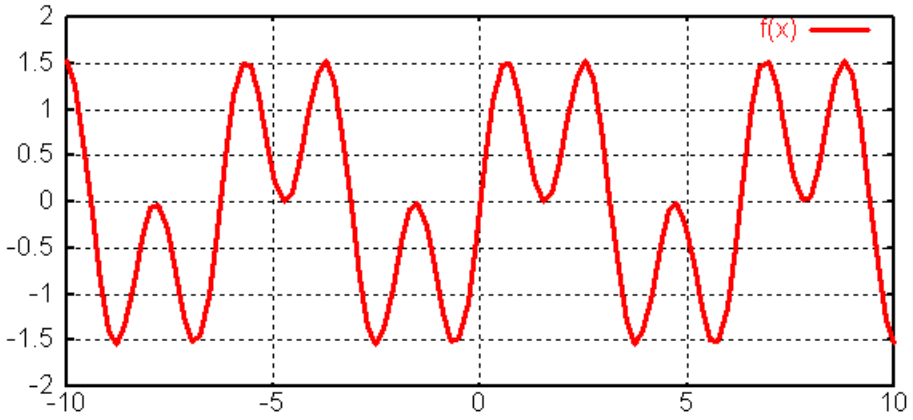
Some Useful Functions

Signal is a set of data or information collected over time.



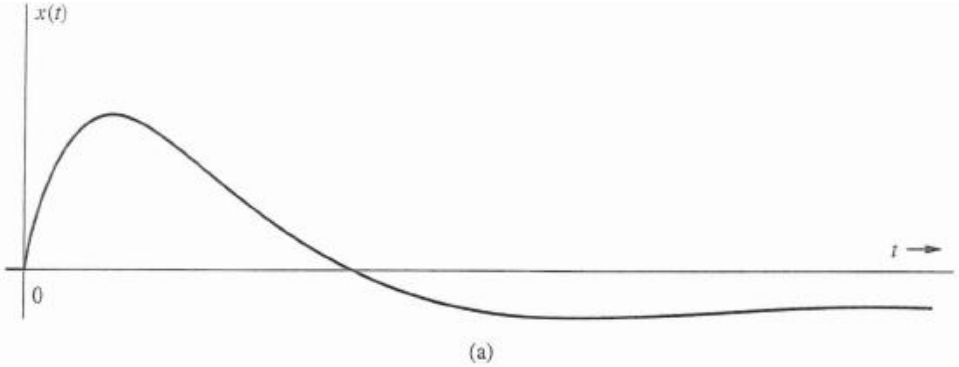
Signal Classification

Signals may be classified into:

1. Continuous-time and discrete-time signals
2. Analogue and digital signals
3. Periodic and aperiodic signals
4. Energy and power signals
5. Deterministic and probabilistic signals
6. Causal and non-causal
7. Even and Odd signals

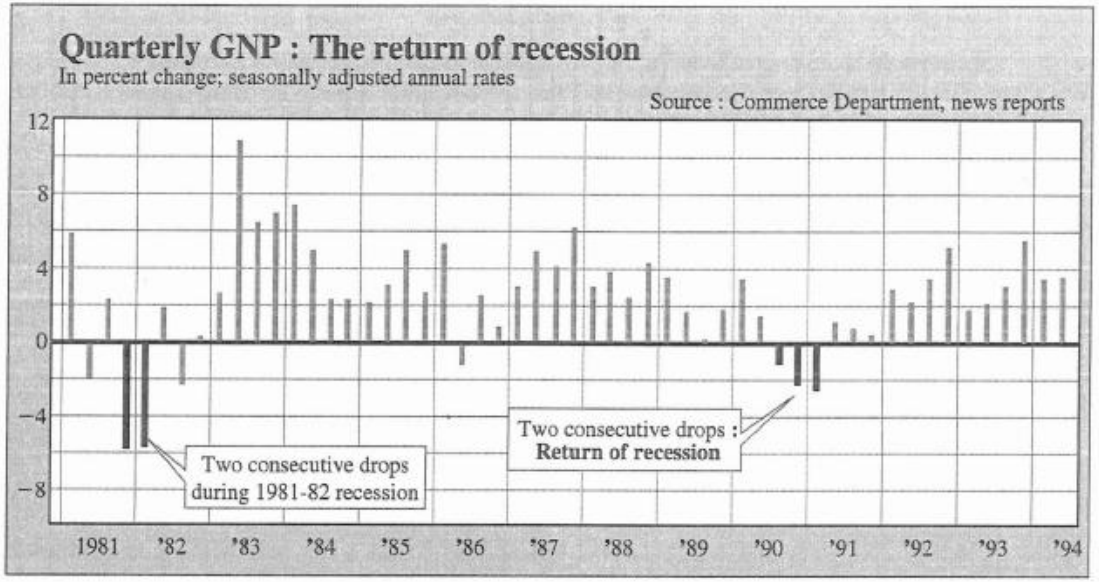
Signal Classification- Continuous vs Discrete

