**********Draft**********

FFT Octave

08/25/20

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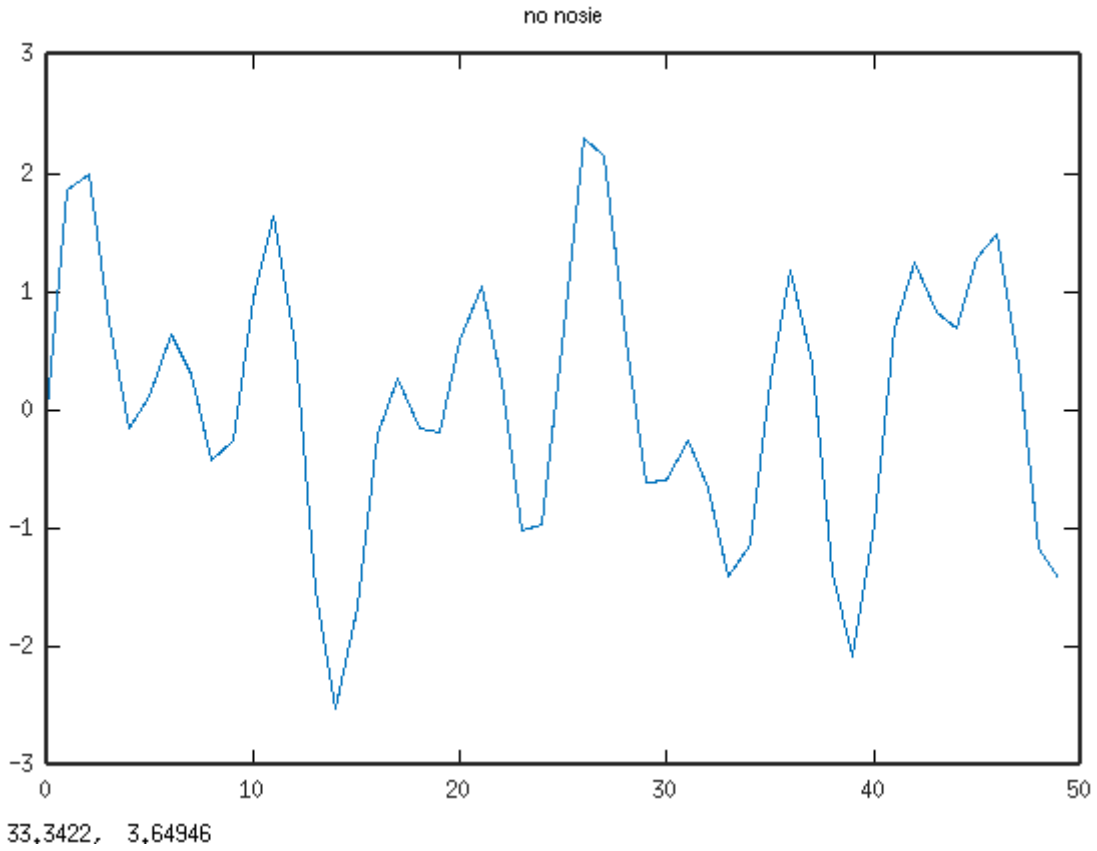
Starting with an example in Matlab at “https://www.mathworks.com/help/matlab/ref/fft.html”

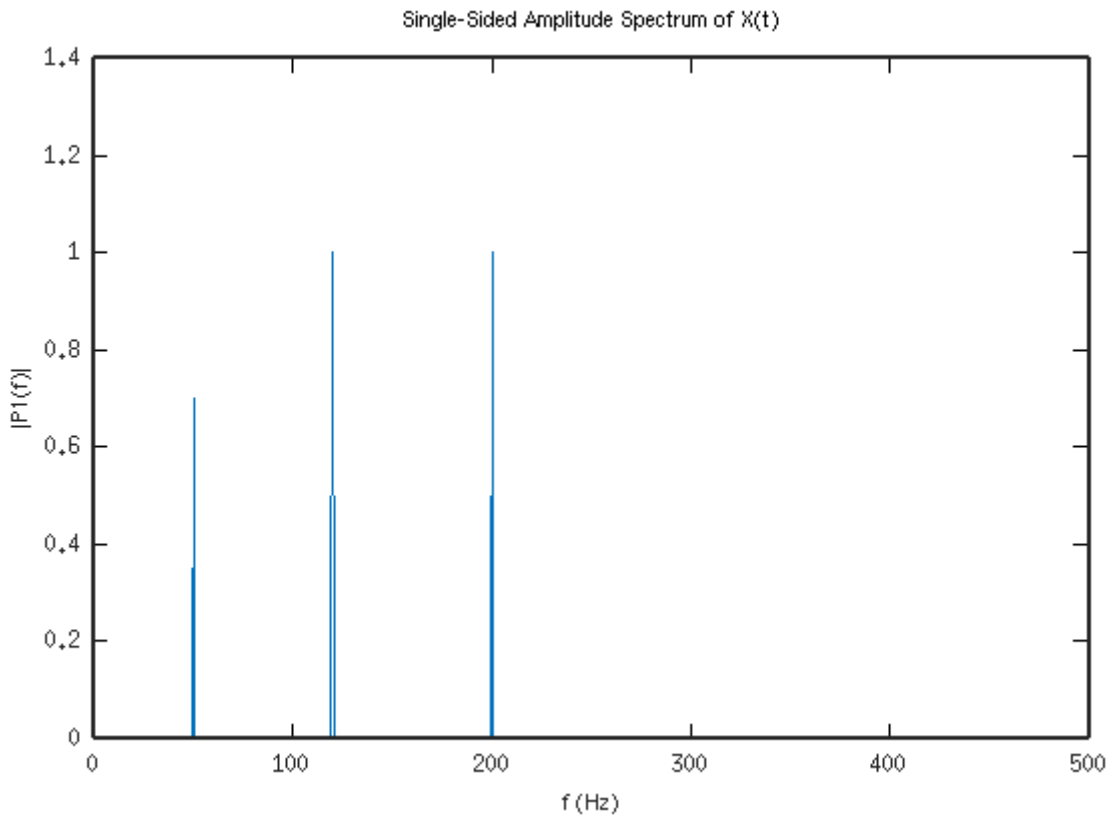
The signal below is combination of 3 frequencies. The 3 frequencies are 50, 120, and 200 Hz.

Figure 1



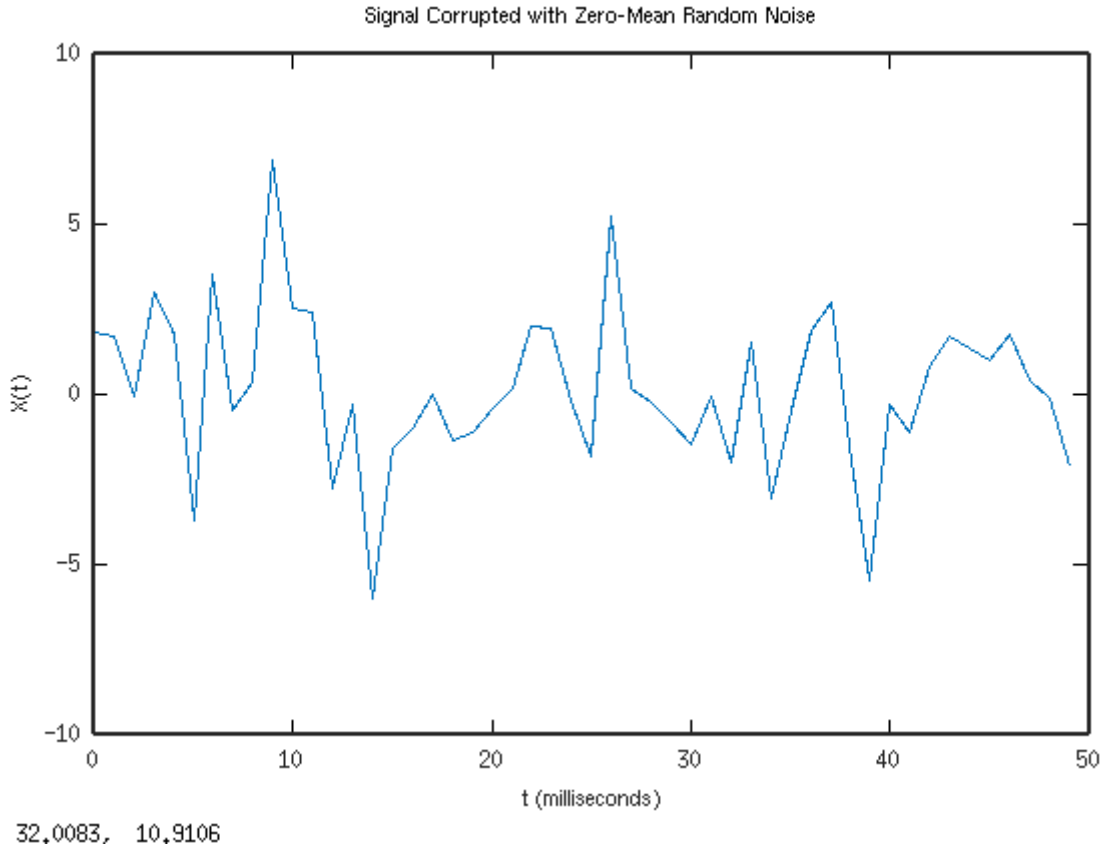
Taking the FFT demonstrates what frequencies make up the signal above.

