**Digital Signal Processing**

Assignment 2

A discrete time signal x[n] is such that its value is one when 0<=n<=4 and zero elsewhere. 4, 5, 10 and 20 point DFT were taken and then their inverse DFT were taken and compared with the original signal. 4 point DFT showed distortion as a result of time domain aliasing.

Matlab code:

clear all;

close all;

clc;

t=30;

N=4; %num point DFT

n=0:t;

u=@(x) x>=0; %create unit step

X=@(n) u(n) - u(n-5);

stem(n,X(n));

Xper = @(n) X(mod(n,N)); %making x(n) periodic

x = fft(X(n), N); %taking fast fourier transform

y = ifft(x, N); % taking inverse FFT

Xgraph = zeros(1, t+1);

Xgraph(1:N) = x(1:N);

invXgraph = zeros(1, t+1);

invXgraph(1:N) = y(1:N);

subplot(4, 1, 1)

stem(n, X(n));

title('Original signal x[n]')

subplot(4,1,2)

stem(n, Xper(n));

title('x[n] as periodic function')

subplot(4,1,3)

stem(n, Xgraph);

title('4 point DFT')

subplot(4,1,4)

stem(n, invXgraph);

title('inverse DFT')





