Lucas Mendicino - I affirm that I adhered to the Honor Code in this assignment
NSCI 360, Fall 2019

Computational Assignment 1: Introduction to programming and scientific computation in Matlab

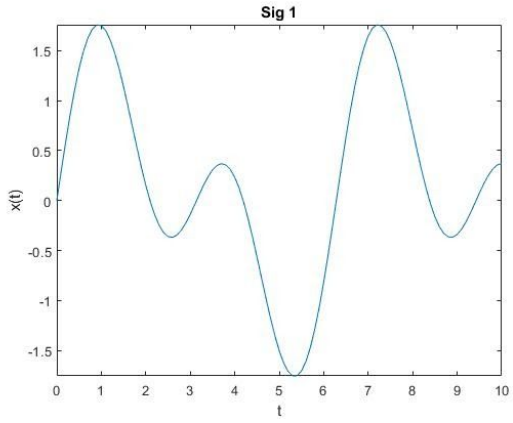
LEVEL 2 and LEVEL 3
7. *For* loops.

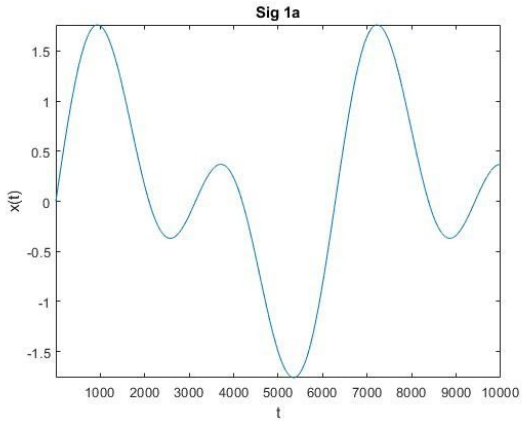
```
for x = 2:2:10
        disp(x);
    end
```

8. Plot out a signal

```
t = 0:0.1:10
Sig1 = sin(t) + sin(2*t)

plot(t,Sig1)
title('Sig 1')
xlabel('t')
ylabel('x(t)')
axis tight
figure
```

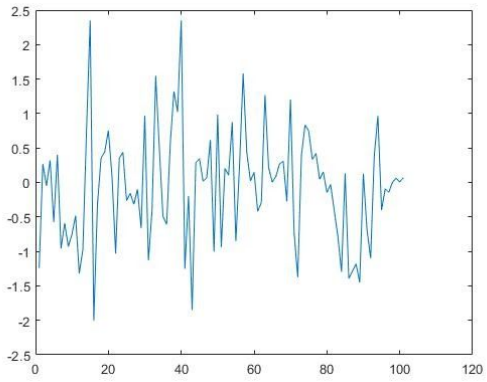





```
t = 0:0.001:10
Sig1a = sin(t) + sin(2*t)
plot(Sig1a)
title('Sig 1a')
xlabel('t')
ylabel('x(t)')
axis tight
```

9. Plot out a more complex signal.

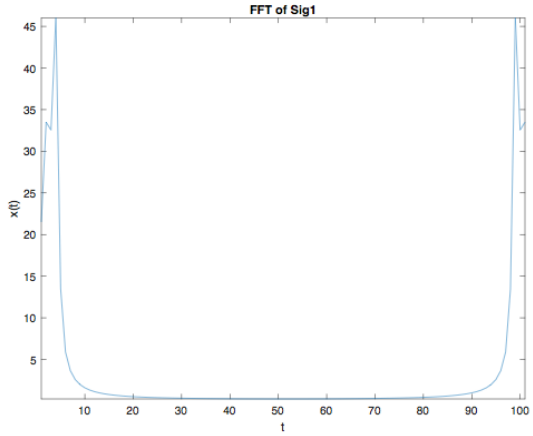
```
t = 0:0.1:10;
Sig1 = sin(2.*(t+randn(1,1))+4);
Sig2 = sin((t+randn(1,1)/2)-6);
Sig3 = sin(((t+randn(1,1)).*(2/3))-1);
Signal = Sig1 + Sig2 + Sig3;
SignalNoise =
Signal.*randn(1,length(t));
plot(SignalNoise)
```



