American International University – Bangladesh (AIUB)

Department of Computer Science And Engineering

LAB REPORT COVER PAGE

Course Name	DATA COMMUNICATION
Lab Report No	04
Lecturer Name	ABIR AHMED
Semester	SUMMER 2020-2021
Submission Date	20/6/2021
Section	C
Group No.	

Student Name	ID	Contribution(out of 100%)
MD. NAIMUL HOSSAIN	19-39513-1	100%

Lecturer Remarks (Only for teacher)	

QUESTION

Performance Task for Lab Report: (your ID = AB-CDEFG-H)

**Generate a composite signal using two simple signals as,

x = A1 sin(2π(C*100)t) + A2 cos(2π(G*100)t) + s*randn(size(t));

(a) Select the value of the amplitudes as follows: let A1 = AB, A2 = AF and s=AH

(b) Calculate the SNR value of the composite signal.

(c) Find the bandwidth of the signal and calculate the maximum capacity of the channel.

(d) What will be the signal level to achieve the data rate

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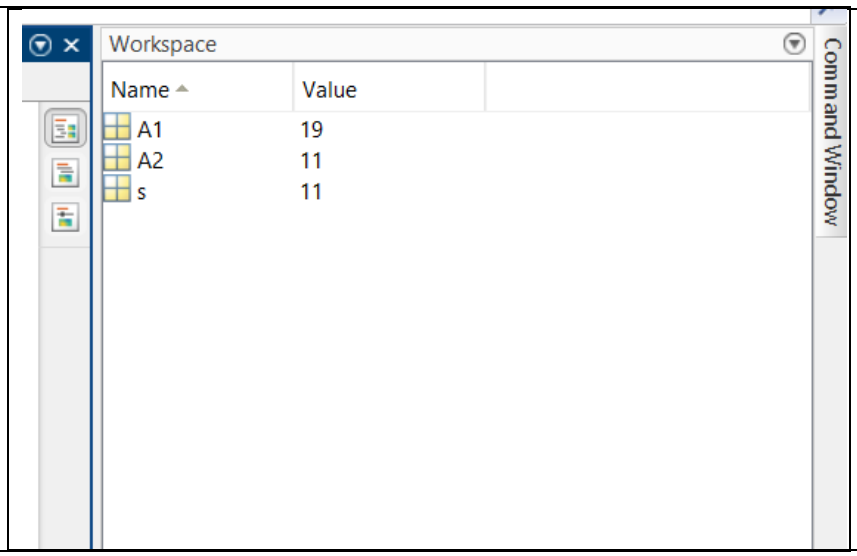
MY Id is 19-39513-1.

1 9 - 3 9 5 1 3 – 1
A B C D E F G H

So, A_1 = AB= 19 , A_2= AF=11, s=AH=11

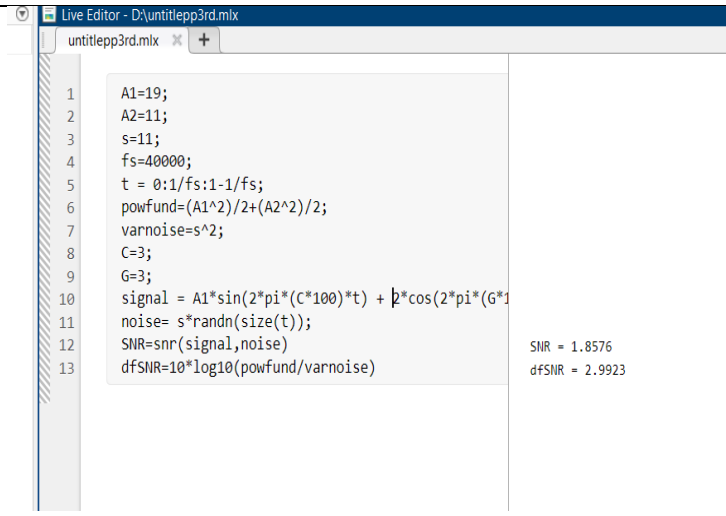
(a)

```
A1=19;
A2=11;
 s=11;
```



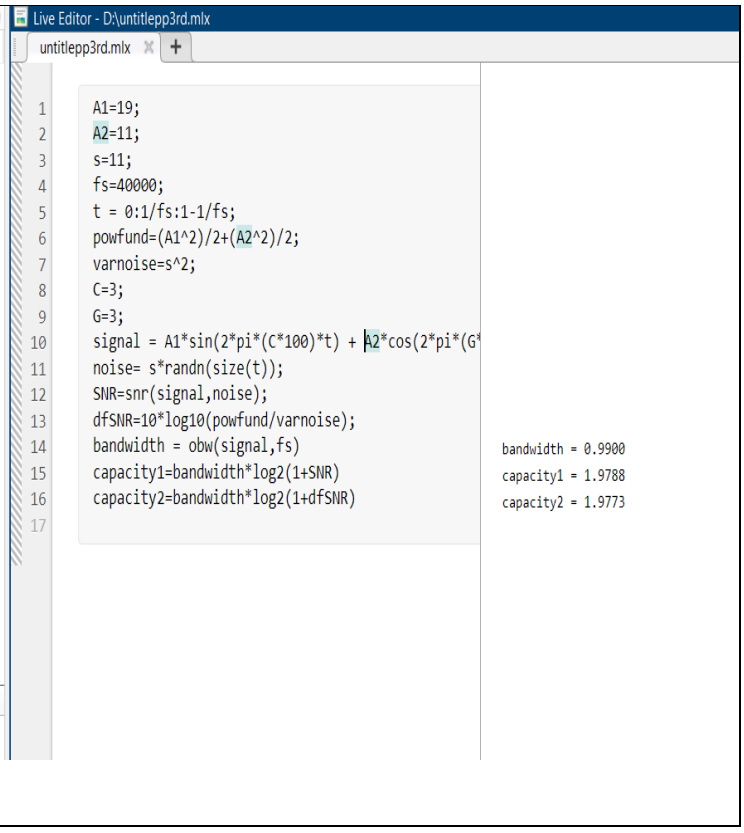
(b)

```
A1=19;
A2=11;
s=11;
fs=40000;
t = 0:1/fs:1-1/fs;
powfund=(A1^2)/2+(A2^2)/2;
varnoise=s^2;
C=3;
G=3;
signal =
A1*sin(2*pi*(C*100)*t)2*cos(2*pi*(G*100)*t);
noise= s*randn(size(t));
SNR=snr(signal,noise)
dfSNR=10*log10(powfund/varnoise)
```



(c)

```
A1=19;
A2=11;
s=11;
fs=40000;
t = 0:1/fs:1-1/fs;
powfund=(A1^2)/2+(A2^2)/2;
varnoise=s^2;
C=3;
G=3;
signal =
A1*sin(2*pi*(C*100)*t) +
A2*cos(2*pi*(G*100)*t);
noise= s*randn(size(t));
SNR=snr(signal,noise);
dfSNR=10*log10(powfund/varnoi
se);
bandwidth = obw(signal,fs)
capacity1=bandwidth*log2(1+SN
R)
capacity2=bandwidth*log2(1+df
SNR)
```



(d)

```
A1=19;
A2=11;
s=11;
fs=40000;
t = 0:1/fs:1-1/fs;
powfund=(A1^2)/2+(A2^2)/2;
varnoise=s^2;
C=3;
G=3;
signal = A1*sin(2*pi*(C*100)*t) +
A2*cos(2*pi*(G*100)*t);
noise= s*randn(size(t));
SNR=snr(signal,noise);
dfSNR=10*log10(powfund/varnoise);
bandwidth = obw(signal,fs);
capacity1=bandwidth*log2(1+SNR);
capacity2=bandwidth*log2(1+dfSNR);
apprxDataRate1=floor(bandwidth*log
2(1+SNR));
apprxDataRate2=floor(bandwidth*log
2(1+dfSNR));
level1=floor(2^(apprxDataRate1/(2*
bandwidth)))
level2=floor(2^(apprxDataRate2/(2*
bandwidth)))
```