.

independent variable -  $t$

Signal -  $x(t)$  - function of the indep. variable

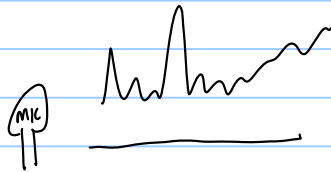
How can we describe these signals

$$x(t) = [t \cos t] \quad x(\pi) = \pi \cos \pi = -\pi$$

$x(t)$  will be used to denote

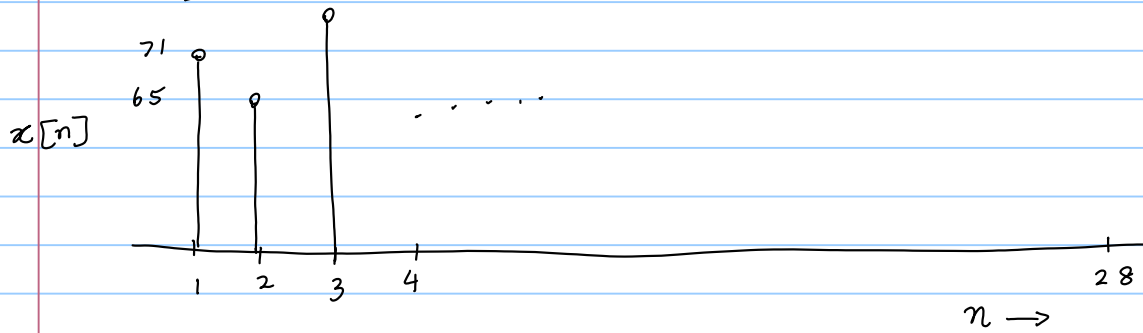
\* Signal ✓

\* Value taken by the signal at time  $t$

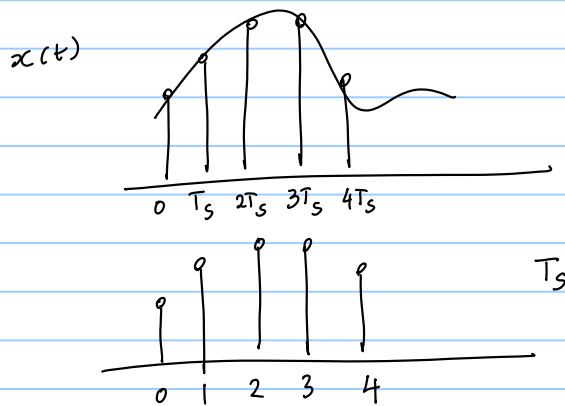


CT  $x(t)$  Continuous-time (CT) and Discrete-time (DT) signals

DT  $x[n]$



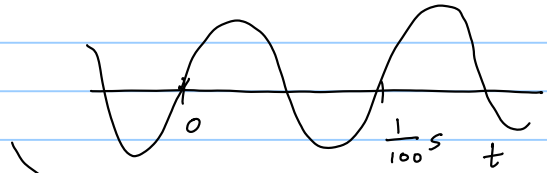
Sampling We will often obtain DT signals by sampling CT time



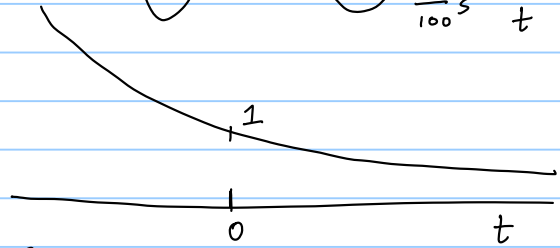
# How to specify or describe signals?

## Mathematical description

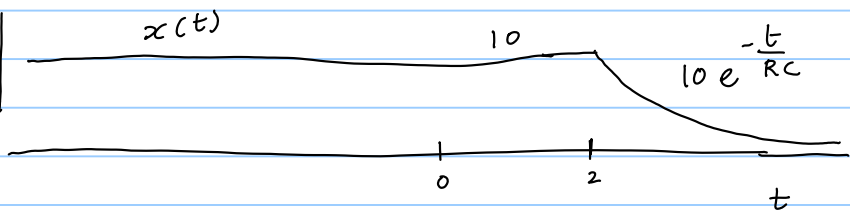
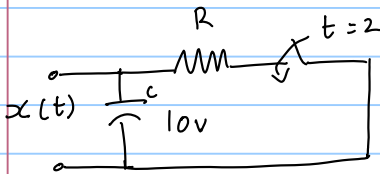
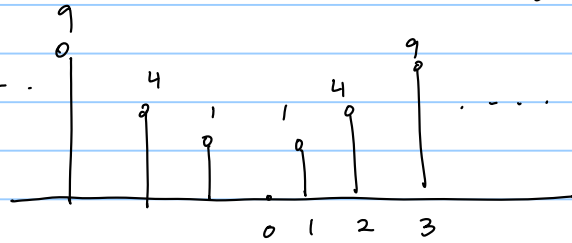
$$x(t) = \sin(200\pi t)$$



$$x(t) = e^{-t}$$

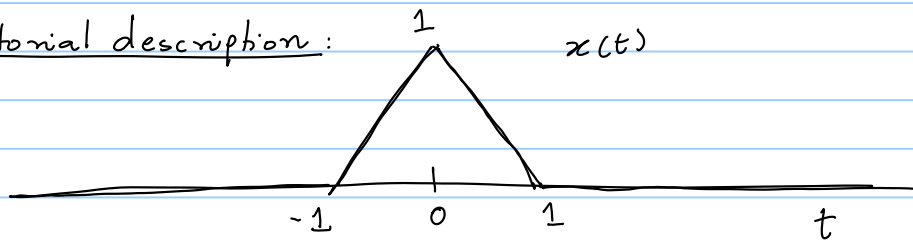


$$x[n] = n^2 \dots$$



$$\begin{cases} x(t) = 10 & t < 2 \\ x(t) = 10e^{-\frac{t}{RC}} & t \geq 2 \end{cases} \leftarrow \text{Piecewise}$$

## Pictorial description:



$$\begin{aligned} x(t) &= 1 - |t| & \text{if } -1 < t < 1 \\ &= 0 & \text{otherwise} \end{aligned}$$