Lab Report-3
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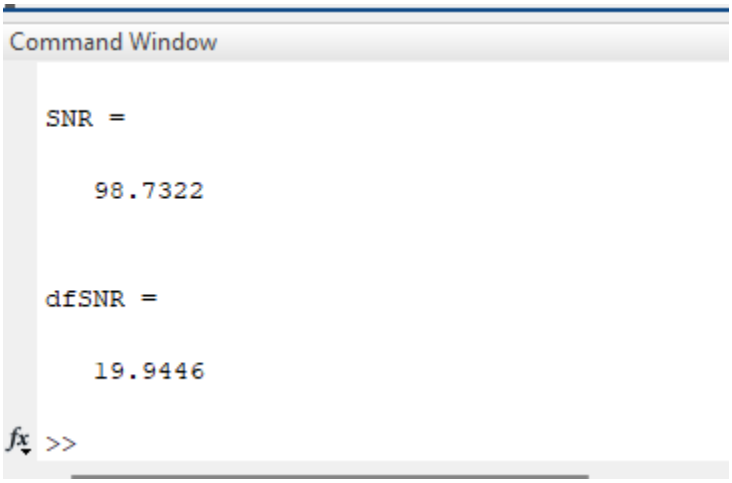
ID: 20-44213-3

3(a)

```
%ID=20-44213-3
A1=203;
A2=43;
s=443/30;
```

3(b)

```
%ID=20-44213-3
A1=203;
A2=43;
s=443/30;
fs=40000;
t = 0:1/fs:1-1/fs;
powfund=(A1^2)/2+(A2^2)/2;
varnoise=s^2;
x =
A1*sin(2*pi*(443*100)*t)+A2*cos(2*pi*(423*100)*t)+s*randn(size(t
));
noise= s*randn(size(t));
SNR=powfund/varnoise
dfSNR=10*log10(powfund/varnoise)
```



3(c)

```
%ID=20-44213-3
A1=203;
A2=43;
s=443/30;
fs=40000;
t = 0:1/fs:1-1/fs;
powfund=(A1^2)/2+(A2^2)/2;
varnoise=s^2;
x =
A1*sin(2*pi*(443*100)*t)+A2*cos(2*pi*(423*100)*t)+s*randn(size(t
));
noise= s*randn(size(t))
SNR=powfund/varnoise
dfSNR=10*log10(powfund/varnoise)
bandwidth = 700-300
capacity1=bandwidth*log2(1+SNR)
capacity2=bandwidth*log2(1+dfSNR)
```

Command Window

```
SNR =

   98.7322


dfSNR =

   19.9446


bandwidth =

   400


capacity1 =

   2.6560e+03


capacity2 =

   1.7554e+03

fx >>
```

3(d)

```
%ID=20-44213-3
A1=203;
A2=43;
s=443/30;
fs=40000;
t = 0:1/fs:1-1/fs;
powfund=(A1^2)/2+(A2^2)/2;
varnoise=s^2;
C=4;
G=0;
x =
A1*sin(2*pi*(C*100)*t)+A2*cos(2*pi*(G*100)*t)+s*randn(size(t));
noise= s*randn(size(t));
SNR=powfund/varnoise
dfSNR=10*log10(powfund/varnoise);
bandwidth = 700-300
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)))
```

```
apprxDataRate1 =

        2655


apprxDataRate2 =

        1755


level1 =

     9


level2 =

     4
```