3(a)

ID=20-42277-1
A1=201;
A2=41;
s=421/30;

3(b)

```
A1=201;
A2=41;
s=421/30;
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)
```

```
>> A1=201;
A2=41;
 s=421/30;
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)

SNR =

  106.8427


dfSNR =

   20.2874
```

3(c)

```
A1=201;
A2=41;
 s=421/30;
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)
```

```
SNR =

  106.8427


dfSNR =

   20.2874


bandwidth =

   400


capacity1 =

   2.7011e+03


capacity2 =

   1.7648e+03
```

3(d).

```
A1=201;
A2=41;
 s=421/30;
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 =

        2701


apprxDataRate2 =

        1764


level1 =

    10


level2 =

     4
```