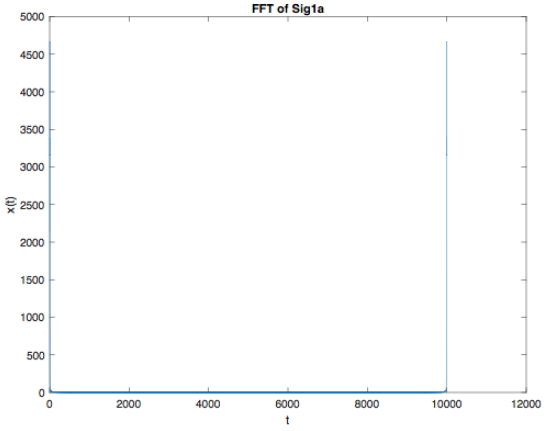
LEVEL 3 ONLY

10. Power spectra.

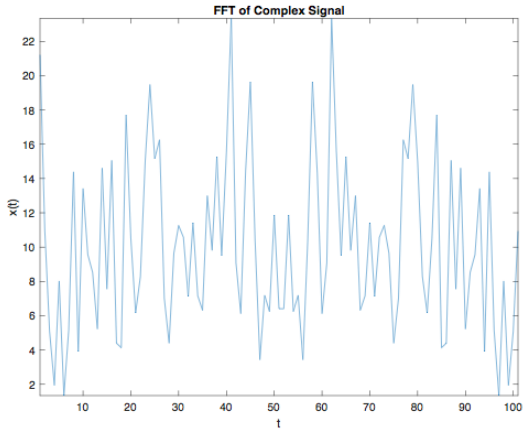
```
plot(abs(fft(Sig1)));
```




```
plot(abs(fft(Sig1a)));
```



```
plot(abs(fft(SignalNoise)));
```

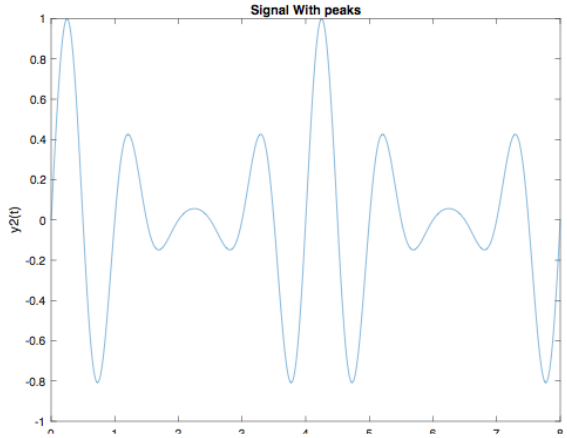


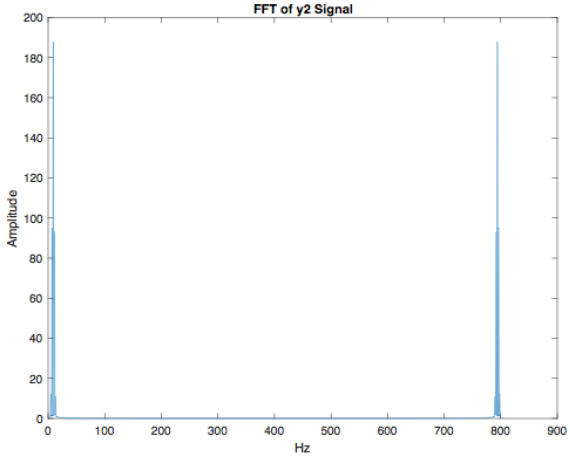
11. Signal construction:
peaks at t = 0.25, t = 4.25

```
t=0:0.01:8;
w = 1;
d= w/4:4*w:10;
y2=(pulstran(t,d,'gauspuls',w));

plot(t,y2);
xlabel('Time (s)')
ylabel('y2(t)')
title('Signal With peaks')
figure;

plot(abs(fft(y2)));
title('FFT of y2 Signal')
xlabel('Hz')
ylabel('Amplitude')
```





12.

```
for i = 1:20
    n(i) = exprnd(0.005);
    t = cumsum(n)
end

for j = 1:length(t)
     line([t(j) t(j)],[0 0.5], 'LineWidth', 2 );
end

xlabel('Time (s)')
ylabel('Amplitude')
title('Model Spike Train')
figure;

histogram(t, 'BinWidth',0.03)
xlabel('Inter-Spike Durations ')
ylabel('Frequency')
title('Model Spike Train Histogram')
```