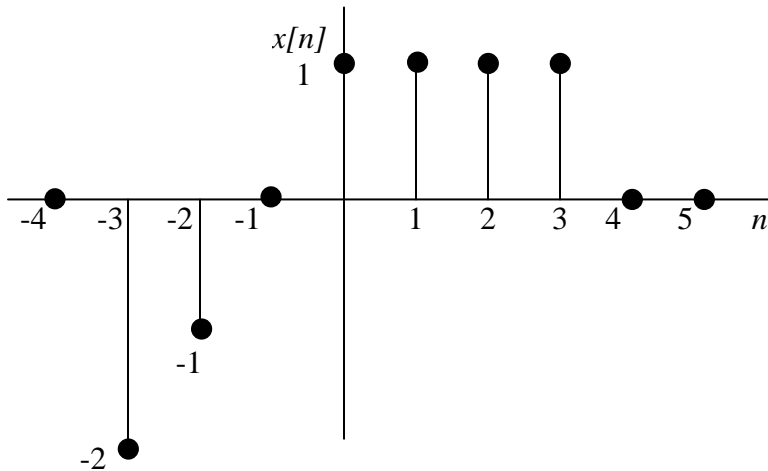


EE 327 Signals and Systems 1
Homework 2

1. Sketch the following discrete-time signals.

- a. $x[n] = u[n-5] - u[n-6]$
- b. $x[n] = 10u[-n+2] - 5u[n-2]$
- c. $x[n] = 4\delta[n+5] + (n+5)u[n+3] - nu[n]$
- d. $x[n] = (0.1)^n (u[n] - u[n-5])$

2. A discrete-time signal, $x[n]$, is shown below. Sketch each of the following signals.



- a. $y[n] = x[n-3]$
- b. $y[n] = x[3-n]$
- c. $y[n] = x[3n]$
- d. $y[n] = x[3n+1]$
- e. $y[n] = x[n]u[3-n]$
- f. $y[n] = x[n-2]\delta[n-2]$
- g. $y[n] = x[(n-1)^2]$

3. The following continuous-time signal is to be discretized. Determine the minimum sampling frequency required to prevent aliasing from occurring.

$$x(t) = 1 + 5 \cos(20\pi t) + 10 \cos(200\pi t)$$

4. Determine if the following system properties are valid.

- a. $y(t) = x(-t)$ Causal?
- b. $y(t) = (t+5)x(t)$ Memoryless?
- c. $y(t) = x(5)$ Memoryless?
- d. $y(t) = 2x(t)$ Stable (BIBO)?

5. Determine if the following system properties are valid.

a. $y(t) = x(t) + a$ Linear?

b. $y(t) = tx(2t)$ Linear?

c. $y(t) = \int_0^t x(t - \tau) d\tau$ Time Invariant?

d. $y(t) = x(2t)$ Time Invariant?

6. Determine the following properties for the discrete-time system that is given.
Properties – Causality, Memory, Stability, Linearity, Time Invariance, LTI.

$$y[n] = \left(\frac{n + 0.5}{n - 0.5} \right)^2 x[n]$$