

# Assignment 1

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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

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

Then compute  $Y(k)$  using

$$Y(k) = X(k)H(k) \quad (2)$$

## 2 SOLUTION

First we can compute  $X(k)$  from

$$x(n) = 1, 2, 3, 4, 2, 1 \quad (3)$$

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

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

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.

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

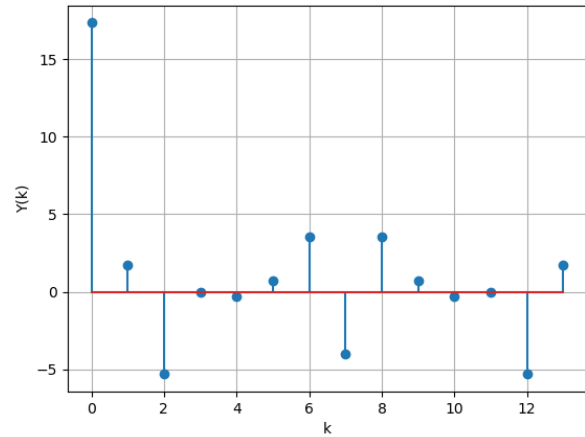


Fig. 0:

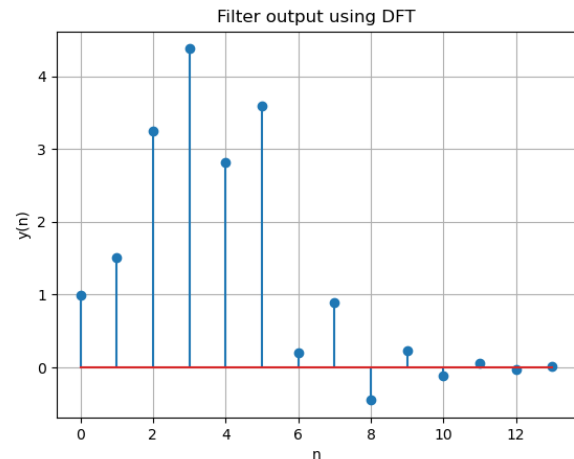


Fig. 0: