1) Write python program to compute DFT and IDFT (without using inbuilt function) of 4- point

sequence, x[n]={ 2,4, 1,3}. Verify your answers by calculation.

What is twiddle factor? What are its properties?

Code -

DFT

import numpy as np

def DFT(x):

N=len(x)

n=np.arange(N)

print('\n Time index:',n)

K=np.arange(N)

K=K.reshape(N,1)

print('\nTranspose of frequency index k:\n',K)

W=np.exp(-2j\*np.pi\*n\*K/N)

Wt=np.round(W.real,1)+np.round(W.imag,1)\*1j

print('\n Twiddle factor matrix:\n',Wt)

return(np.dot(Wt,x))

x1=[1,2,3,4]

x1K=DFT(x1)

print('X(n):',x1)

print('X(k):',x1K)

IDFT

import numpy as np

def IDFT(x):

N=len(x)

n=np.arange(N)

print('\n Time index:',n)

K=np.arange(N)

K=K.reshape(N,1)

print('\nTranspose of frequency index k:\n',K)

W=np.exp(2j\*np.pi\*n\*K/N)

Wt=np.round(W.real,1)+np.round(W.imag,1)\*1j

print('\n Twiddle factor matrix:\n',Wt)

return(np.dot(Wt,x)/N)

x1=[10,-2+2j,-2,-2-2j]

x1n=IDFT(x1)

print('X(n):',x1)

print('x(n):',x1n)