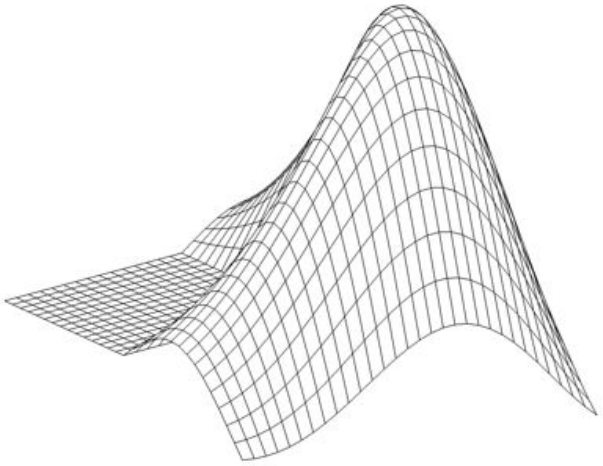
Matlab Project



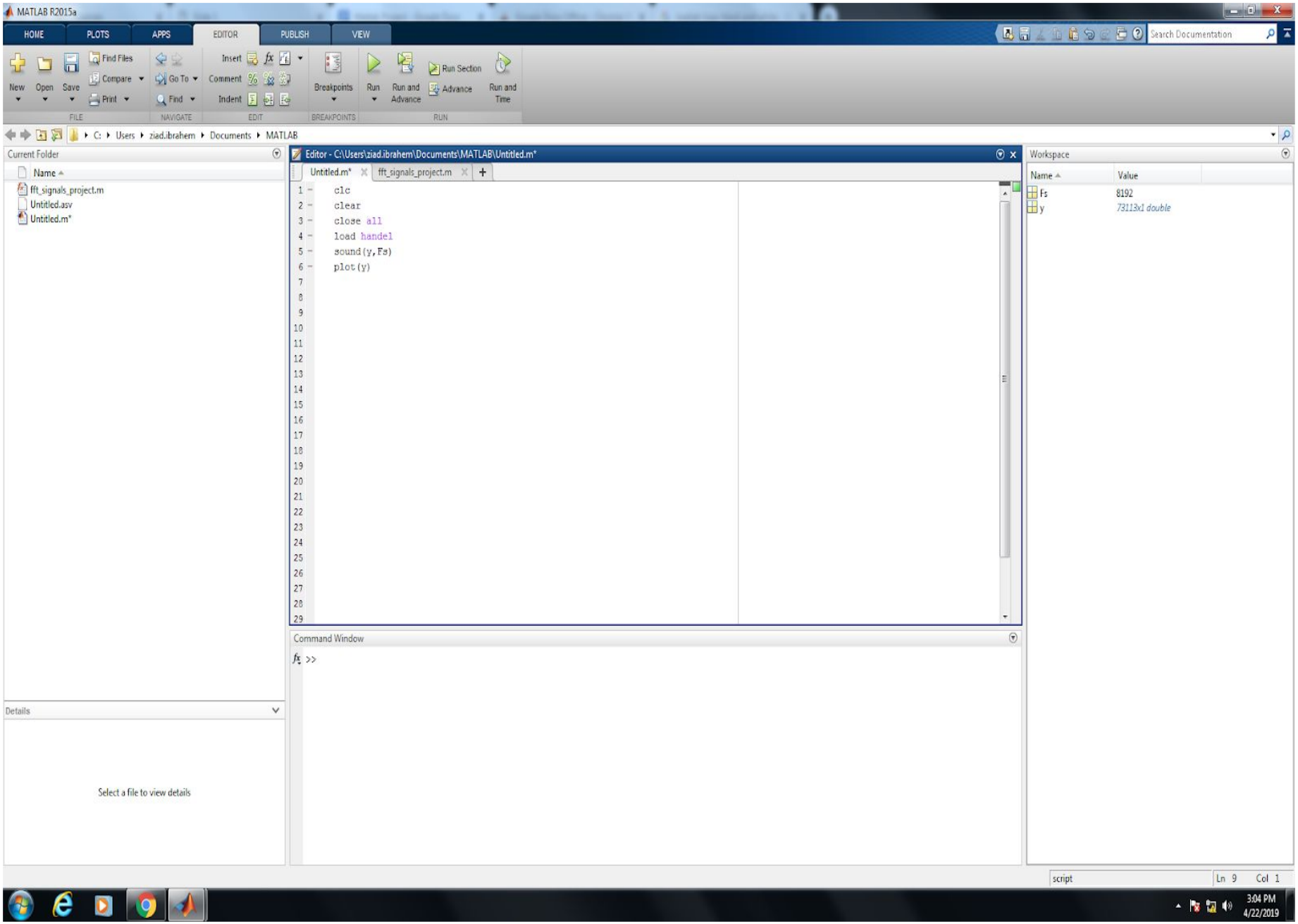
By: **Ziad Ayman**
Nadine Ahmed
Maryam Ahmed
ID: **43-4384**

Tutorial: **T5 IET**

Supervised by: **Engy Aly**

Part A :

- Load Handel
- Plot y
- The graph was not as expected
- The x-axis corresponds to the number of samples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RUN
C: ▸ Users ▸ ziad.ibrahem ▸ Documents ▸ MATLAB
Current Folder
Name
fft_signals_project.m
Untitled.asv
Untitled.m*
Editor - C:\Users\ziad.ibrahem\Documents\MATLAB\Untitled.m*
Untitled.m*
fft_signals_project.m
1 clc
2 clear
3 close all
4 load handel
5 sound(y,Fs)
6 plot(y)
Workspace
Name
Value
Fs
8192
y
73113x1 double
Command Window
>>
Details
Select a file to view details
script
Ln 9
Col 1
3:04 PM
4/22/2019

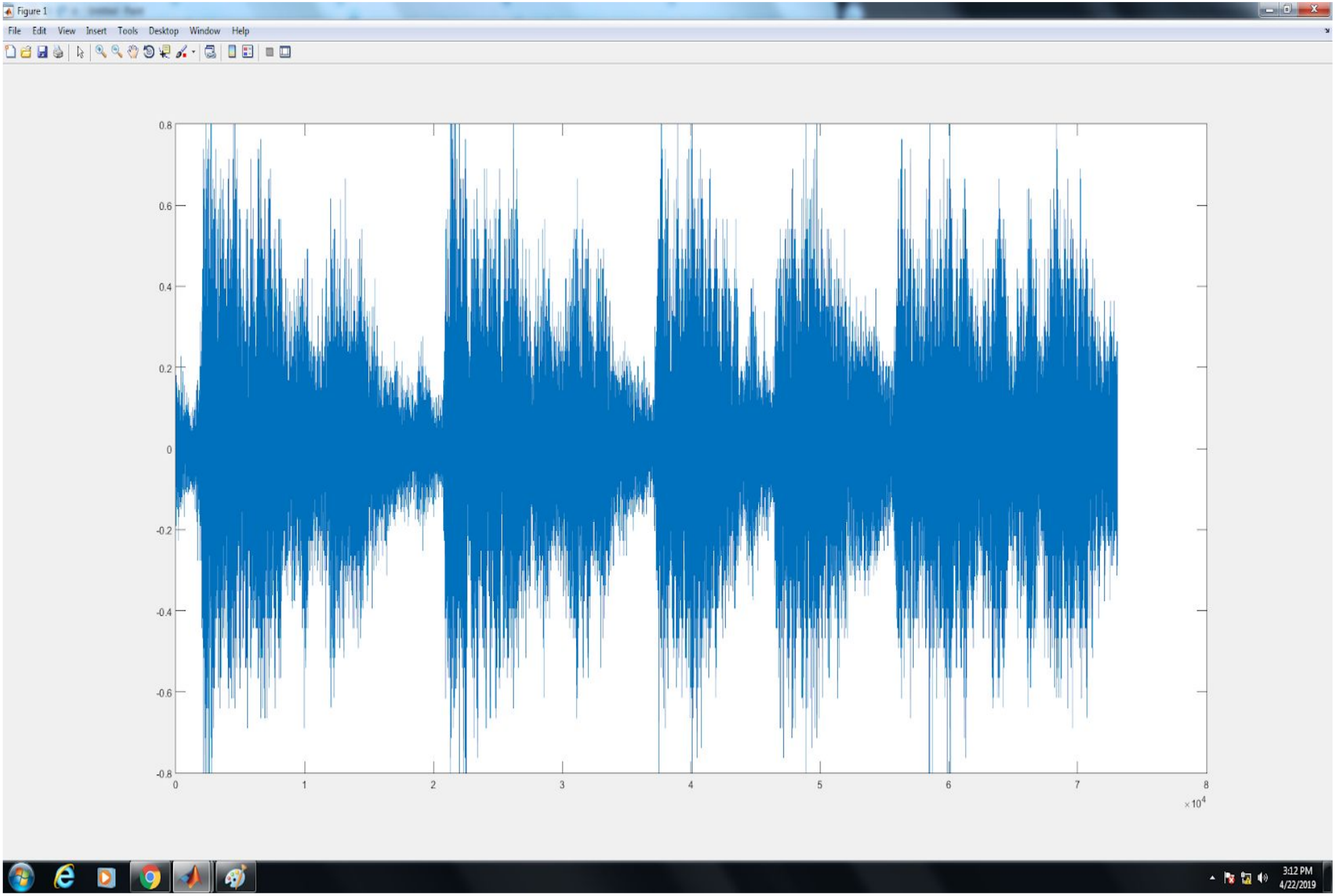
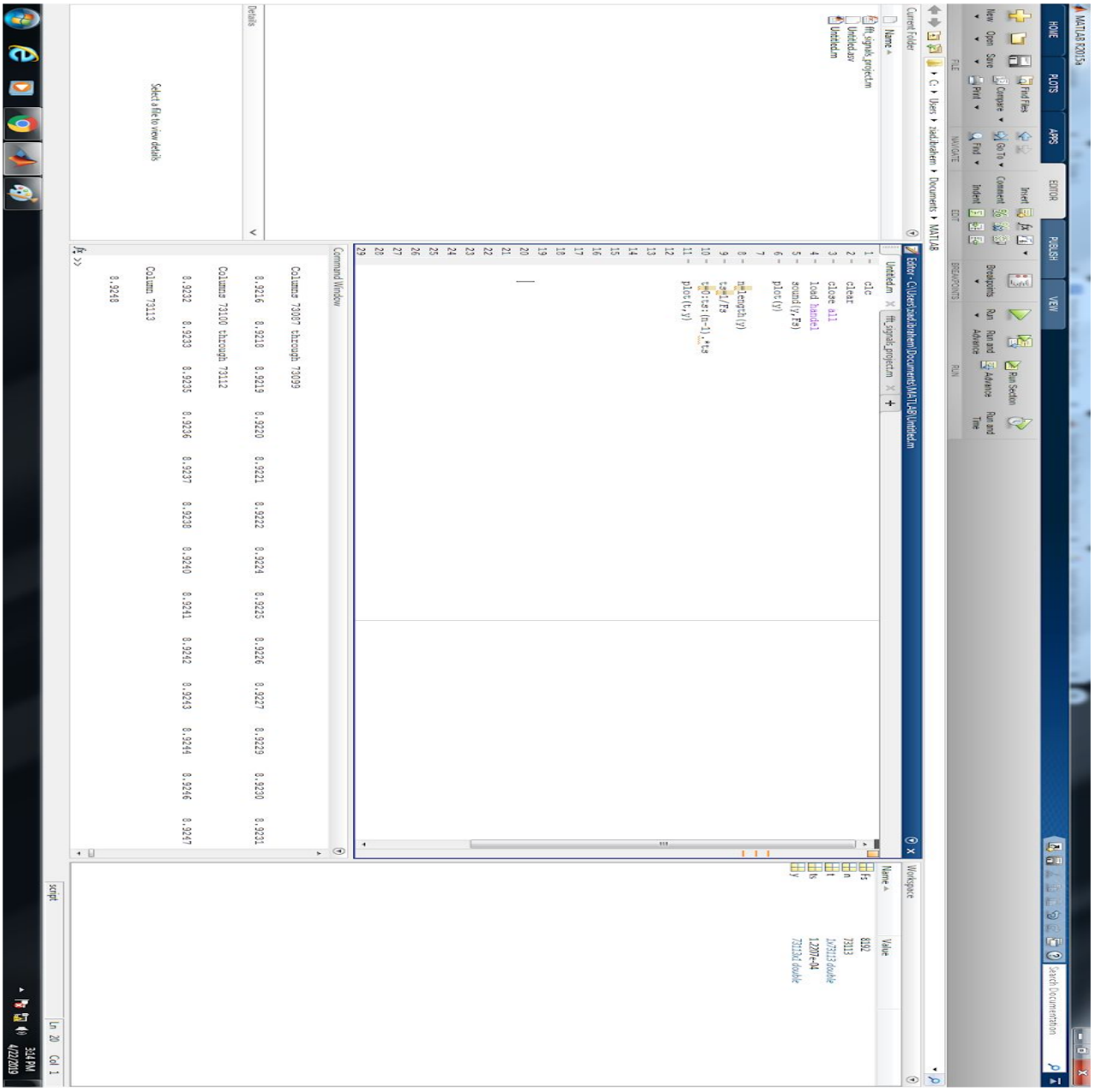
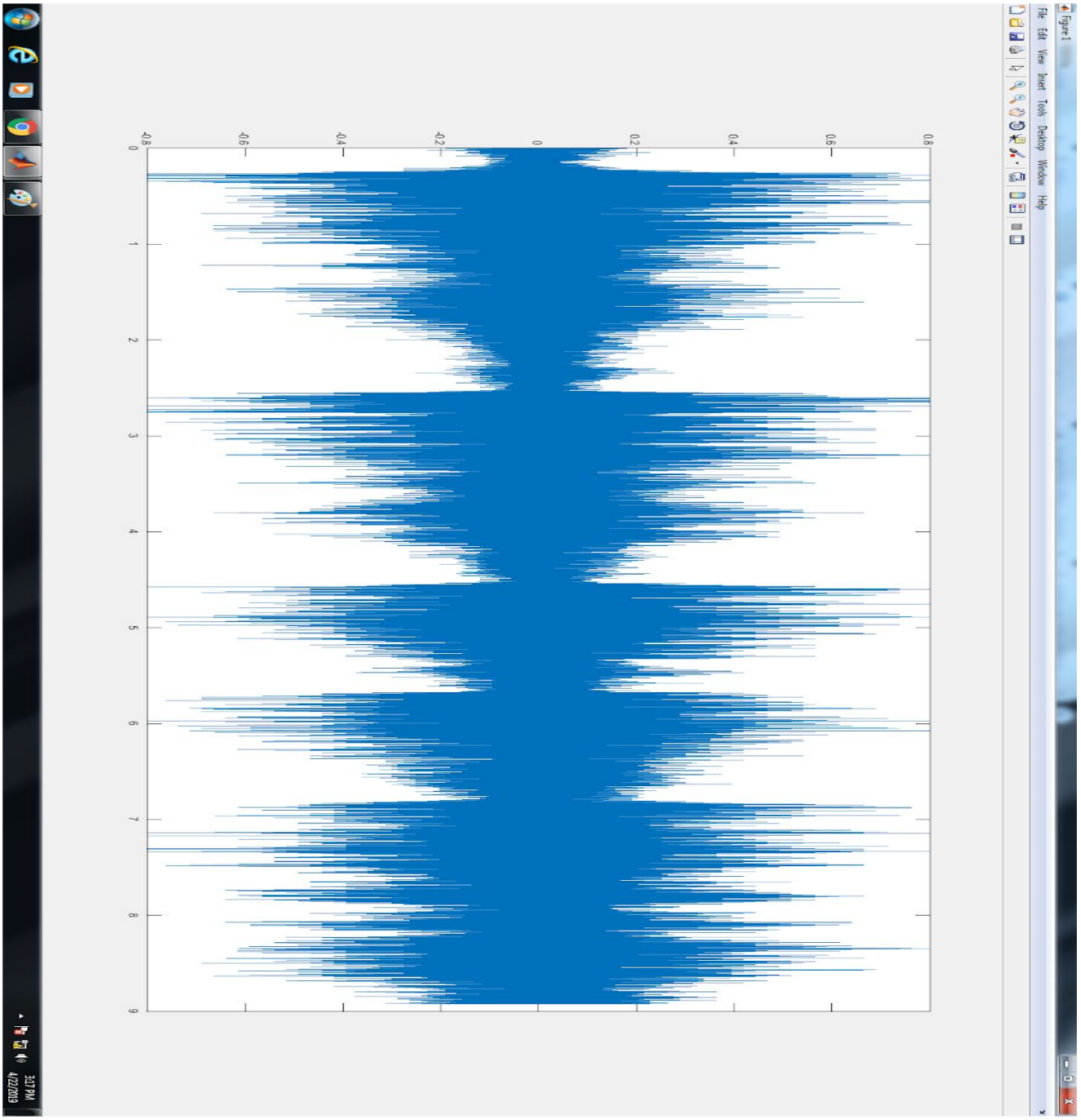


Figure 1
File Edit View Insert Tools Desktop Window Help
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
0 1 2 3 4 5 6 7 8
×10^4
3:12 PM
4/22/2019

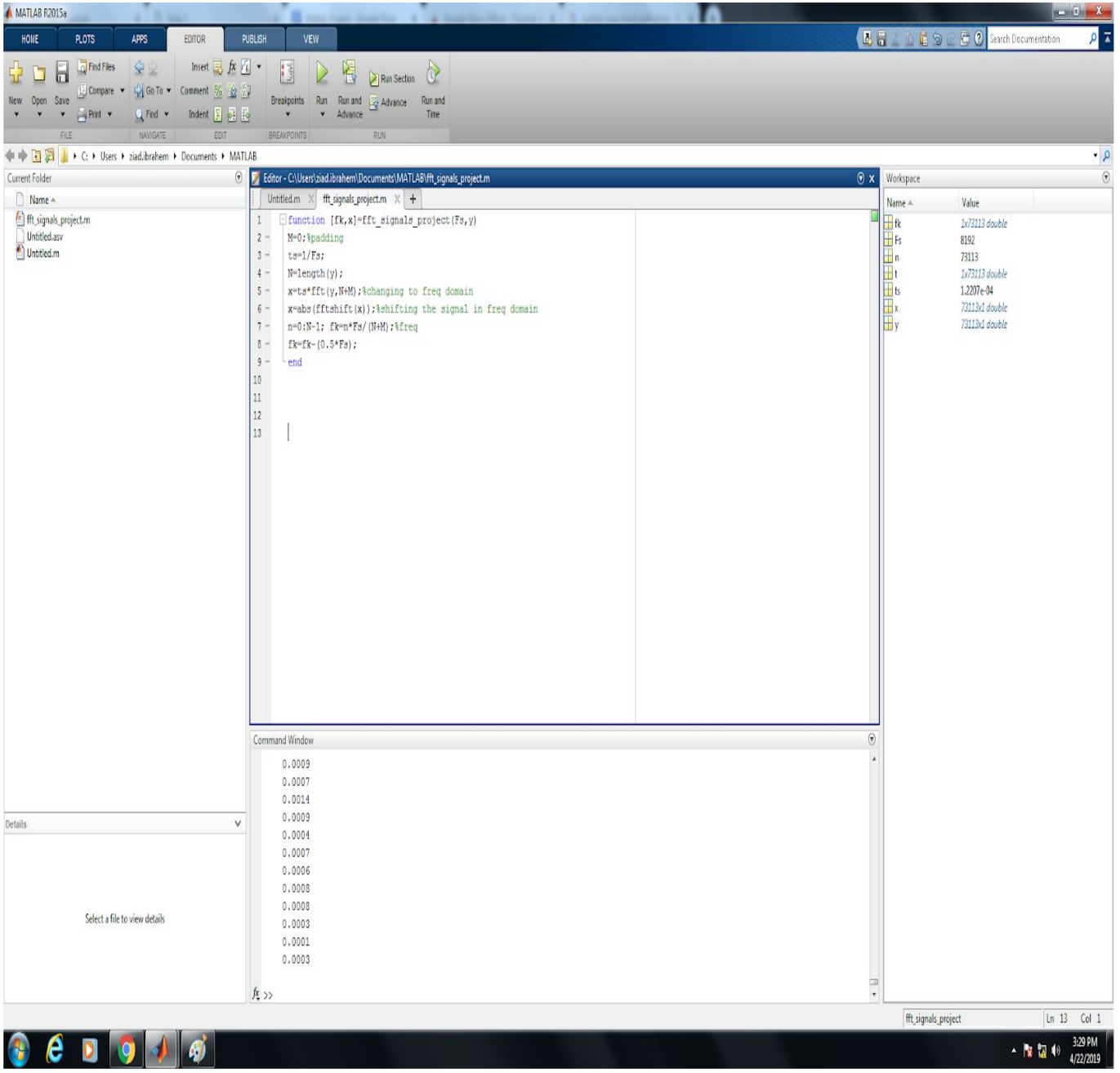
To overcome the problem i did so :



(n-1) because i considered the sample at t=0



FFT Code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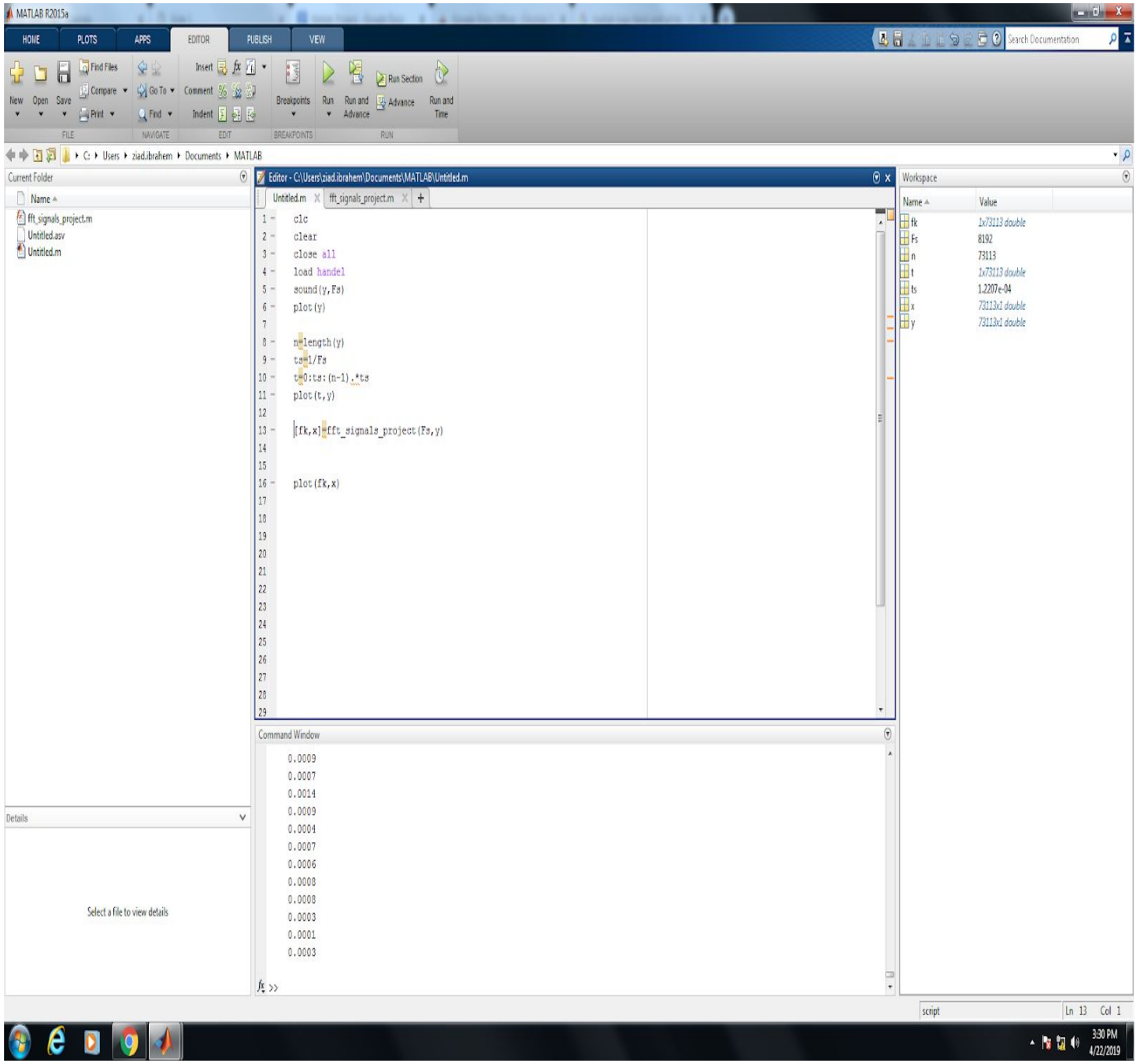
BREAKPOINTS
RUN
C: ▸ Users ▸ ziad.ibrahem ▸ Documents ▸ MATLAB
Current Folder
Name
fft_signals_project.m
Untitled.asv
Untitled.m
Editor - C:\Users\ziad.ibrahem\Documents\MATLAB\fft_signals_project.m
Untitled.m
fft_signals_project.m
1 function [fk,x]=fft_signals_project(Fs,y)
2 M=0;%padding
3 ts=1/Fs;
4 N=length(y);
5 x=ts*fft(y,N+M);%changing to freq domain
6 x=abs(fftshift(x));%shifting the signal in freq domain
7 n=0:N-1; fk=n*Fs/(N+M);%freq
8 fk=fk-(0.5*Fs);
9 end
10
11
12
13
Workspace
Name
Value
fk 1x73113 double
Fs 8192
n 73113
t 1x73113 double
ts 1.2207e-04
x 73113x1 double
y 73113x1 double
Command Window
0.0009
0.0007
0.0014
0.0009
0.0004
0.0007
0.0006
0.0008
0.0008
0.0003
0.0001
0.0003
>>
Details
Select a file to view details
fft_signals_project
Ln 13 Col 1
3:29 PM
4/22/2019



Using FFT and plotting it

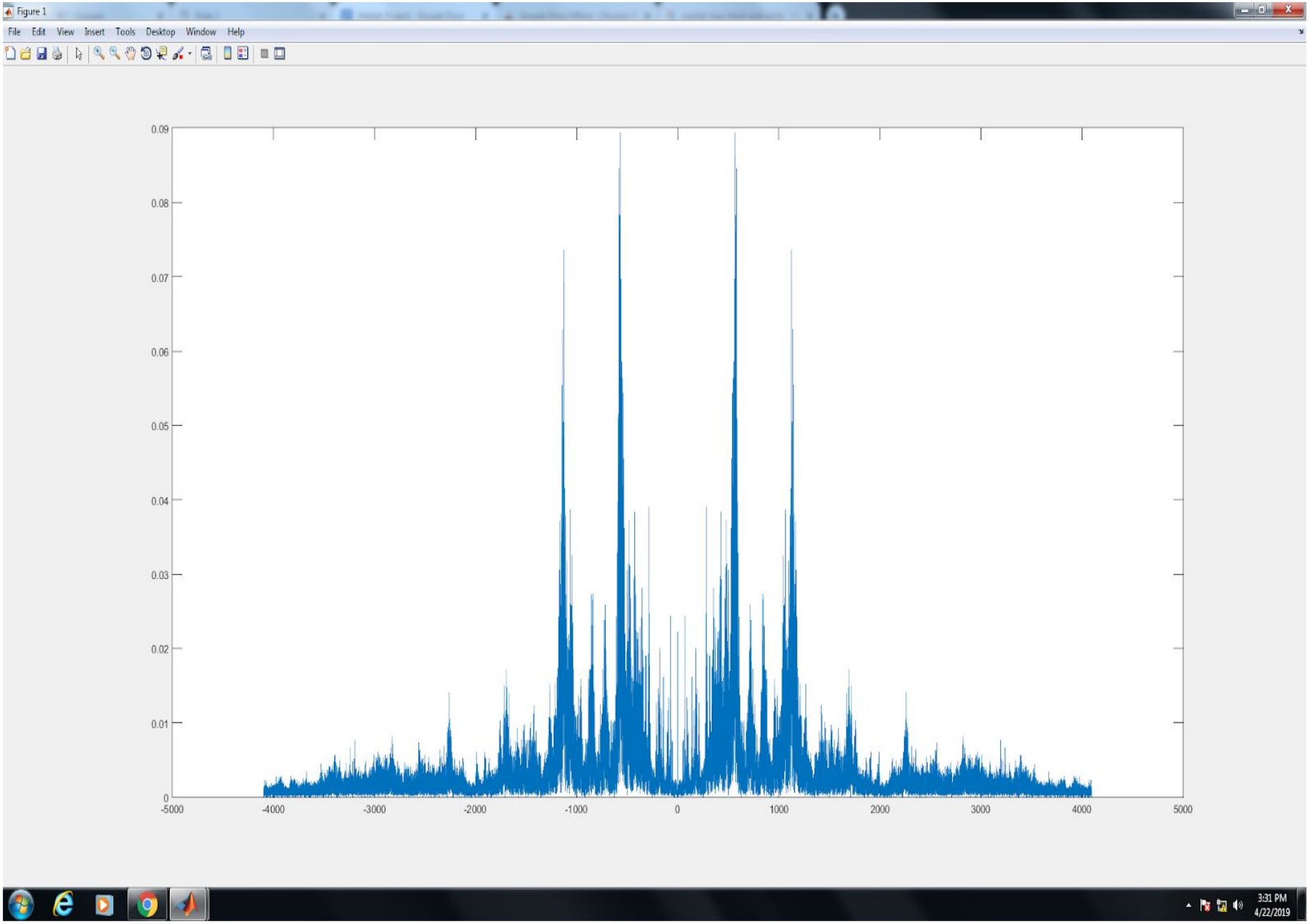
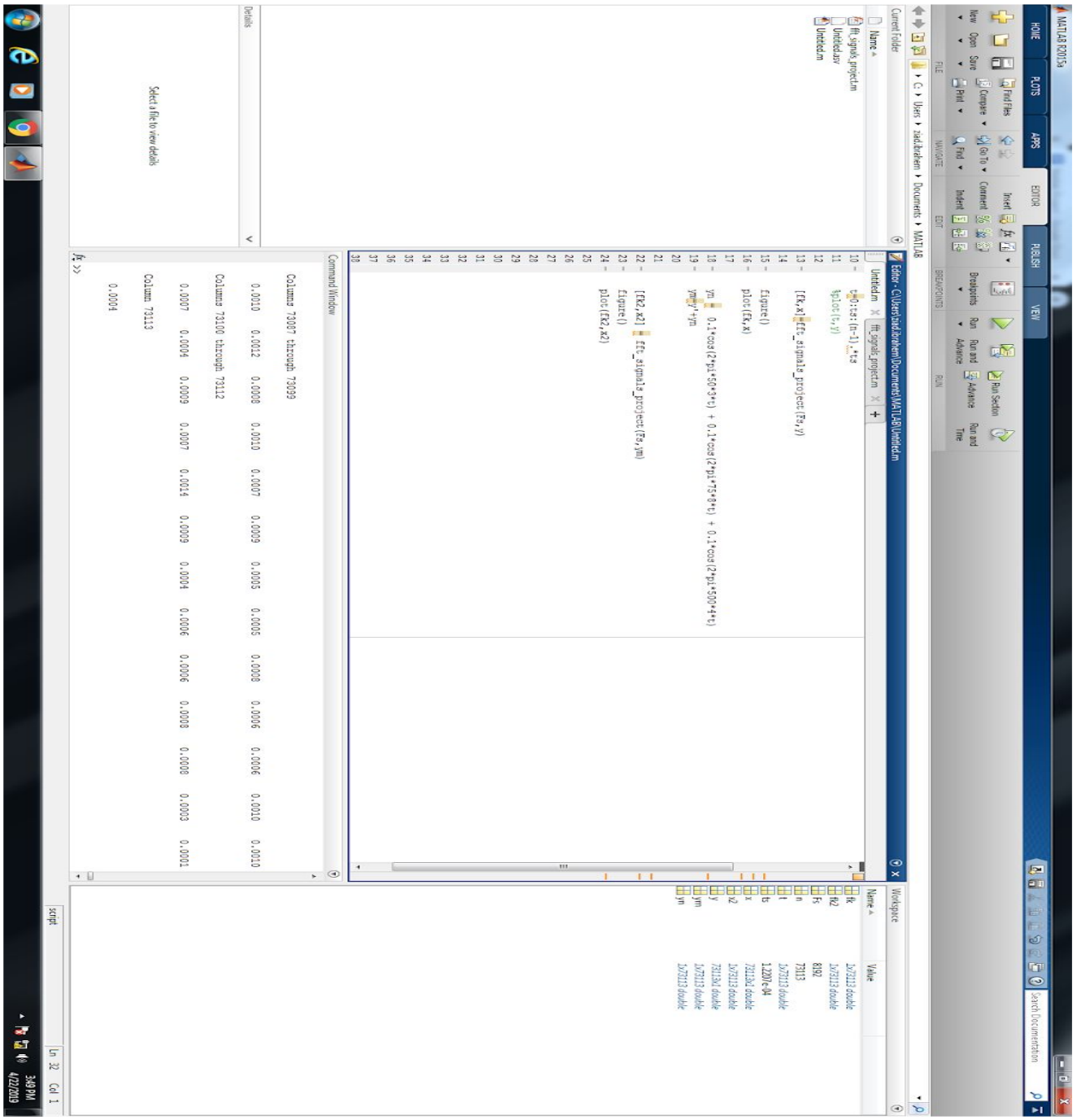
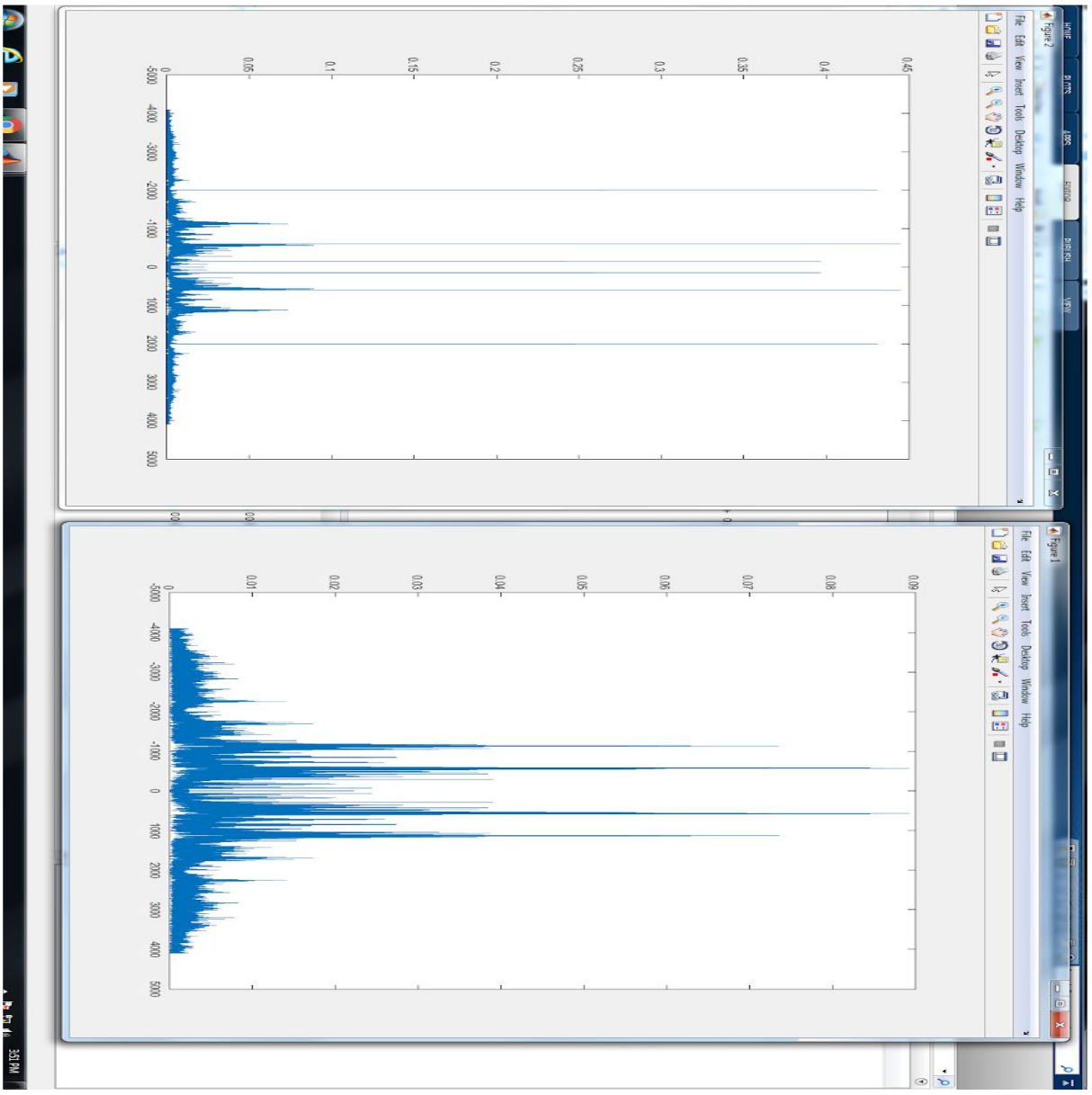


Figure 1
File Edit View Insert Tools Desktop Window Help
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
-5000
-4000
-3000
-2000
-1000
0
1000
2000
3000
4000
5000
3:31 PM
4/22/2019

Part B :
Adding the noise (ID#384)

