

Discrete Time Signals

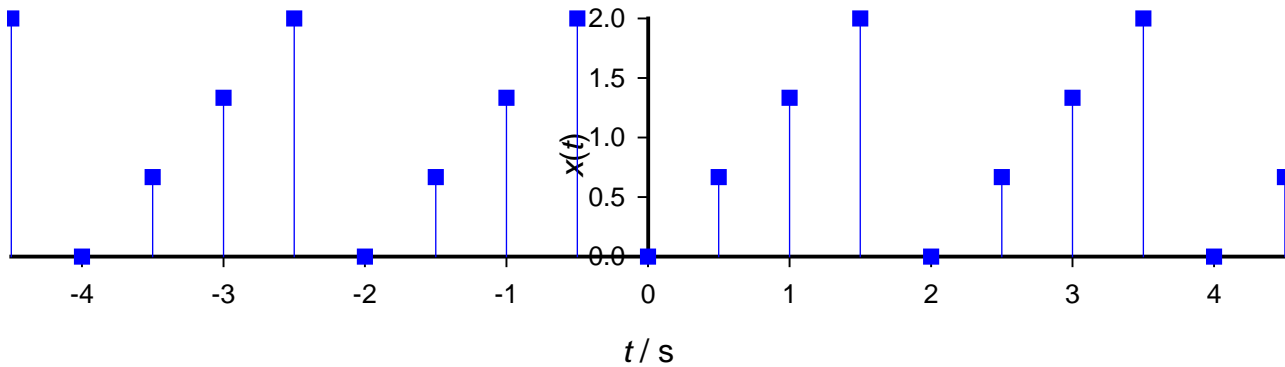
Energy and power

1. Find the energy content of the signal $\{x_n\} = 1, \frac{1}{2}, \frac{1}{3}, \dots, \frac{1}{n}$ where $n \rightarrow \infty$

Periodic discrete time signals

2.

Periodic discrete time signal

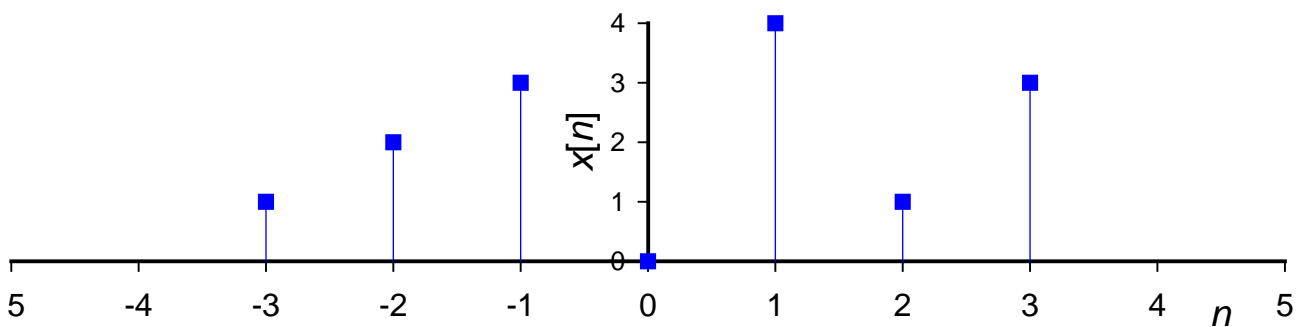


Consider the discrete time signal above.

- a. What is the fundamental period?
- b. What is the fundamental frequency?

Impulse and step functions

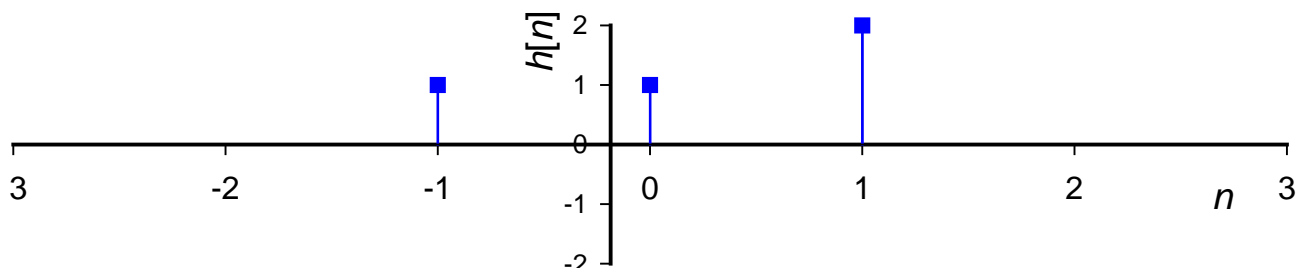
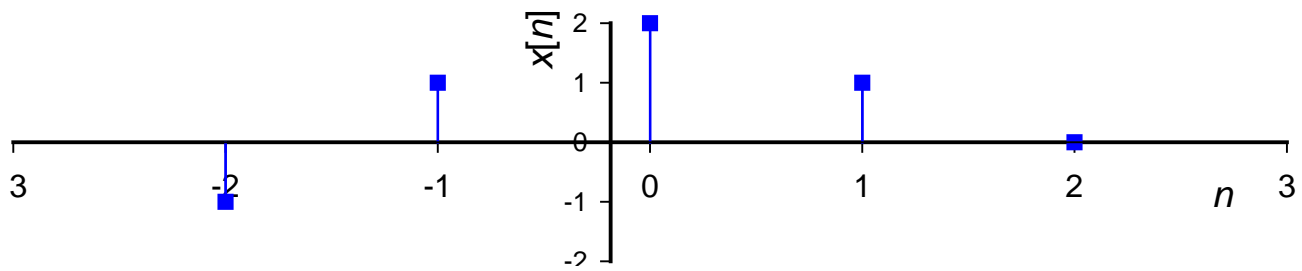
3. Consider the following discrete time signal



- a. write down the members of the sequence
- b. sketch $x[n] u[n]$
- c. sketch $x[n] u[n - 2]$
- d. sketch $x[n] \delta[n - 1]$

Discrete time convolution

4. Find $y[n] = x[n] * h[n]$ for the signals shown below

**Discrete LTI system properties**

5. Are the discrete LTI systems whose impulse responses are given below memoryless? Causal? BIBO stable?

- $h[n] = nu[n]$
- $h[n] = \alpha^{n-1} u[n-2]$ where $|\alpha| < 1$

Step response

6. Find the step response for a system with impulse response $h[n] = 3\delta[n] + \delta[n-1]$