

Assignment - 2

Syed Saqib Habeeb

Abstract—This document contains the solution to Exercise 2.22(d) of Signals and systems-Oppenheim and shafer.

$$y[2] = x(-1)h(3) + x(0)h(2) + x(1)h(1) + x(2)h(0) + x(3)h(-1) \quad (8)$$

Problem 1. Given that, For each of the pairs of sequences in Figure, use the discrete convolution to find the response to the input $x[n]$ of the linear time-invariant system with impulse response $h[n]$.

$$y[3] = x(0)h(3) + x(1)h(2) + x(2)h(1) = -1 \quad (9)$$

Hence we have $y[n]$ as

$$y[n] = \{0, -2, 5, 0, -1\} \quad (10)$$

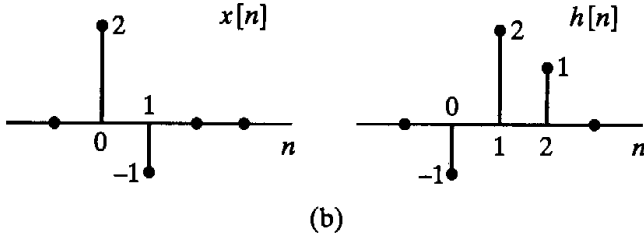


Fig. 1

Solution:

As we know the to compute the convolution:

$$y(n) = x(n) * h(n) = \sum_{n=-\infty}^{\infty} x(k)h(n-k) \quad (1)$$

Given that

$$x[n] = \{0, 2, -1, 0, 0\} \quad (2)$$

$$h[n] = \{0, -1, 2, 1, 0\} \quad (3)$$

Now we will compute the values of $y[n]$

$$y[n] = \sum_{n=-\infty}^{\infty} x(k)h(n-k) \quad (4)$$

$$y[-1] = x(-1)h(0) + x(0)h(-1) = 0 \quad (5)$$

$$y[0] = x(-1)h(1) + x(0)h(0) + x(1)h(-1) = -2 \quad (6)$$

$$y[1] = x(-1)h(2) + x(0)h(1) + x(1)h(0) + x(2)h(-1) = 5 \quad (7)$$