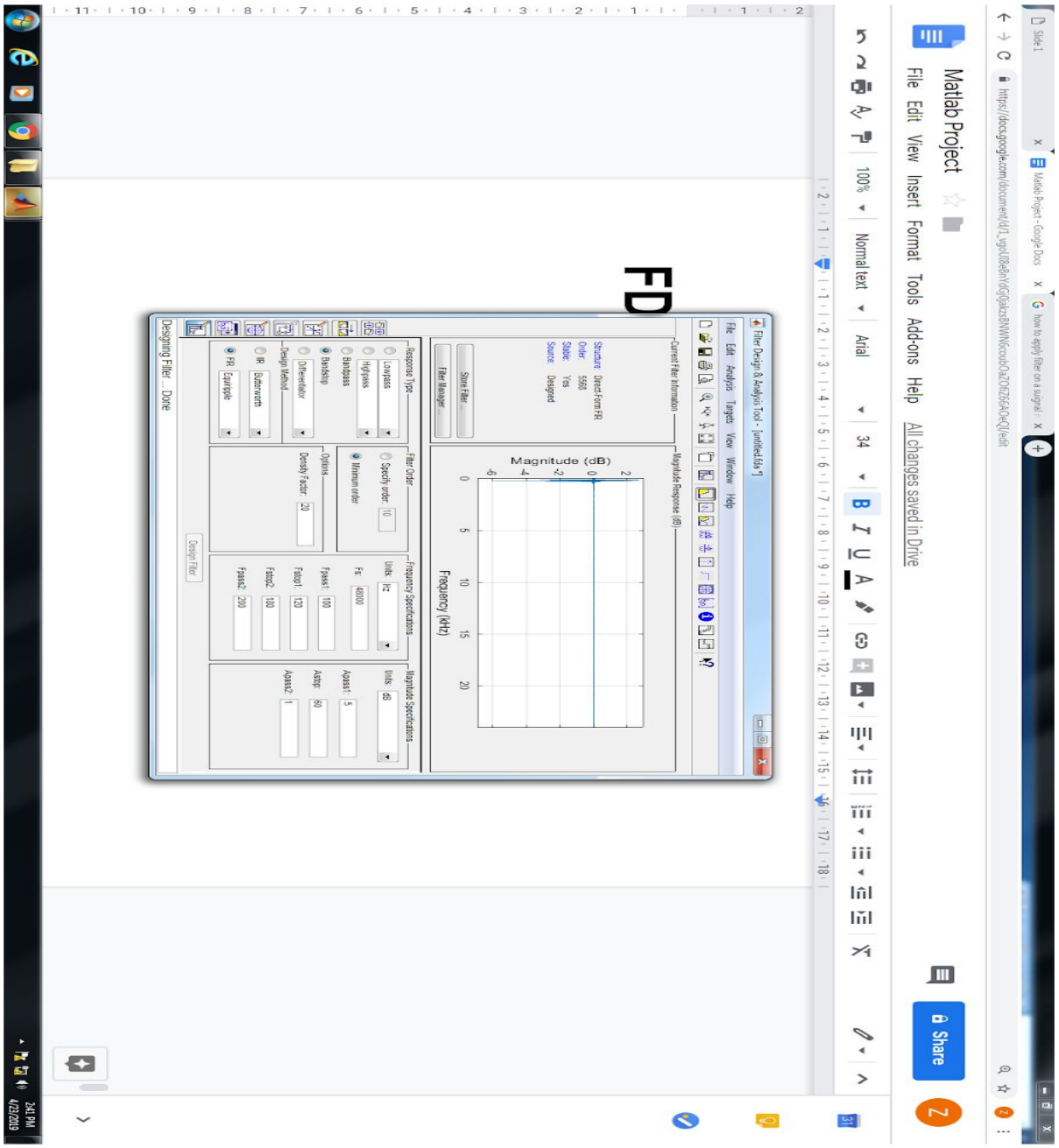


figure(2) is with noise

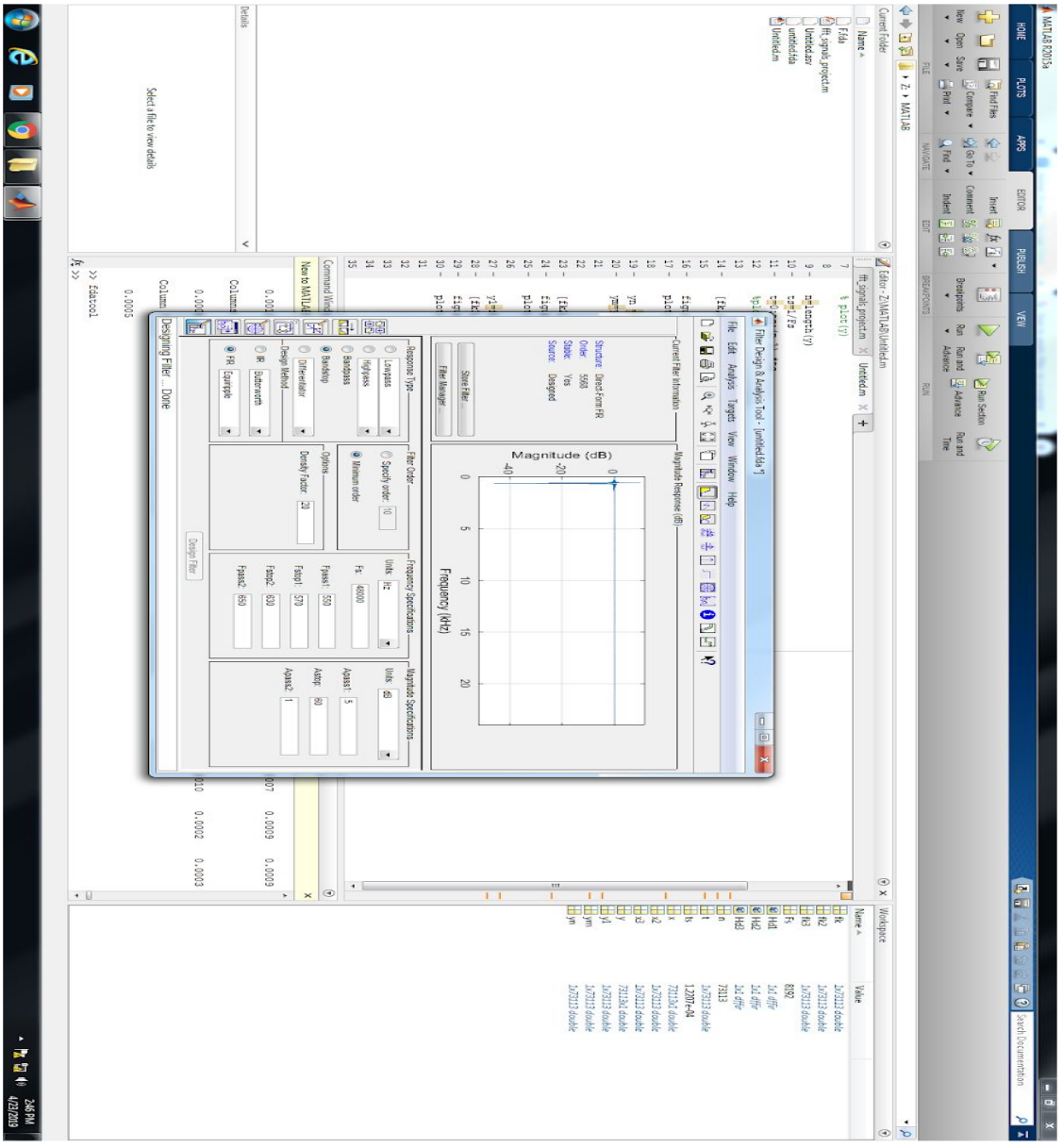


FDA tool to remove noise

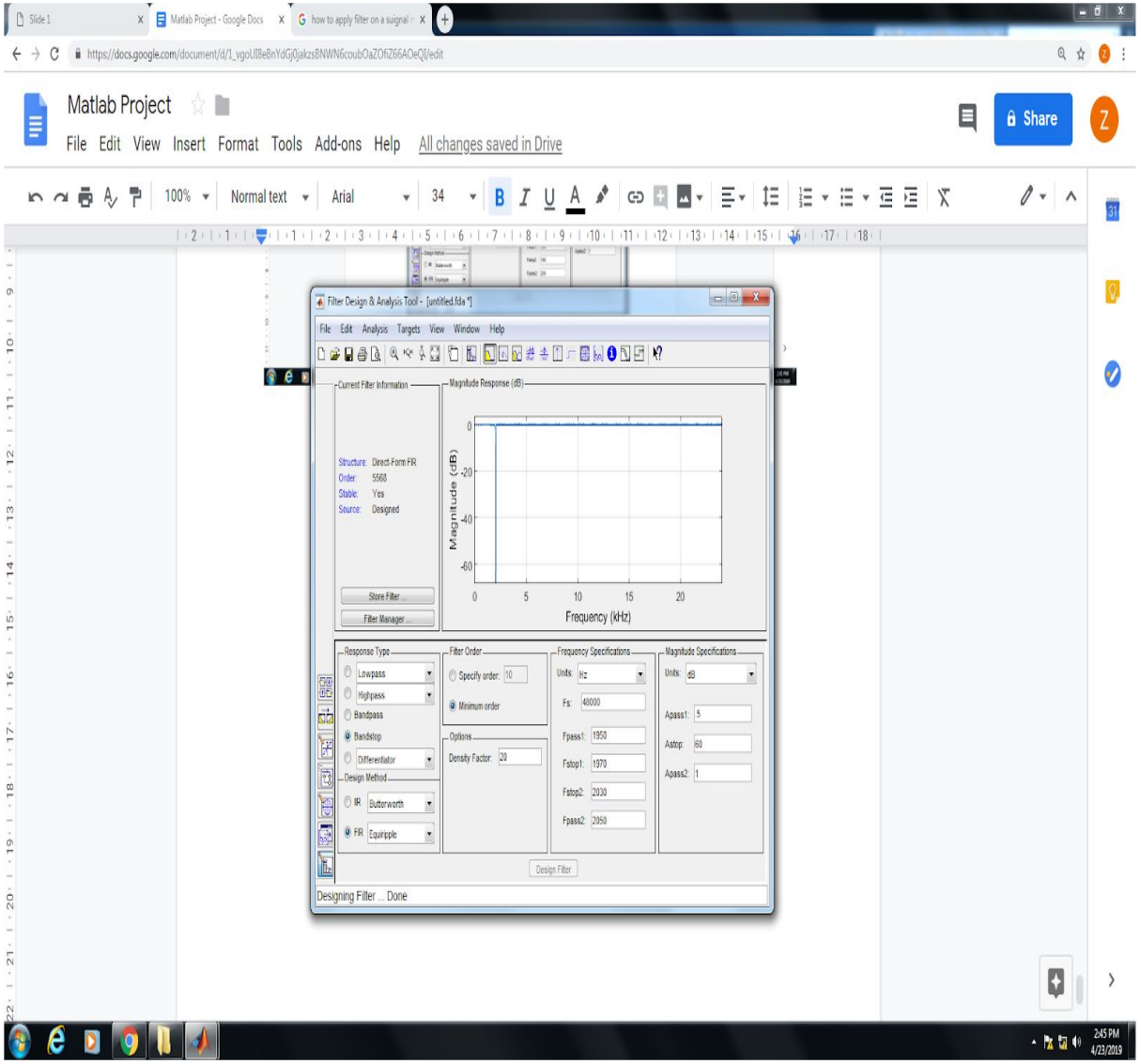
HD1

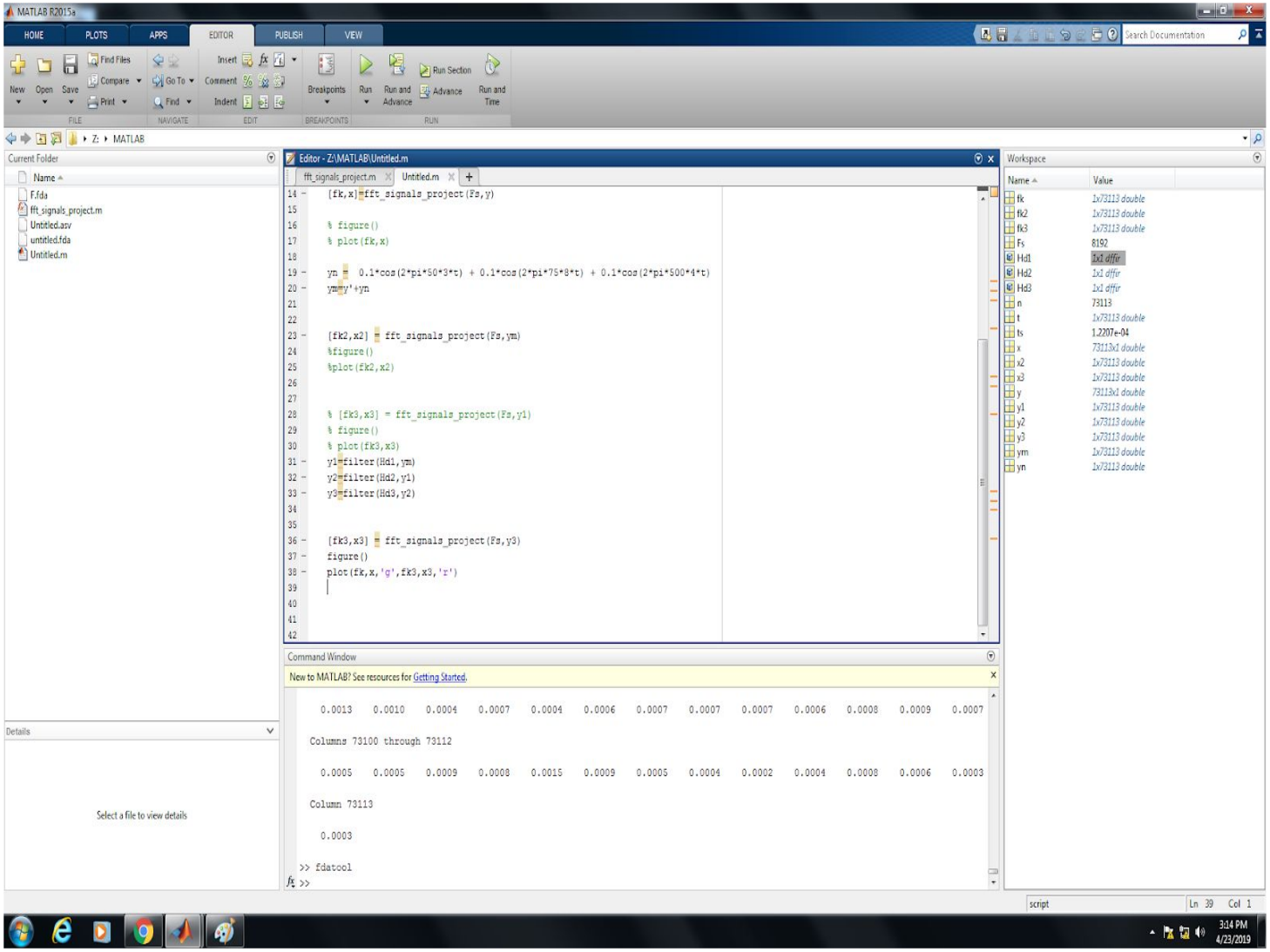


HD2



HD3


Matlab Project
File Edit View Insert Format Tools Add-ons Help All changes saved in Drive
Share
Filter Design & Analysis Tool - [untitled.fda *]
File Edit Analysis Targets View Window Help
Current Filter Information
Structure: Direct-Form FIR
Order: 5568
Stable: Yes
Source: Designed
Store Filter ...
Filter Manager ...
Magnitude Response (dB)
Magnitude (dB)
Frequency (kHz)
Response Type
Lowpass
Highpass
Bandpass
Bandstop
Differentiator
Design Method
IR Butterworth
FR Equiripple
Filter Order
Specify order: 10
Minimum order
Options
Density Factor: 20
Frequency Specifications
Units: Hz
Fs: 48000
Fpass1: 1950
Fstop1: 1970
Fstop2: 2030
Fpass2: 2050
Magnitude Specifications
Units: dB
Apass1: 5
Astop: 60
Apass2: 1
Design Filter
Designing Filter ... Done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Current Folder
