ECE 132A Project

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```
% create parameters
T = 1; R_s = 1 / T;
F_s = 16;
rolloff = 0.5;
N = [1.6e5 1.6e6 1.6e7];
P = [2 4 8];
fig = 1;
```

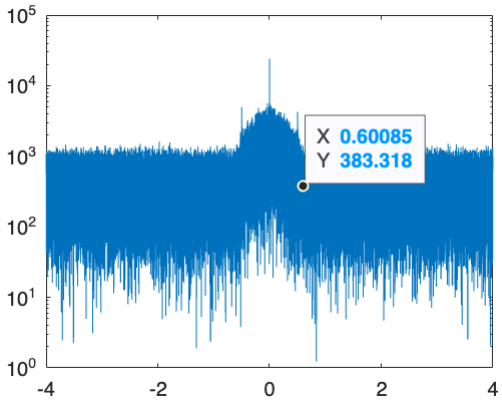
2.

```
p = P(1)
```

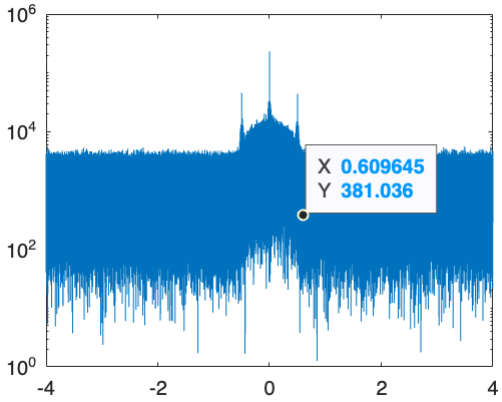
```
p = 2
```

```
for n = N
    n
    figure(fig)
    fig
    fig = fig + 1;
    frqs = (-n/2:(n/2)-1)'*F_s/n
    semilogy(frqs/p,fftshift(abs(fft(yrx(1:n).^p))))
    ax = gca;
    chart = ax.Children(1);
    datatip(chart,0.6008,383.3);
end
```

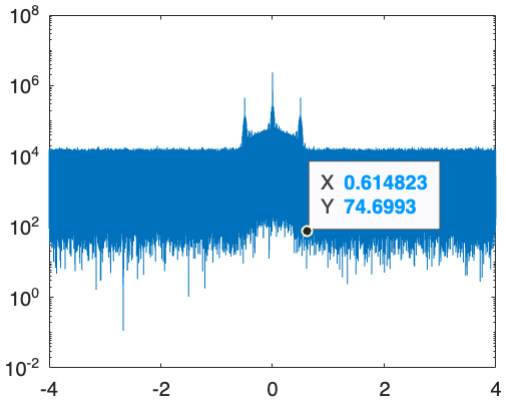
```
n = 160000
fig = 1
frqs = 160000×1
   -8.0000
   -7.9999
   -7.9998
   -7.9997
   -7.9996
   -7.9995
   -7.9994
   -7.9993
   -7.9992
   -7.9991
      ⋮
```




```
n = 1600000
fig = 2
frqs = 1600000×1
   -8.0000
   -8.0000
   -8.0000
   -8.0000
   -8.0000
   -8.0000
   -7.9999
   -7.9999
   -7.9999
   -7.9999
      ⋮
```




```
n = 16000000
fig = 3
frqs = 16000000×1
   -8.0000
   -8.0000
   -8.0000
   -8.0000
   -8.0000
   -8.0000
   -8.0000
   -8.0000
   -8.0000
   -8.0000
      ⋮
```

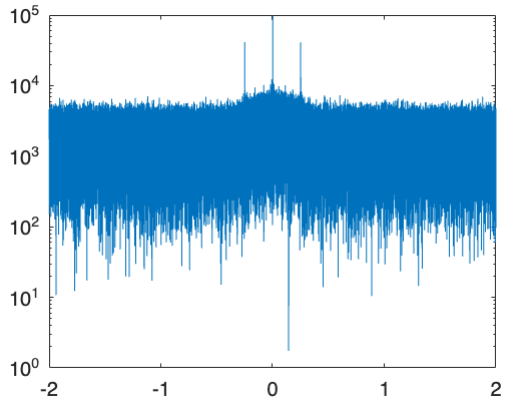



```
p = P(2)
```

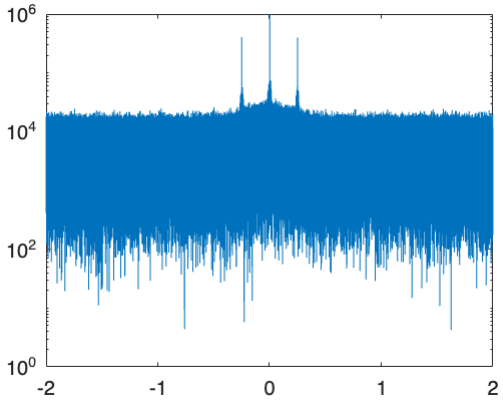
```
p = 4
```

```
for n = N
    n
    figure(fig)
    fig
    fig = fig + 1;
    frqs = (-n/2:(n/2)-1)'*F_s/n
    semilogy(frqs/p,fftshift(abs(fft(yrx(1:n).^p))))
end
```

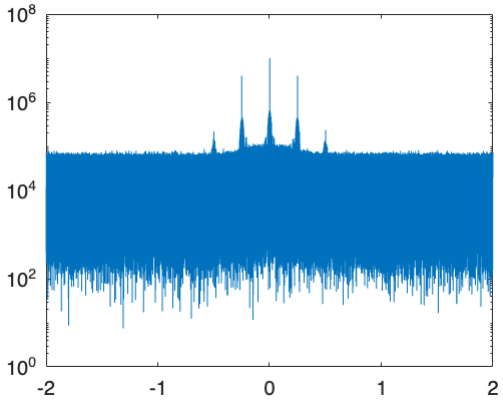
```
n = 160000
fig = 4
frqs = 160000×1
   -8.0000
   -7.9999
   -7.9998
   -7.9997
   -7.9996
   -7.9995
   -7.9994
   -7.9993
   -7.9992
   -7.9991
      ⋮
```