Continuous-time



(a)

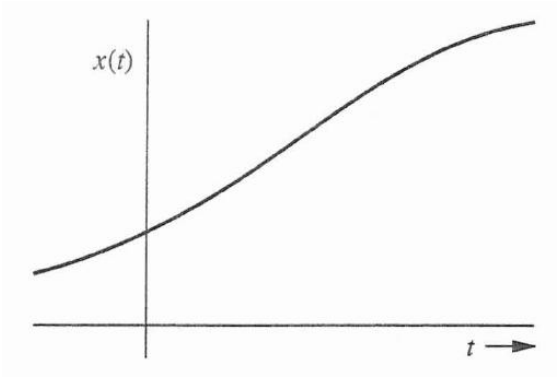
Discrete-time



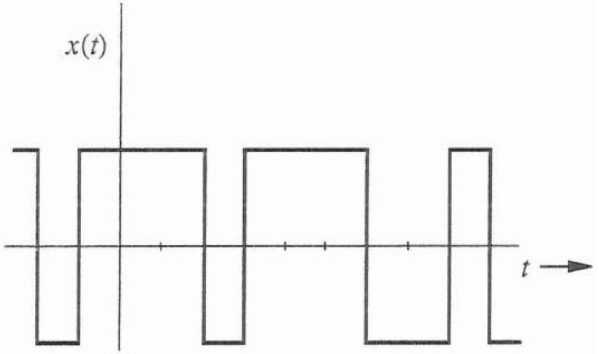
(b)