Name
F.fda
fft_signals_project.m
Untitled.asv
untitled.fda
Untitled.m
Details
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Editor - Z:\MATLAB\Untitled.m
fft_signals_project.m
Untitled.m
14 - [fk,x]=fft_signals_project(Fs,y)
15
16 % figure()
17 % plot(fk,x)
18
19 - yn = 0.1*cos(2*pi*50*3*t) + 0.1*cos(2*pi*75*8*t) + 0.1*cos(2*pi*500*4*t)
20 - ym=y'+yn
21
22
23 - [fk2,x2] = fft_signals_project(Fs,ym)
24 %figure()
25 %plot(fk2,x2)
26
27
28 % [fk3,x3] = fft_signals_project(Fs,y1)
29 % figure()
30 % plot(fk3,x3)
31 - y1=filter(Hd1,ym)
32 - y2=filter(Hd2,y1)
33 - y3=filter(Hd3,y2)
34
35
36 - [fk3,x3] = fft_signals_project(Fs,y3)
37 - figure()
38 - plot(fk,x,'g',fk3,x3,'r')
39
40
41
42
Command Window
New to MATLAB? See resources for Getting Started.
0.0013 0.0010 0.0004 0.0007 0.0004 0.0006 0.0007 0.0007 0.0007 0.0006 0.0008 0.0009 0.0007
Columns 73100 through 73112
0.0005 0.0005 0.0009 0.0008 0.0015 0.0009 0.0005 0.0004 0.0002 0.0004 0.0008 0.0006 0.0003
Column 73113
0.0003
>> fdatool
fx >>
Workspace
Name
Value
fk 1x73113 double
fk2 1x73113 double
