

```
In [ ]: '''
Name: Om Kadam
Roll No: 45
Class: TE-EXTC A
Division: A
Year Of Study: TE
Branch: EXTC
Date: 24/08/2023
Time: 14:00
'''
```

Problem Statement: Prove 4 DFT Properties

```
In [2]: #Importing inbuilt libraries
import numpy as np
import matplotlib.pyplot as plt
```

Circular Timeshift Property

```
In [3]: #Getting user-defined inputs and determining its length
x = eval(input("Enter x(n) = "))
L = len(x)
print('Length is = ', L, '\n')
x1 = eval(input("Enter x1(n) = "))
M = len(x1)
print('Length is = ', M, '\n')
N = max(L,M)
```

Enter x(n) = [1,3,2,5]
Length is = 4

Enter x1(n) = [2,5,1,3]
Length is = 4

```
In [4]: X = np.fft.fft(x)
print(X)
```

[11.+0.j -1.+2.j -5.+0.j -1.-2.j]

```
In [5]: m = 1
Xr = np.zeros(N, complex)
for k in range(N):
    Xr[k] += X[k] * np.exp((-2j * np.pi * m * k) / N)
print(np.round(Xr, decimals = 2))
```

[11.+0.j 2.+1.j 5.+0.j 2.-1.j]

```
In [6]: X1 = np.fft.fft(x1)
print(X1)
```

[11.+0.j 1.-2.j -5.+0.j 1.+2.j]

```
In [7]: if Xr.all() == X1.all():
```

```
    print('Verified')
else:
    print('Not Verified')
```

Verified

```
In [8]: x1 = eval(input("Enter x1(n) = "))
        M = len(x1)
        print('Length is = ', M, '\n')
```

Enter x1(n) = [3,2,5,1]
Length is = 4

```
In [9]: m = 2
        Xr = np.zeros(N, complex)
        for k in range (N):
            Xr[k] += X[k] * np.exp((-2j * np.pi * m * k) / N)
        print(np.round(Xr, decimals = 2))
```

[11.+0.j 1.-2.j -5.-0.j 1.+2.j]

```
In [10]: X1 = np.fft.fft(x1)
         print(X1)
```

[11.+0.j -2.-1.j 5.+0.j -2.+1.j]

```
In [11]: if Xr.all() == X1.all():
         print('Verified')
         else:
             print('Not Verified')
```

Verified