Figure 2



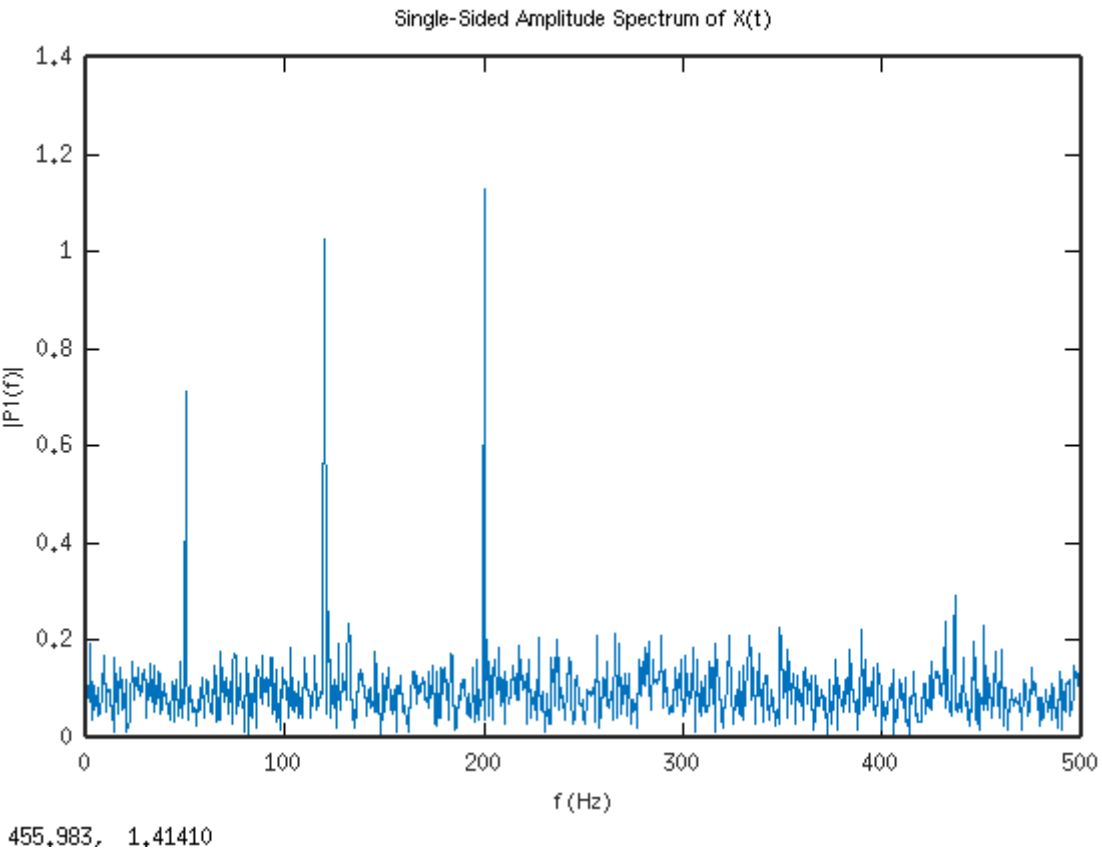
The signal below is combination of 3 frequencies witgh random noise. The 3 frequencies are 50, 120, and 200 Hz.

Figure 3



Taking the FFT demonstrates what frequencies make up the signal above.

Figure 4



Octave code that produce the plots above.

```
clear
close all

Fs = 1000;            % Sampling frequency
T = 1/Fs;             % Sampling period
L = 1500;             % Length of signal
t = (0:L-1)*T;        % Time vectorc

%S = 0.7*sin(2*pi*50*t) + sin(2*pi*120*t);
S = 0.7*sin(2*pi*50*t) + sin(2*pi*120*t) + sin(2*pi*200*t);

X = S + 2*randn(size(t));

figure

plot(1000*t(1:50),X(1:50))
title('Signal Corrupted with Zero-Mean Random Noise')
xlabel('t (milliseconds)')
ylabel('X(t)')

Y = fft(X);
```

```
P2 = abs(Y/L);
P1 = P2(1:L/2+1);
P1(2:end-1) = 2*P1(2:end-1);

figure
f = Fs*(0:(L/2))/L;
plot(f,P1)
title('Single-Sided Amplitude Spectrum of X(t)')
xlabel('f (Hz)')
ylabel('|P1(f)|')
```