



American International University- Bangladesh
Department of Computer Science

Lab Report Cover Sheet

Course Name	Data Communication
Lab Report No.	04
Lecturer Name	TANJIL AMIN
Semester	Summer 2020-21
Submission Date	30/06/2020
Section	E
Group No.	

Student Name	Student ID	Contribution (out of 100%)
1. Rahman, Mahibur	18-36904-1	100%
2.		
3.		
4.		
Lecturer Remarks (Only for teacher)		

ID: 18-36904-1

AB-CDEFG-H

A=1, B=8, C=3, D=6, E=9, F=0, G=4, H=1

(A)

$$A1 = A+B+H=1+8+1=10$$

$$A2 = 8+3+1 = 12$$

$$s = (C+D+H)/30 = (3+6+1)/30 = 0.33$$

(B)

close all;

clc;

A1=10;

A2=12;

s=0.33;

fs=50000;

t = 0:1/fs:1-1/fs;

powfund=(A1^2)/2+(A2^2)/2;

varnoise=s^2;

C=3;

D=6;

H=1;

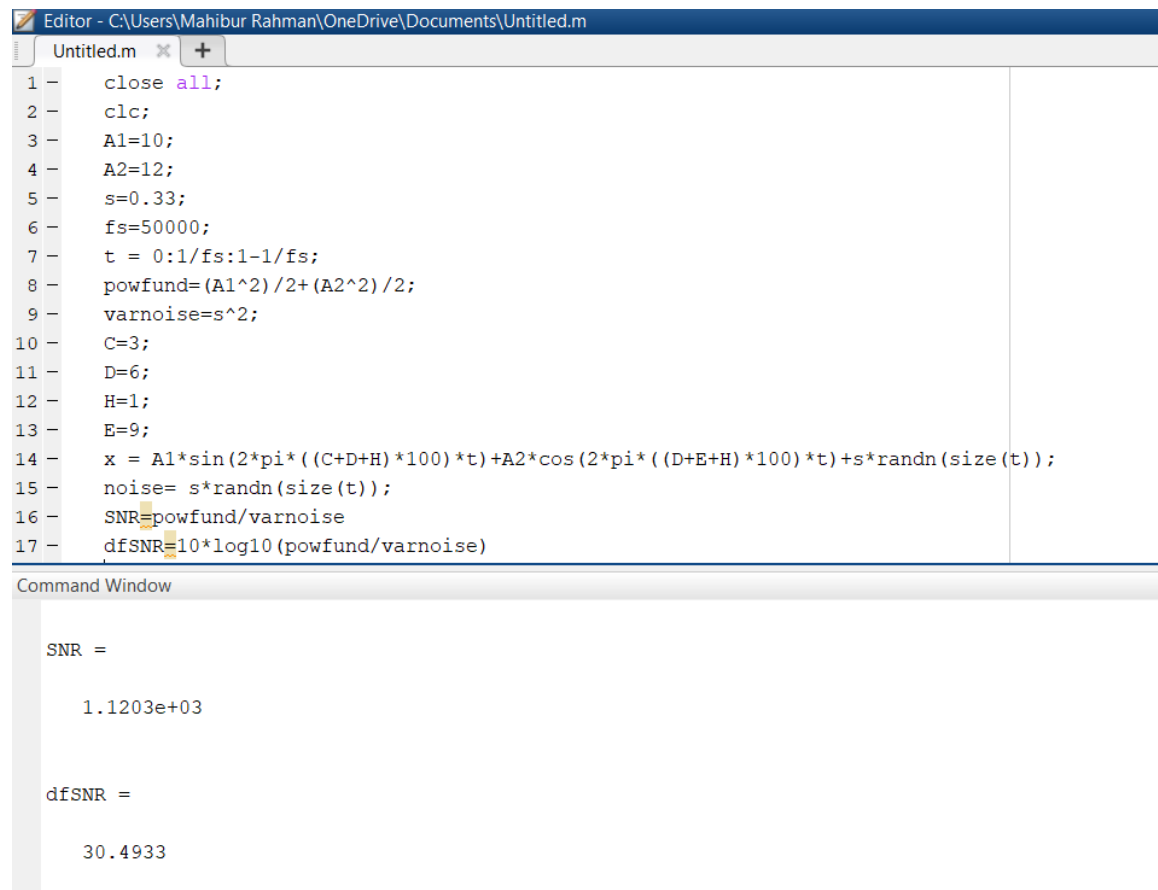
E=9;

x = A1*sin(2*pi*((C+D+H)*100)*t)+A2*cos(2*pi*((D+E+H)*100)*t)+s*randn(size(t));

noise= s*randn(size(t));

SNR=powfund/varnoise

dfSNR=10*log10(powfund/varnoise)

A screenshot of the MATLAB environment. The top window is the 'Editor' showing a script named 'Untitled.m'. The script contains 17 lines of MATLAB code for signal processing. The bottom window is the 'Command Window', which displays the results of the SNR and dfSNR calculations. The Editor window title is 'Editor - C:\Users\Mahibur Rahman\OneDrive\Documents\Untitled.m'. The Command Window title is 'Command Window'.

```
1 - close all;
2 - clc;
3 - A1=10;
4 - A2=12;
5 - s=0.33;
6 - fs=50000;
7 - t = 0:1/fs:1-1/fs;
8 - powfund=(A1^2)/2+(A2^2)/2;
9 - varnoise=s^2;
10 - C=3;
11 - D=6;
12 - H=1;
13 - E=9;
14 - x = A1*sin(2*pi*((C+D+H)*100)*t)+A2*cos(2*pi*((D+E+H)*100)*t)+s*randn(size(t));
15 - noise= s*randn(size(t));
16 - SNR=powfund/varnoise
17 - dfSNR=10*log10(powfund/varnoise)
```

Command Window

```
SNR =
    1.1203e+03

dfSNR =
    30.4933
```

(C)

close all;

clc;

A1=10;

A2=12;

s=0.33;

```

fs=50000;

t = 0:1/fs:1-1/fs;

powfund=(A1^2)/2+(A2^2)/2;

varnoise=s^2;

C=3;

D=6;

H=1;

E=9;

x = A1*sin(2*pi*((C+D+H)*100)*t)+A2*cos(2*pi*((D+E+H)*100)*t)+s*randn(size(t));

noise= s*randn(size(t))

SNR=powfund/varnoise

dfSNR=10*log10(powfund/varnoise)

bandwidth = 1600-1000

capacity1=bandwidth*log2(1+SNR)

capacity2=bandwidth*log2(1+dfSNR)

```

```
Editor - C:\Users\Mahibur Rahman\OneDrive\Documents\Untitled.m
Untitled.m x +
14 - x = A1*sin(2*pi*((C+D+H)*100)*t)+A2*cos(2*pi*((D+E+H)*100)*t)+s*randn(size(t));
15 - noise = s*randn(size(t))
16 - SNR=powfund/varnoise
17 - dfSNR=10*log10(powfund/varnoise)
18 - bandwidth = 1600-1000
19 - capacity1=bandwidth*log2(1+SNR)
20 - capacity2=bandwidth*log2(1+dfSNR)

Command Window
SNR =

    1.1203e+03

dfSNR =

    30.4933

bandwidth =

    600

capacity1 =

    6.0786e+03

capacity2 =

    2.9862e+03
```

(D)

```
close all;
```

```
clc;
```

```
A1=10;
```

```
A2=12;
```

```
s=0.33;
```

```
fs=50000;
```

```
t = 0:1/fs:1-1/fs;
```

```
powfund=(A1^2)/2+(A2^2)/2;
```

```
varnoise=s^2;
```

```
C=3;
```

```
D=6;
```

```

H=1;
E=9;
x = A1*sin(2*pi*((C+D+H)*100)*t)+A2*cos(2*pi*((D+E+H)*100)*t)+s*randn(size(t));
noise= s*randn(size(t));
SNR=powfund/varnoise ;
dfSNR=10*log10(powfund/varnoise);
bandwidth = 1600-1000;
capacity1=bandwidth*log2(1+SNR)
capacity2=bandwidth*log2(1+dfSNR)
apprxDataRate1=floor(bandwidth*log2(1+SNR))
apprxDataRate2=floor(bandwidth*log2(1+dfSNR))
level1=floor(2^(apprxDataRate1/(2*bandwidth)))
level2=floor(2^(apprxDataRate2/(2*bandwidth)))

```

```
Editor - C:\Users\Mahibur Rahman\OneDrive\Documents\Untitled.m
Untitled.m
21 - apprxDataRate1=floor (bandwidth*log2 (1+SNR) )
22 - apprxDataRate2=floor (bandwidth*log2 (1+dfSNR) )
23 - level1=floor (2^(apprxDataRate1/(2*bandwidth)))

Command Window
capacity1 =
    6.0786e+03

capacity2 =
    2.9862e+03

apprxDataRate1 =
    6078

apprxDataRate2 =
    2986

level1 =
    33

level2 =
    5
```