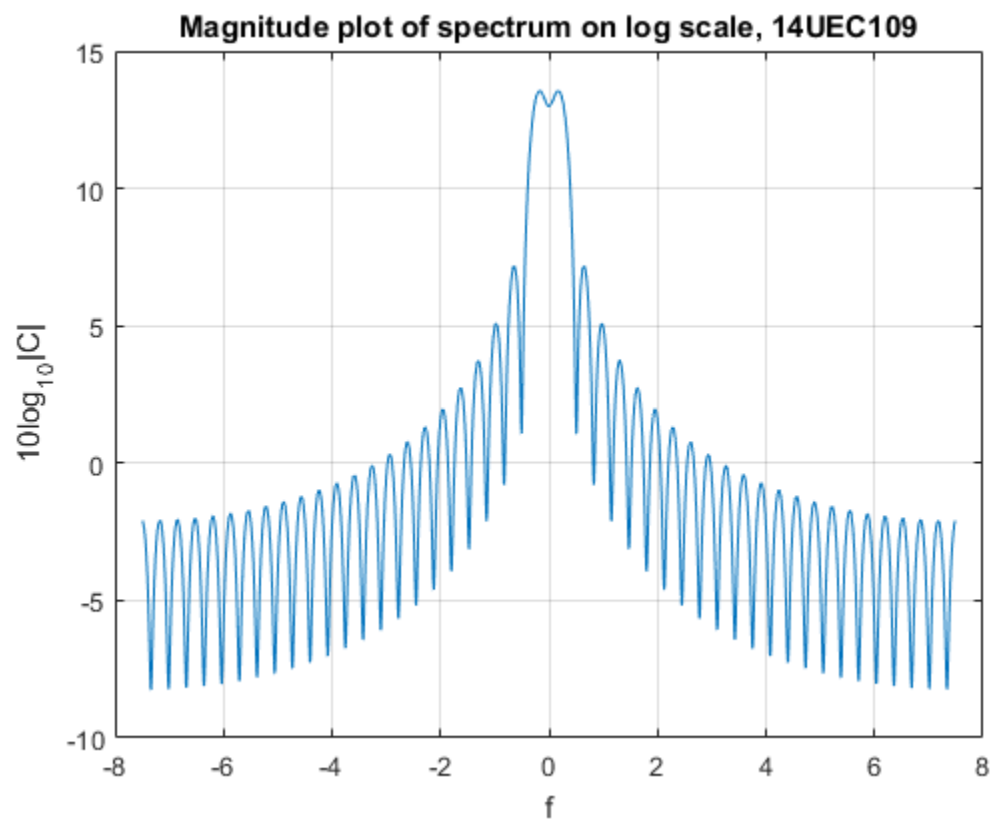
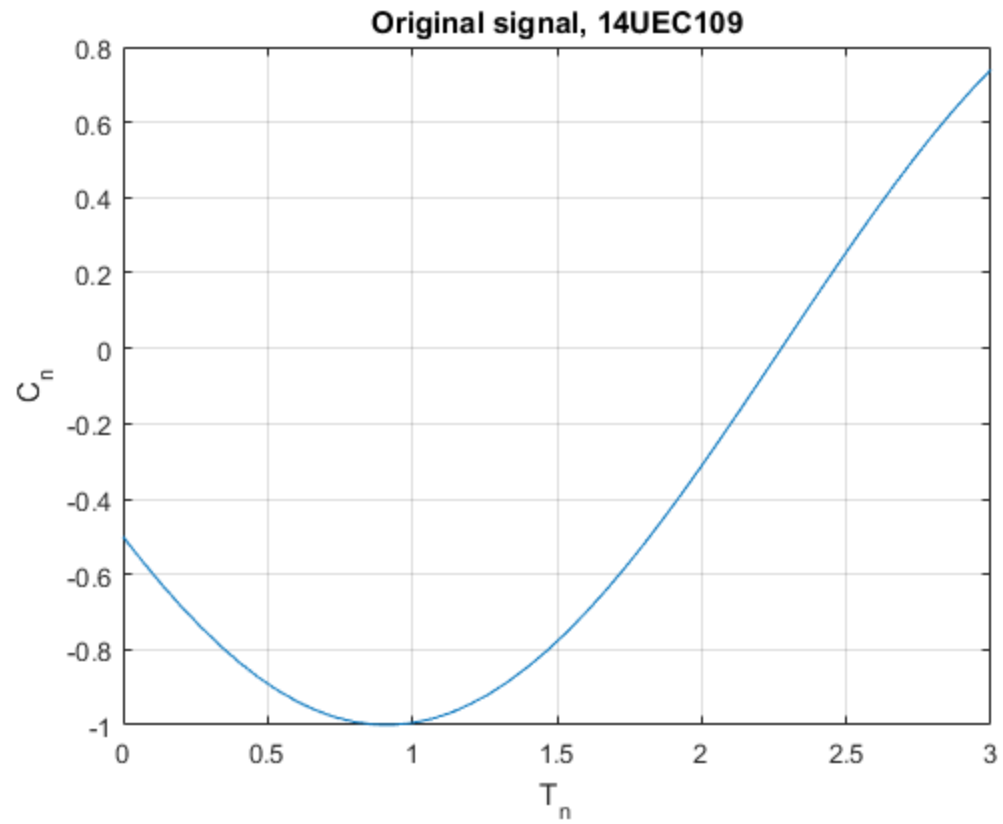

```
%Exercisel,Q3.FFT using bin center frequency
close all; %close figures
clear all; %clear workspace
clc; %clear command window

fs = 15; % Sample frequency
T = 1/fs; % Sample period
tn = [0 : T : 3]; % Time vector with samples spaced T seconds apart
N = 2^12; % FFT size
k = (N/2) + 50; %cycles per sample
fbin = (-0.5*fs + (k/N)*fs); % bin center Frequency of the sinusoid
theta = 2*pi/3; % Phase of the sinusoid
cn = cos(2*pi*fbin*tn + theta); % Construct the sinusoid

figure(1) %first plot
plot(tn, cn); % Plot the sinusoid
xlabel('T_n'); %label of x-axis
ylabel('C_n'); %label of y-axis
title('Original signal, 14UEC109'); %title of graph
grid on; %switches on grid in figure

f = ([0 : N - 1]/N - 0.5)*fs; % The frequency vector for plotting
C = fftshift(fft(cn,N)); % Compute the FFT and rearrange the output

figure(2) %second plot
plot(f, 10*log10(abs(C))); % Plot the magnitude of spectrum on log
scale
xlabel('f'); %label of x-axis
ylabel('10log_10|C|'); %label of y-axis
title('Magnitude plot of spectrum on log scale, 14UEC109'); %title of
graph
grid on; %switches on grid in figure
```



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