Assignment 1

G Yashwanth Naik - EE18BTECH11017

Download all python codes from

https://github.com/yashwanthguguloth24/EE3025-DSP-lab/tree/main/Assignment1/codes

and latex-tikz codes from

https://github.com/yashwanthguguloth24/EE3025-DSP-lab/tree/main/Assignment1

1 Problem

Given $x(n)$ and $y(n)$. Compute $X(k)$ using the formula

$$X(k) \stackrel{\triangle}{=} \sum_{n=0}^{N-1} x(n) e^{-j2\pi kn/N}, \quad k = 0,1,\ldots,N-1 \tag{1}$$

Then compute $Y(k)$ using

$$Y(k) = X(k)H(k) \tag{2}$$

2 Solution

First we can compute $X(k)$ from

$$x(n) = \left\{ \underset{\uparrow}{1}, 2, 3, 4, 2, 1 \right\} \tag{3}$$

using DFT equation (1). Now we can also compute $H(k)$ from,

$$h(n) + \frac{1}{2} h(n-1) = \delta(n) + \delta(n-2), \tag{4}$$

using DFT equation (1). Then we compute $Y(k)$ using (2).
The following code plots Fig.0 and Fig. 0

https://github.com/yashwanthguguloth24/EE3025-DSP-lab/tree/main/Assignment1/codes/6.2.py

We can also compute $y(n)$ using IDFT from Equation 5.

$$y(n) = \frac{1}{N} \sum_{k=0}^{N-1} Y(k) \cdot e^{j2\pi kn/N}, \quad n = 0,1,\ldots,N-1 \tag{5}$$

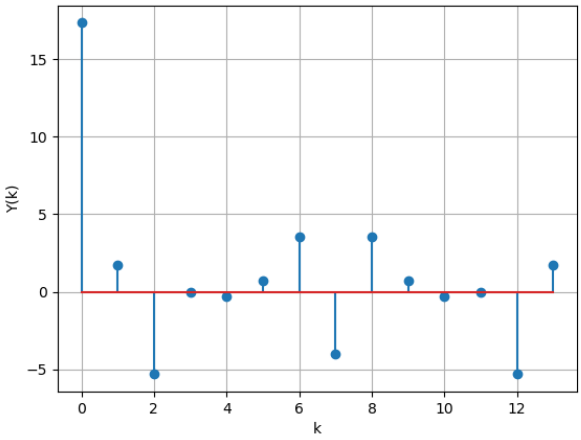

Fig. 0:

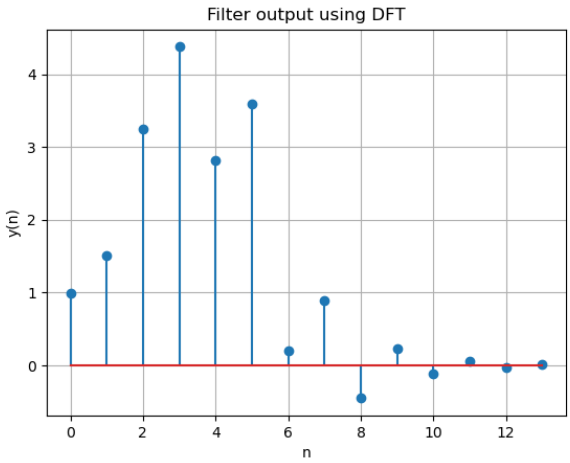

Fig. 0: