



AMERICAN INTERNATIONAL UNIVERSITY-BANGLADESH (AIUB)

Faculty of Engineering
Department of EEE and CoE
Undergraduate Program

Course: Data Communication

Fall 2021-22, MID

Experiment 4: Study of Nyquist bit rate and Shannon capacity using MATLAB.

Submitted by:

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Section: F

Submitted To

AFSAH SHARMIN

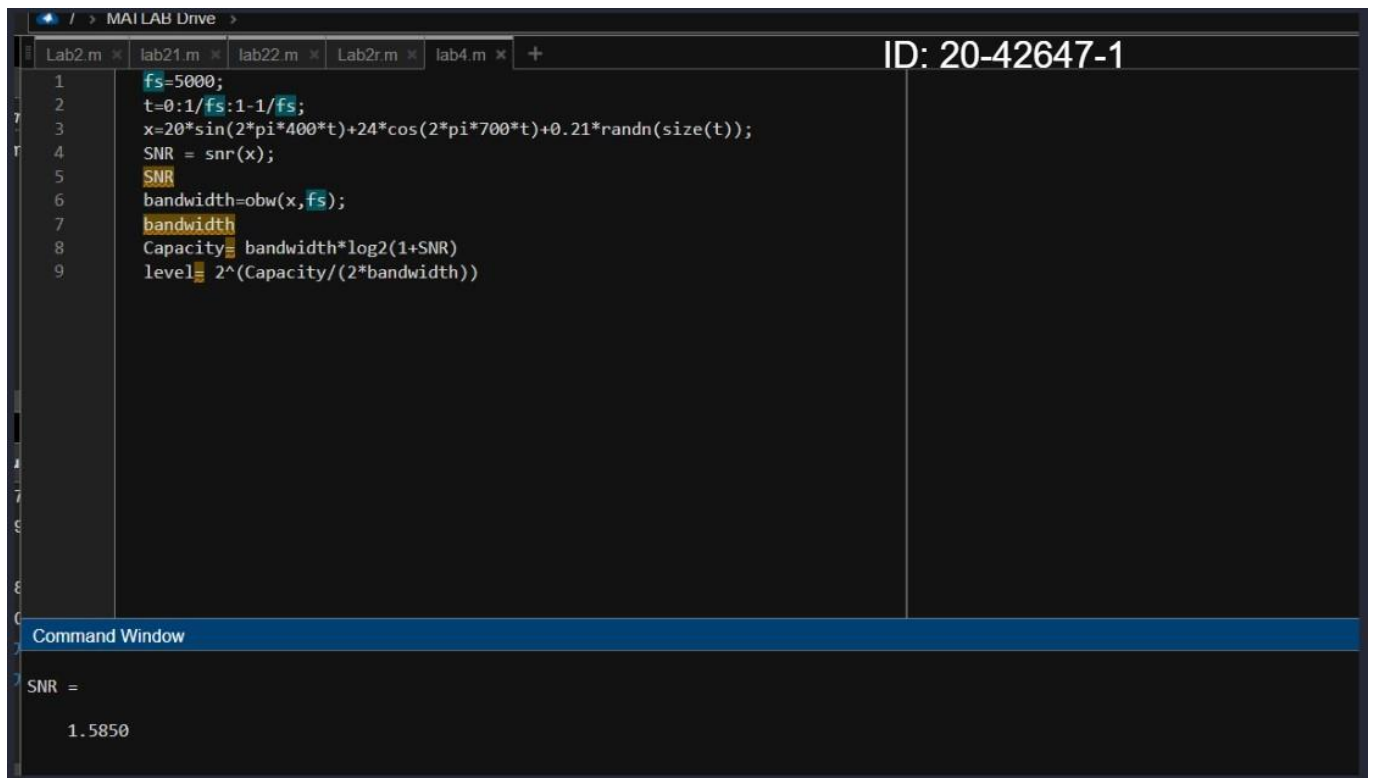
Lecturer

Faculty of Engineering

American International University-Bangladesh

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

(b)



A screenshot of the MATLAB IDE. The top toolbar shows the MATLAB Drive icon and a path. The tab bar contains 'Lab2.m', 'lab21.m', 'lab22.m', 'Lab2r.m', and 'lab4.m'. The main editor window displays the following code:

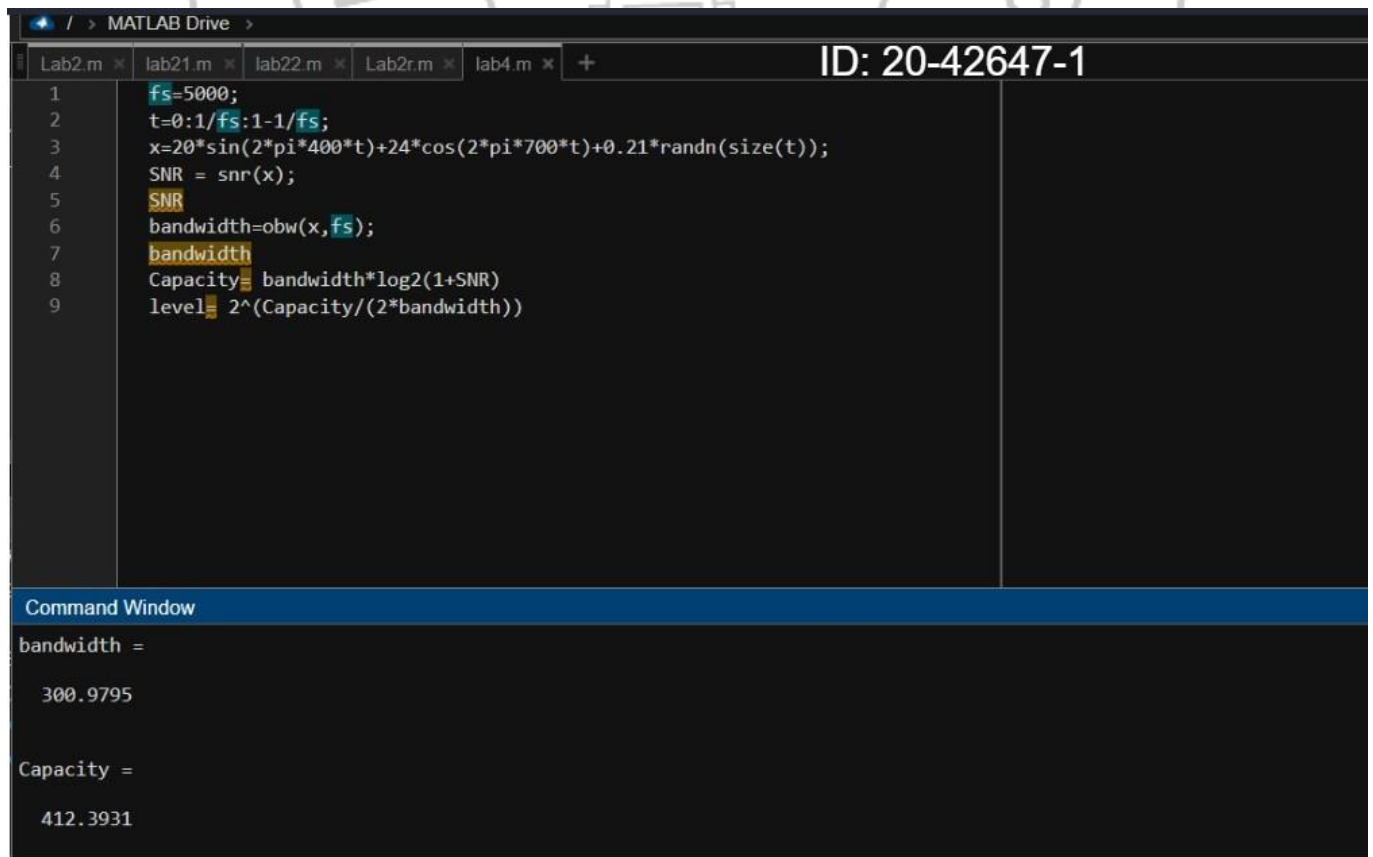
```
1 fs=5000;  
2 t=0:1/fs:1-1/fs;  
3 x=20*sin(2*pi*400*t)+24*cos(2*pi*700*t)+0.21*randn(size(t));  
4 SNR = snr(x);  
5 SNR  
6 bandwidth=obw(x,fs);  
7 bandwidth  
8 Capacity= bandwidth*log2(1+SNR)  
9 level= 2^(Capacity/(2*bandwidth))
```

The Command Window at the bottom shows the output for the SNR variable:

```
SNR =  
  
1.5850
```

The ID: 20-42647-1 is displayed in the top right corner.

(c)



A screenshot of the MATLAB IDE, similar to the one above. The code in the editor is identical to the one in part (b):

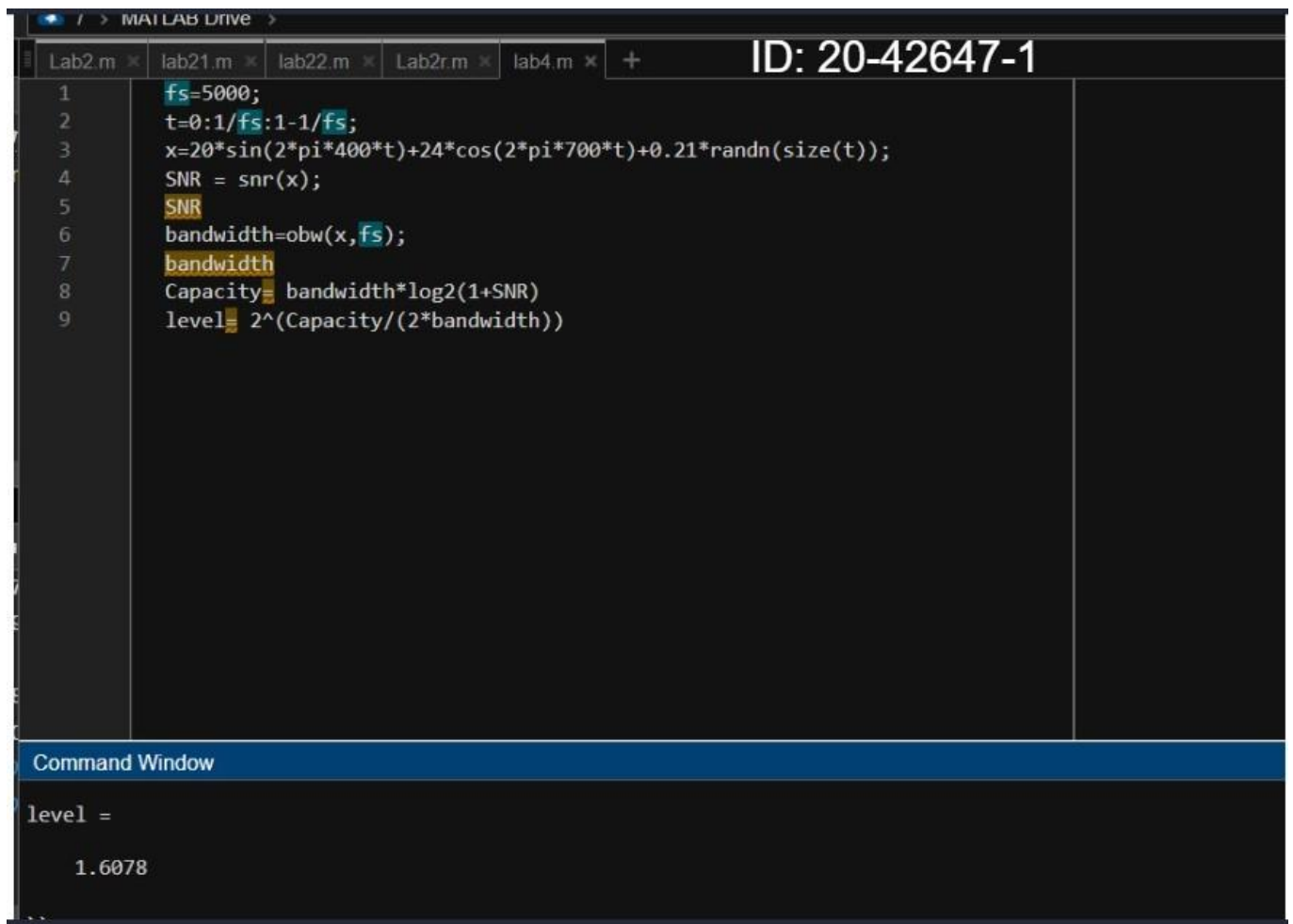
```
1 fs=5000;  
2 t=0:1/fs:1-1/fs;  
3 x=20*sin(2*pi*400*t)+24*cos(2*pi*700*t)+0.21*randn(size(t));  
4 SNR = snr(x);  
5 SNR  
6 bandwidth=obw(x,fs);  
7 bandwidth  
8 Capacity= bandwidth*log2(1+SNR)  
9 level= 2^(Capacity/(2*bandwidth))
```

The Command Window at the bottom shows the outputs for both bandwidth and Capacity:

```
bandwidth =  
  
300.9795  
  
Capacity =  
  
412.3931
```

The ID: 20-42647-1 is displayed in the top right corner.

(d)



The image shows a MATLAB Drive window with a script editor and a command window. The script editor contains the following code:

```
1 fs=5000;  
2 t=0:1/fs:1-1/fs;  
3 x=20*sin(2*pi*400*t)+24*cos(2*pi*700*t)+0.21*randn(size(t));  
4 SNR = snr(x);  
5 SNR  
6 bandwidth=obw(x,fs);  
7 bandwidth  
8 Capacity= bandwidth*log2(1+SNR)  
9 level= 2^(Capacity/(2*bandwidth))
```

The command window shows the output of the script:

```
level =  
1.6078
```

