

Experiment 4: Linear Convolution and Circular Convolution

I Pre Lab

1. Define Linear Convolution

Soln. Linear Convolution is a mathematical operation due to calculate the output of any linear time invariant system, given its input and impulse response. It is applicable for the both Continuous and discrete time signal represents $y(n) = x(n) * h(n)$.

2. Define Circular Convolution

Soln. It is also known as cyclic convolution, which is the convolution of two periodic functions that have the same period. Multiplication of two sequences in frequency domain is called as Circular Convolution.

3. What is Convolution property of DFT?

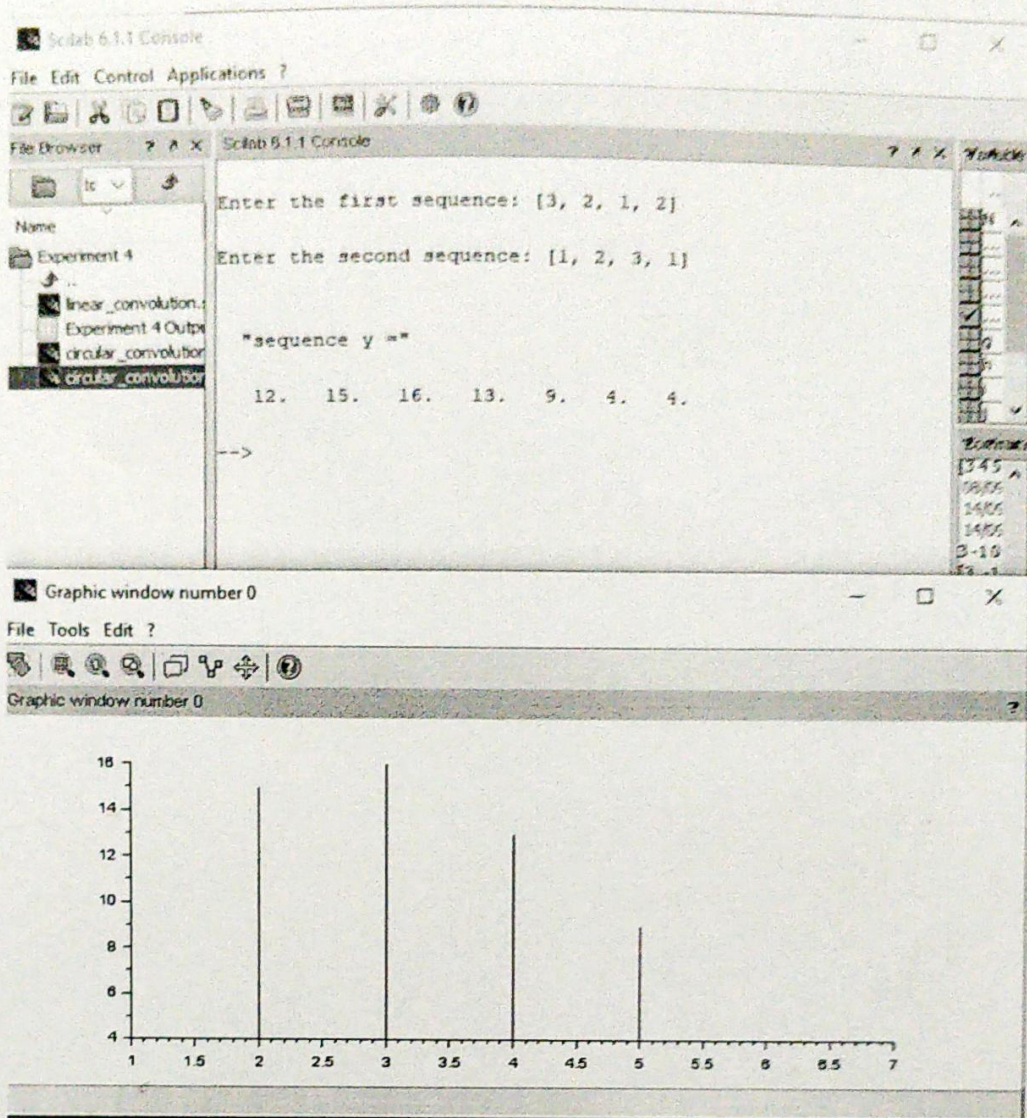
Soln. The Circular Convolution property states that,

$$\text{If } x_1(n) \xrightarrow[N]{\text{DFT}} X_1(k) \text{ and } x_2(n) \xrightarrow[N]{\text{DFT}} X_2(k) \text{ then}$$

$$x_1(n) \circledast x_2(n) \xrightarrow{\text{DFT}} X_1(k) X_2(k) N$$

It means that Circular Convolution of $x_1(n)$ and $x_2(n)$ is equal to multiplication of their DFT.

$$y(n) = \sum_{m=0}^{N-1} x_1(n) x_2(m-1) N$$



RESULT:

Linear and Circular Convolution of two input sequence
using Scilab were obtained and output was verified

Aditya
27-9-2022