Signal Classification- Analogue vs Digital

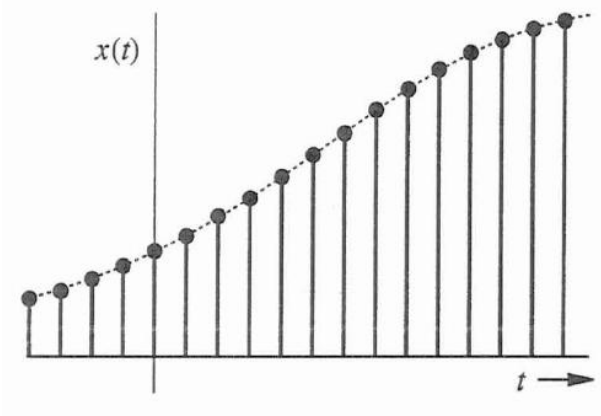
Analogue, continuous



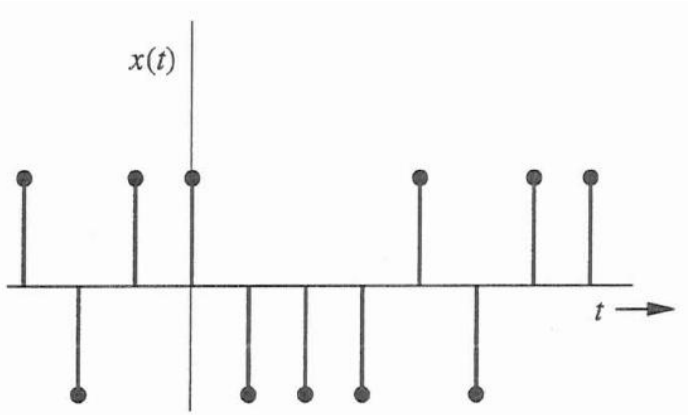
Digital, continuous



Analogue, discrete



Digital, discrete

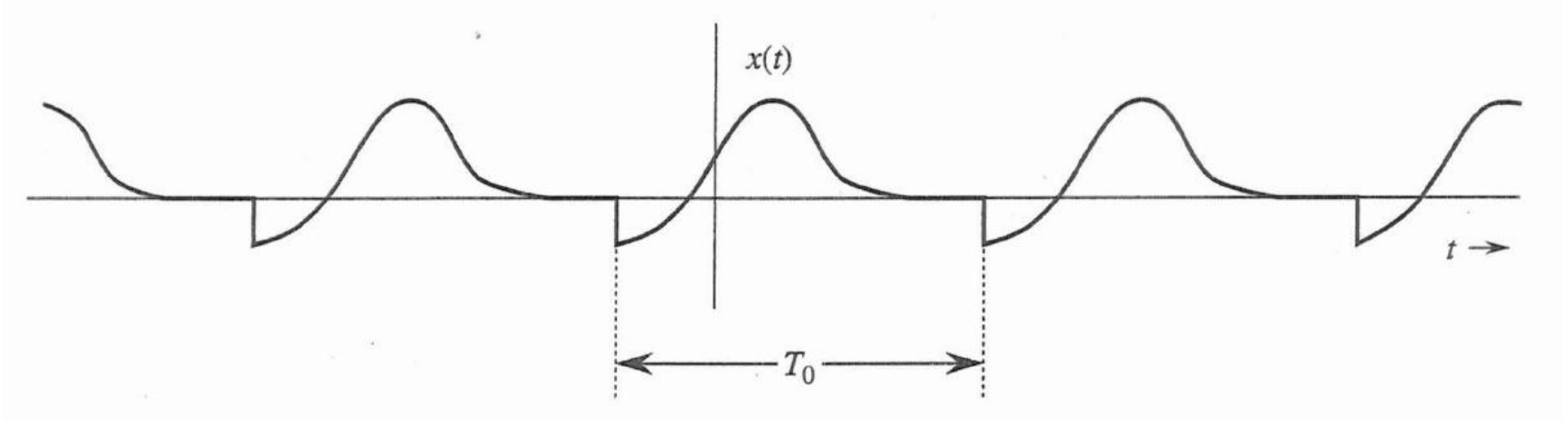


Signal Classification- Periodic vs Aperiodic

A signal *x(t) is said to be periodic if for some positive constant* T_o

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

The smallest value of T_o *that satisfies the periodicity condition of this* equation is the *fundamental period of x(t).*



Signal Classification- Energy v/s Power

- Energy of a signal *x(t)* is given by:

$$E_x = \int_{-\infty}^{\infty} |x(t)|^2 \, dt$$

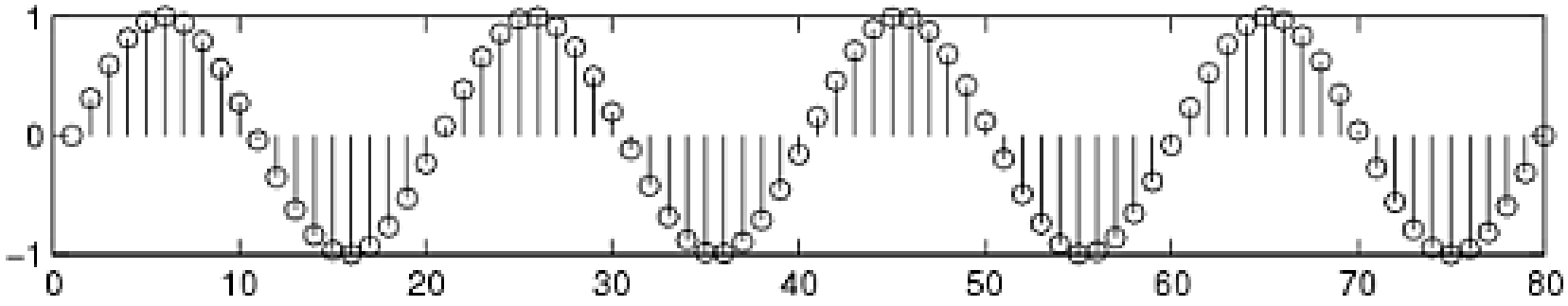
- Power of a signal *x(t)* is given by:

$$P_x = \lim_{T \to \infty} \frac{1}{T} \int_{-T/2}^{T/2} |x(t)|^2 \, dt$$

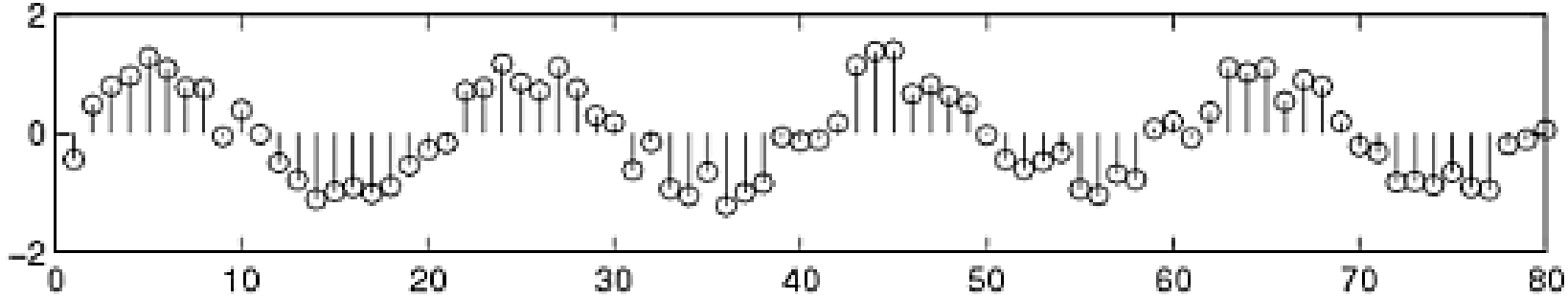
- A signal is Energy signal if $0 < Ex < \infty$
- A signal is Power signal if $0 < Px < \infty$

Signal Classification- Deterministic vs Random

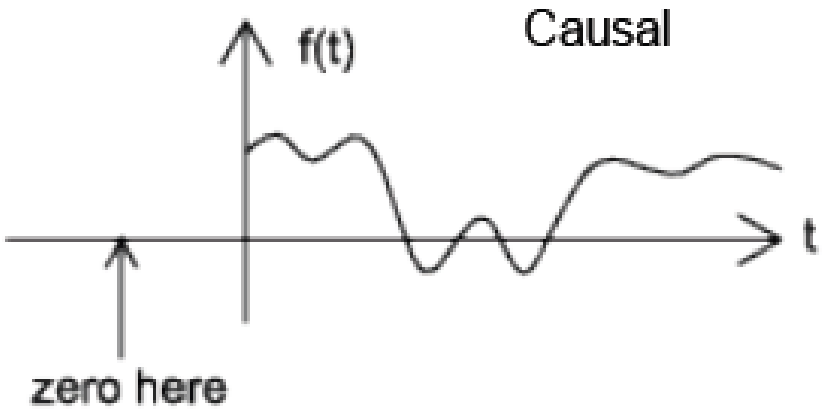
Deterministic

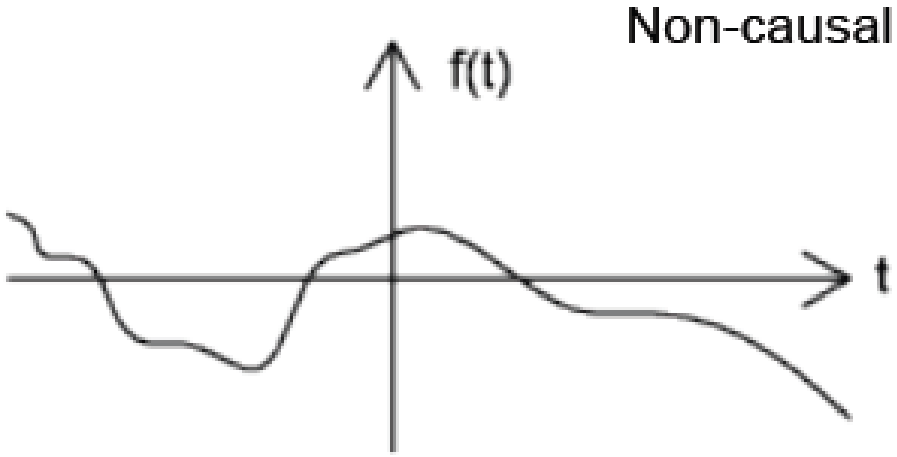


Random



Signal Classification- Causal vs Non-causal





Signal Classification- Even vs Odd