fk3 1x73113 double
Fs 8192
Hd1 1x1 dfilt
Hd2 1x1 dfilt
Hd3 1x1 dfilt
n 73113
t 1x73113 double
ts 1.2207e-04
x 73113x1 double
x2 1x73113 double
x3 1x73113 double
y 73113x1 double
y1 1x73113 double
y2 1x73113 double
y3 1x73113 double
ym 1x73113 double
yn 1x73113 double
script
Ln 39 Col 1
3:14 PM
4/23/2019

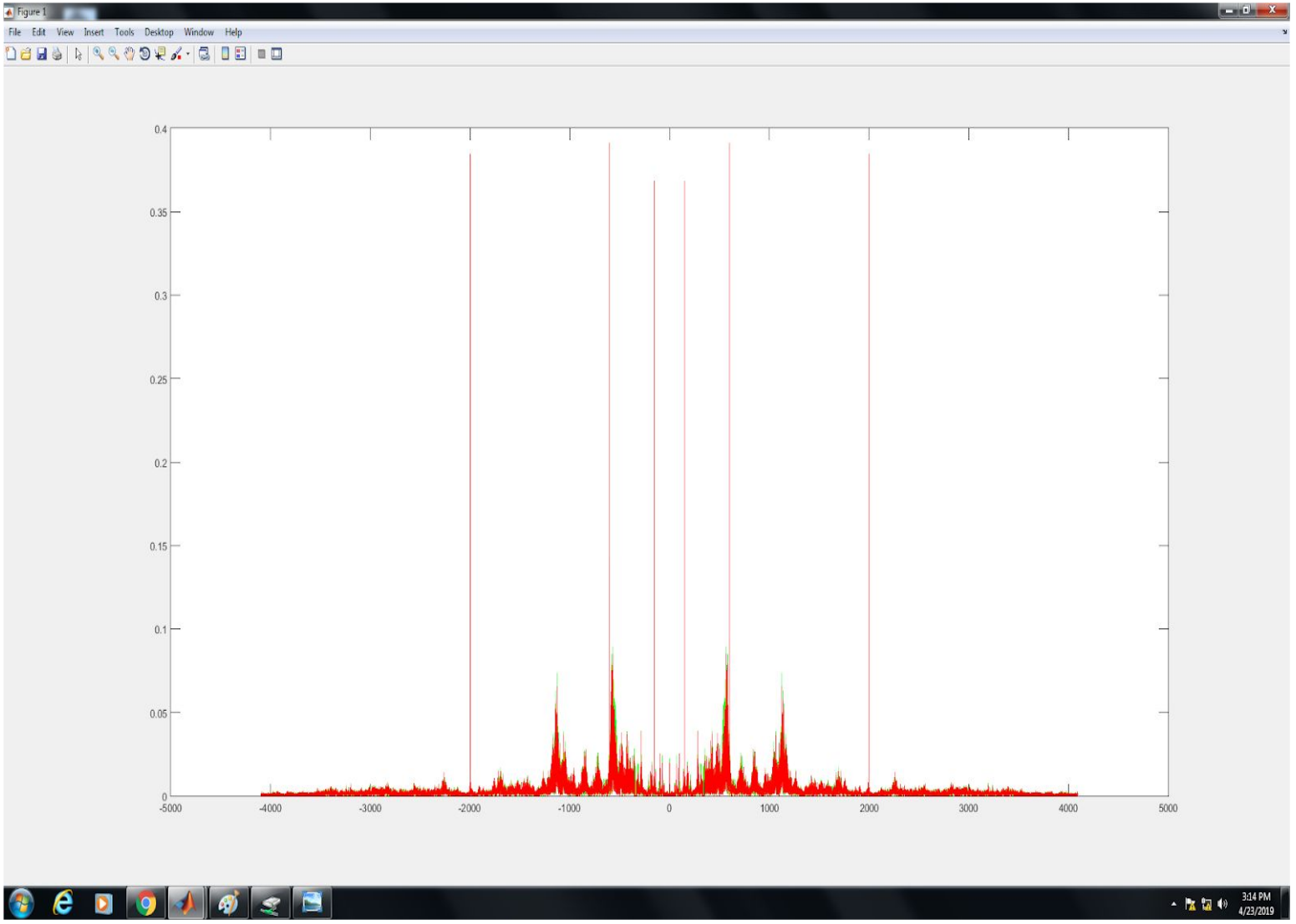
Figure 1
File Edit View Insert Tools Desktop Window Help
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
-5000
-4000
-3000
-2000
-1000
0
1000
2000
3000
4000
5000
3:14 PM
4/23/2019

```
clc
% clear
% close all
load handel
sound(y,Fs)
% plot(y)

n=length(y)
ts=1/Fs
t=0:ts:(n-1).*ts
%plot(t,y)

[fk,x]=fft_signals_project(Fs,y)

% figure()
% plot(fk,x)

yn =  0.1*cos(2*pi*50*3*t) +
0.1*cos(2*pi*75*8*t) +
0.1*cos(2*pi*500*4*t)
ym=y'+yn
```

```
[fk2,x2] = fft_signals_project(Fs,ym)
%figure()
%plot(fk2,x2)


% [fk3,x3] = fft_signals_project(Fs,y1)
% figure()
% plot(fk3,x3)
y1=filter(Hd1,ym)
y2=filter(Hd2,y1)
y3=filter(Hd3,y2)


[fk3,x3] = fft_signals_project(Fs,y3)
figure()
plot(fk,x,'g',fk3,x3,'r')
```