```
n = 1600000
fig = 5
frqs = 1600000×1
   -8.0000
   -8.0000
   -8.0000
   -8.0000
   -8.0000
   -8.0000
   -7.9999
   -7.9999
   -7.9999
   -7.9999
      ⋮
```




```
n = 16000000
fig = 6
frqs = 16000000×1
   -8.0000
   -8.0000
   -8.0000
   -8.0000
   -8.0000
   -8.0000
   -8.0000
   -8.0000
   -8.0000
   -8.0000
      ⋮
```

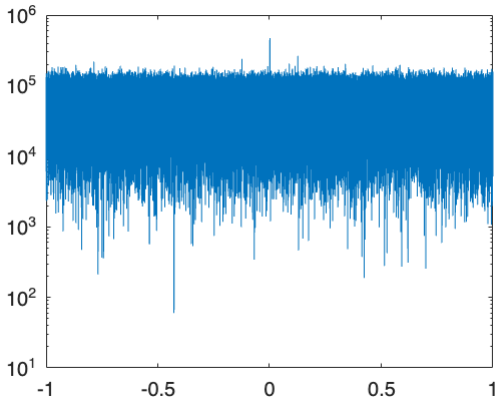


```
p = P(3)
```

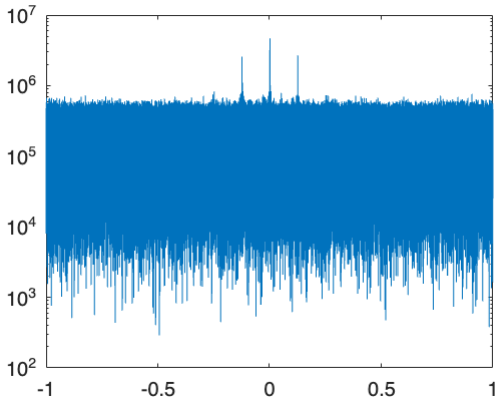
```
p = 8
```

```
for n = N
    n
    figure(fig)
    fig
    fig = fig + 1;
    frqs = (-n/2:(n/2)-1)'*F_s/n
    semilogy(frqs/p,fftshift(abs(fft(yrx(1:n).^p))))
end
```

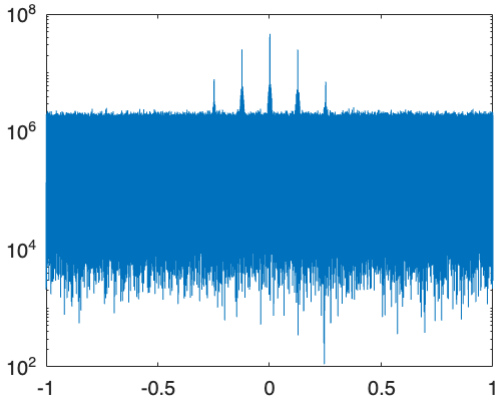
```
n = 160000
fig = 7
frqs = 160000×1
   -8.0000
   -7.9999
   -7.9998
   -7.9997
   -7.9996
   -7.9995
   -7.9994
   -7.9993
   -7.9992
   -7.9991
      ⋮
```




```
n = 1600000
fig = 8
frqs = 1600000×1
   -8.0000
   -8.0000
   -8.0000
   -8.0000
   -8.0000
   -8.0000
   -7.9999
   -7.9999
   -7.9999
   -7.9999
      ⋮
```




```
n = 16000000
fig = 9
frqs = 16000000×1
   -8.0000
   -8.0000
   -8.0000
   -8.0000
   -8.0000
   -8.0000
   -8.0000
   -8.0000
   -8.0000
   -8.0000
    ⋮
```




```
frEst = 0.60085 * (N(1)/F_s)
```

```
frEst = 6.0085e+03
```

```
yderot = yrx .* exp(-2i*pi*frEst*(0:length(yrx)-1)'/F_s);
```

3.

```
hrrc = rrc((-6:1/F_s:6)',rolloff,1)/F_s
```

```
hrrc = 193×1
```

```
  0.0003
  0.0003
  0.0002
  0.0002
  0.0001
  0.0000
 -0.0001
 -0.0002
 -0.0003
 -0.0003
    ⋮
```

6.

```
chosen_n = N(3)
```

```
chosen_n = 16000000
```

```
phase_offset = 7
```

```
phase_offset = 7
```

```
preambleSig = conv(upsample([-1;1;-1;1;-1;1;-1;1;-1;1],F_s),hrrc,"full");
preambleSig = preambleSig(phase_offset*F_s+1:end-phase_offset*F_s);
plot(real(xcorr(yderot(1:chosen_n),preambleSig)))
```