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%Determine DFT for given values of x1[n] and N, find magnitude and phase
%spectra. Use the IDFT to transfer the X[k] sequence) to original sequence.
close all; %close open figures and windows generated by running MATLAB code
clear all; %clear the workspace
clc;      %clear the command window

N = 4;          %No. of samples
Fs= 8000;       %Sampling frequency
X = zeros(4); %Initialising variable of DFT
Ts= 1/Fs;       %Sampling time
x=[1 1 1 1];

%Discrete fourier transform
for k = 1:1:4      %No. of samples
    for n = 0:1:N-1 %Time index
        X(k)=X(k)+(1)*exp(-j*2*pi*(k-1)*n/N);
    end;
end;
X1 = fftshift(abs(X)); %shift the fft to center of maximum amplitude
f = linspace(-Fs/2,Fs/2,N); %x axis symmetric around central frequency

%magnitude plot of DFT
figure(1)          %New figure window
stem(f,X1);        %Discrete plot
xlabel('k');        %Label of x axis
ylabel('X(k)');     %Label of y axis
title('magnitude plot of DFT 14UEC109'); %Title of plot

%phase plot of DFT
figure(2)          %New figure window
stem(f,fftshift(angle(X))); %Discrete plot
xlabel('k');        %Label of x axis
ylabel('\angle X(k)'); %Label of y axis
title('phase plot of DFT 14UEC109'); %Title of plot

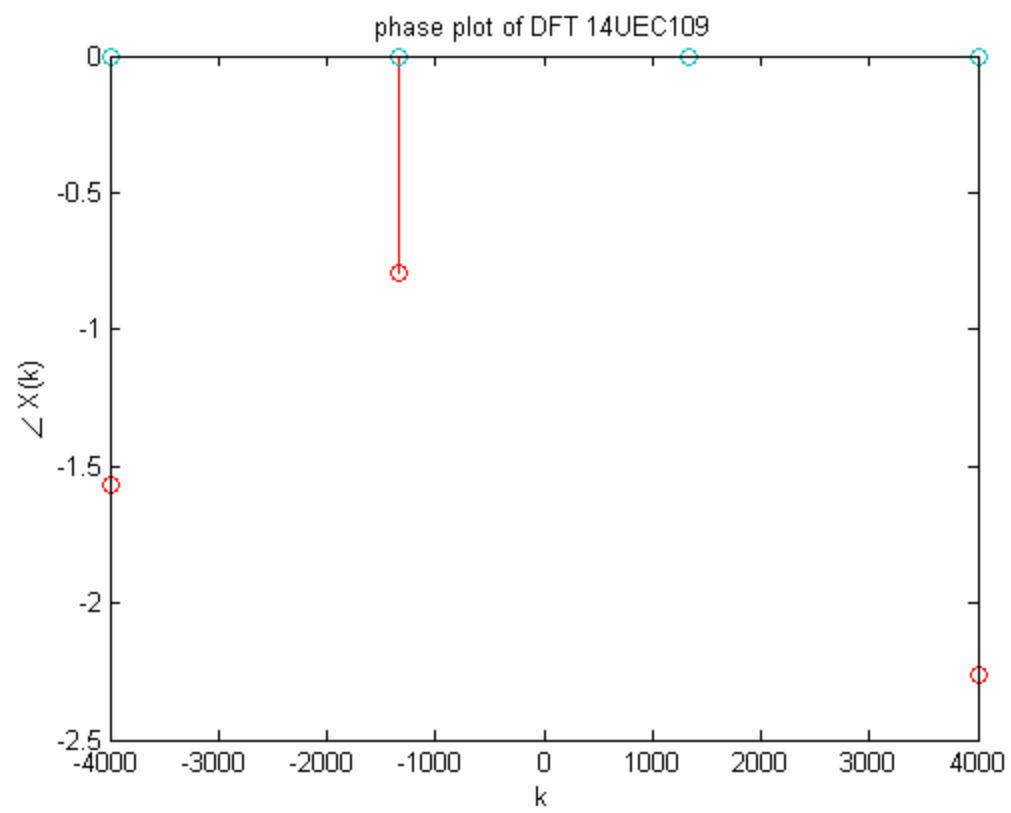
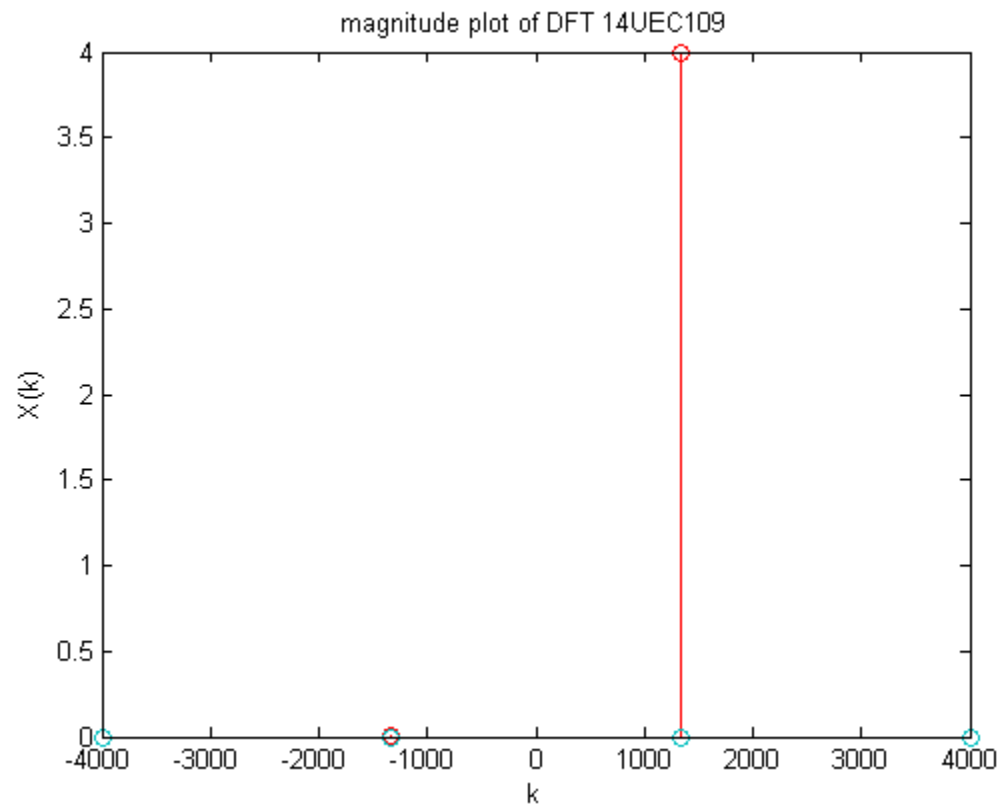
%Inverse Discrete Fourier Transform
x1 = zeros(4); %initialising variable of IDFT signal
for n = 1:1:N    %time index
    for k = 0:1:3 %no. of samples
        x1(n)=x1(n)+(X(k+1)*exp(j*2*pi*(k)*(n-1)/N))/N; %IDFT
    end;
end;

