

MARKS:



AMERICAN INTERNATIONAL UNIVERSITY-
BANGLADESH (AIUB)

Data Communication Laboratory

LAB REPORT

ON

**Study of signal frequency, spectrum, bandwidth, bit rate,
quantization using MATLAB**

Experiment No: 2

Section: [G]

Semester: Spring 20-21

Course Teacher: MD MEHEDI HASAN

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1. Working Procedure:

Given,

ID = AB-CDEFG-H

$$x_1(t) = A_1 \cos(2\pi(C*100)t)$$

$$x_2(t) = A_2 \cos(2\pi(F*100)t)$$

$$x_3(t) = x_1(t) + x_2(t)$$

$A_1 = GD$ and $A_2 = AF$.

Now,

my id = 19-40158-1

So, $A=1$, $B=9$, $C=4$, $D=0$, $E=1$, $F=5$, $G=8$, $H=1$

$A_1=80$, $A_2=15$

$$x_1(t) = 80 \cos(2\pi(4*100)t)$$

$$x_2(t) = 15 \cos(2\pi(5*100)t)$$

$$x_3(t) = 80 \cos(2\pi(4*100)t) + 15 \cos(2\pi(5*100)t)$$

(a) Select the value of the amplitudes as follows: let $A_1 = GD$ and $A_2 = AF$.

Ans.

$A=1$, $B=9$, $C=4$, $D=0$, $E=1$, $F=5$, $G=8$, $H=1$

$A_1=80$, $A_2=15$

(b) Make a plot of x_3 over a range of t that will exhibit approximately 2 cycles. Make sure the plot starts at a negative time so that it will include $t = 0$, and make sure that you have at least 20 samples per period of the wave.

Ans.

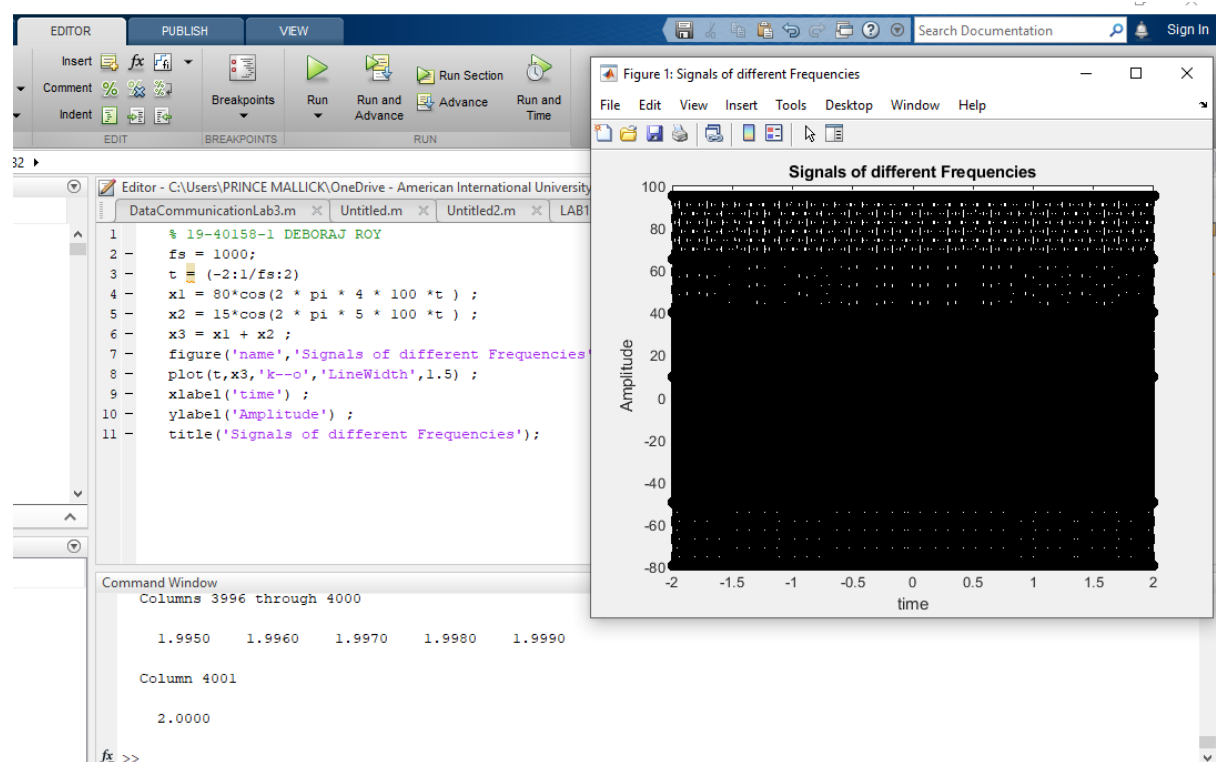
% 19-40158-1 DEBORAJ ROY

$f_s = 1000;$

```

t = (-2:1/fs:2)
x1 = 80*cos(2 * pi * 4 * 100 *t ) ;
x2 = 15*cos(2 * pi * 5 * 100 *t ) ;
x3 = x1 + x2 ;
figure('name','Signals of different Frequencies') ;
plot(t,x3,'k--o','LineWidth',1.5) ;
xlabel('time') ;
ylabel('Amplitude') ;
title('Signals of different Frequencies');

```



(c) Plot x3 in frequency domain and calculate its bandwidth

Ans. % 19-40158-1 DEBORAJ ROY

```
fs = 1000;
t = (-2:1/fs:2)
x1 = 80*cos(2 * pi * 4 * 100 *t ) ;
x2 = 15*cos(2 * pi * 5 * 100 *t ) ;
x3 = x1 + x2 ;
figure('name','Signals of different Frequencies') ;
plot(t,x3,'k--o','LineWidth',1.5) ;
xlabel('time') ;
ylabel('Amplitude') ;
title('Signals of different Frequencies');

fx3 = fft(x3);
fx3 = fftshift(fx3)/(fs/2);
f = fs/2*linspace(-1,1,fs*4+1);
figure('name','FREQUENCY DOMAIN');
plot(f, abs(fx3),'LineWidth',1);
title('FREQUENCY DOMAIN');
axis([-2500 2500 0 5]);
xlabel('Frequency (Hz)');
ylabel('magnitude');
bandwidth = obw(x3,fs)
```

