Basic DSP

Signal notation

signal as function

signals describes how physical quantity varies over time and/or space.

Mathematically: a function of one or more independent variables

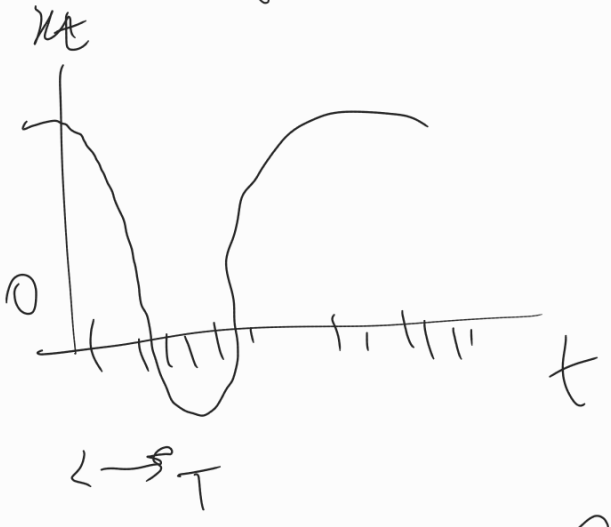
- continuous and discrete Indep Vbls
  - continuous: take any values
  - discrete: a limited set of values (typically integers)

Sampling

Often we obtain a discrete-time signal $x[n]$ by sampling a continuous time signal $x(t)$

$$x[n] = x(t)\Big|_{t=nT} = x(nT)$$

Sample at nT



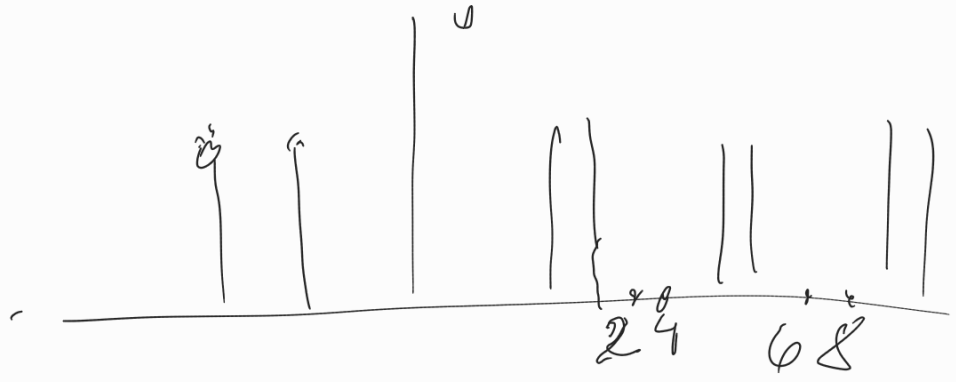
Displaying Signals

Signals stored in a computer must be discrete!

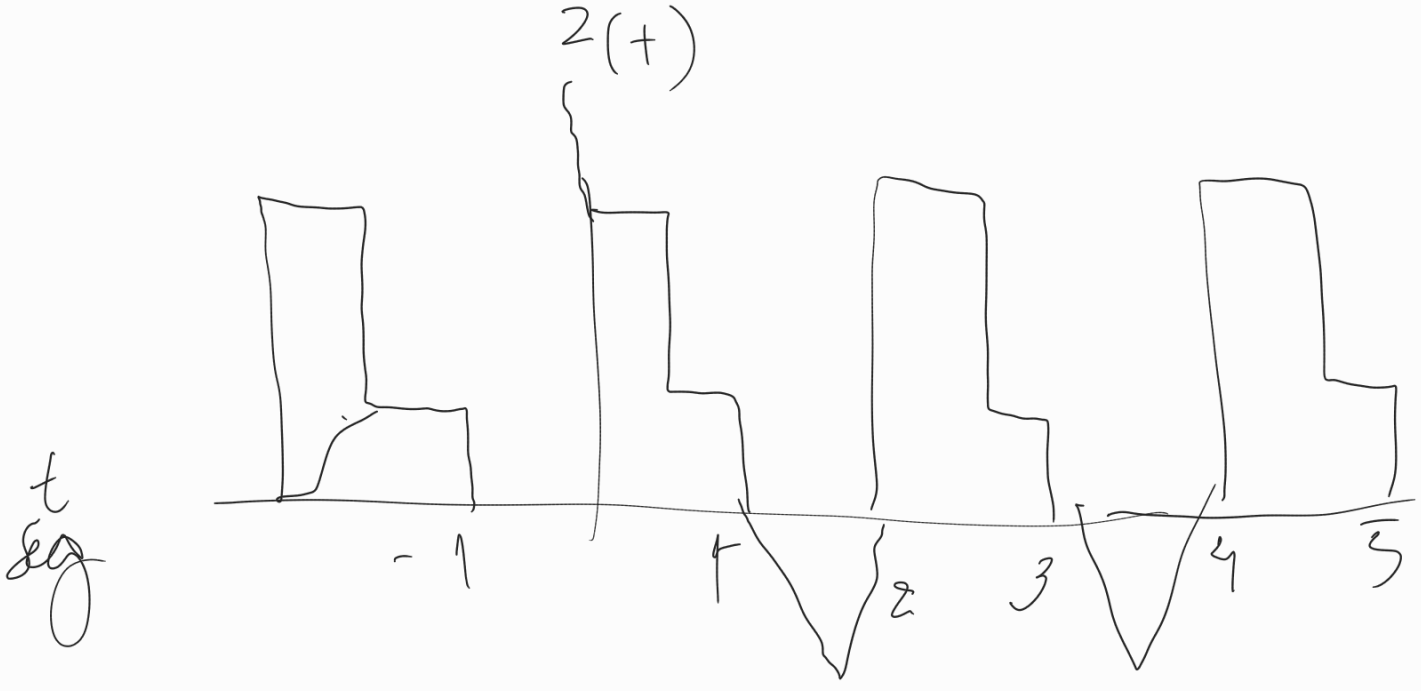
Common to connect samples with straight lines, visual clarity with large number

Periodicity

a signal that repeat a pattern is said to be periodic.



N = 4, 8, 12 ...



Mathematically $T_0 = 2, 4, 6 \ldots$ sec

$$x(t + T_0) = x(t) \text{ for all } t$$

$$x[n + N] = x[n] \text{ for all } n$$