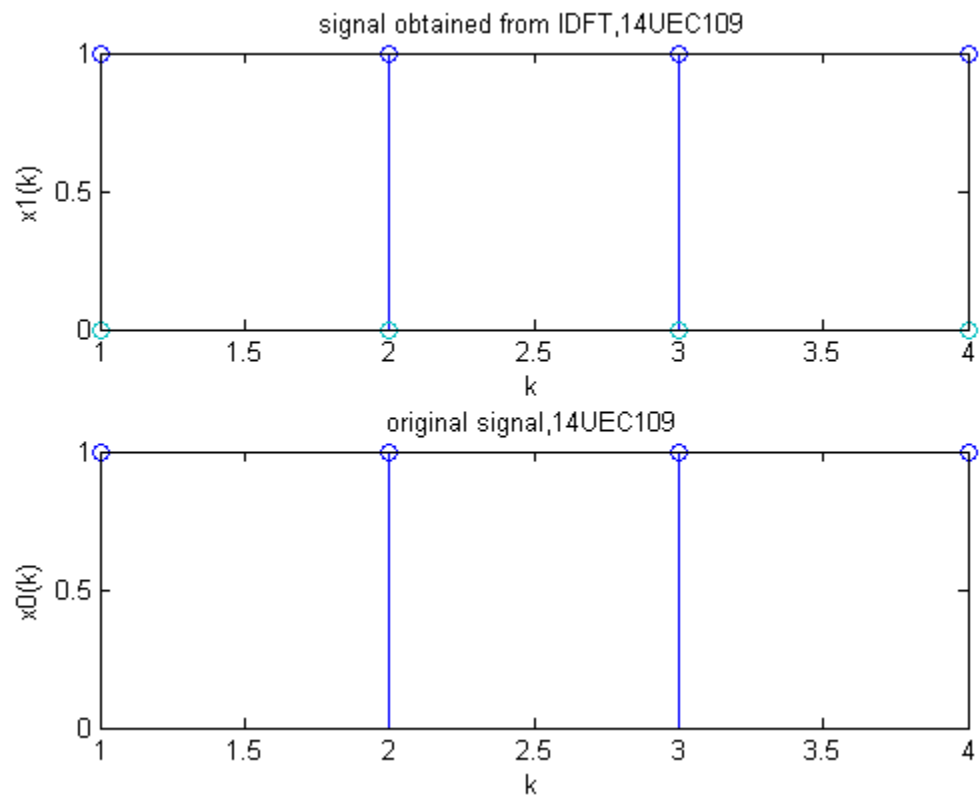
k = 1:1:4;      %No. of samples
x0 = [1 1 1 1]; %original signal

%IDFT PLOT
figure          %New figure window
subplot(2,1,1) %Plotted in first section of 2x1 figure
stem(k,x1);    %continuous plot
xlabel('k');    %Label of x axis
ylabel('x1(k)'); %Label of y axis
title('signal obtained from IDFT,14UEC109'); %Title of plot
hold on        %To hold the current plot in the figure window

%Plot of original signal
subplot(2,1,2) %Plotted in second section of 2x1 figure
stem(k,x0);    %continuous plot
xlabel('k');    %Label of x axis
ylabel('x0(k)'); %Label of y axis
title('original signal,14UEC109'); %Title of plot

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