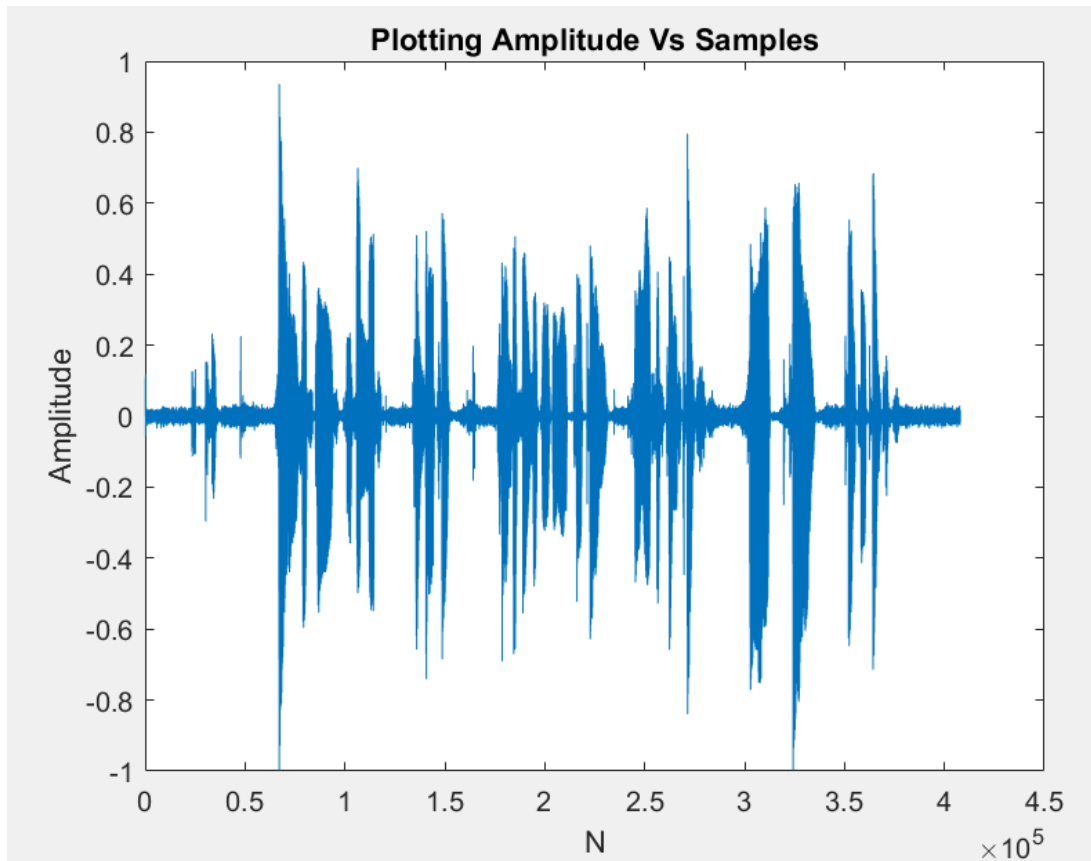# EE 210

HW#: 01

Last Name: **Aldacher**

First Name: **Muhammad**

ID: **011510317**

Date: **9/1/2020**

Assigned question #s: 3

a) **Collect 10 to 20 seconds of your voice with** $\left[fs = 44100 \right]$ **and plot it using Matlab, Octave, or any other programs.**

Matlab code:

```
[x,fs] = audioread('Muhammad_Aldacher_ee210.wav');

plot(x)
sound(x,fs)
title('Plotting Amplitude Vs Samples')
xlabel('N'); ylabel('Amplitude')
```

**b) Change frequency (f) from 100~20kHz in the program. And find how much of frequencies you can hear.**

➔ I can hear up to 16000 Hz (16 KHz).

Matlab code:

```
A = 0.5;
fs = 44100;
n = 0:2*fs-1;
f = 16000;

x = A*cos(2*pi*f*n/fs);
sound(x,fs)
plot(n,x)
```

c) Plot frequency response (magnitude response) of your voice and write observations that where(range of frequencies) most of energies are stored at

➔ Most of the energies is concentrated in the frequency range of 100 Hz to 2000 Hz.
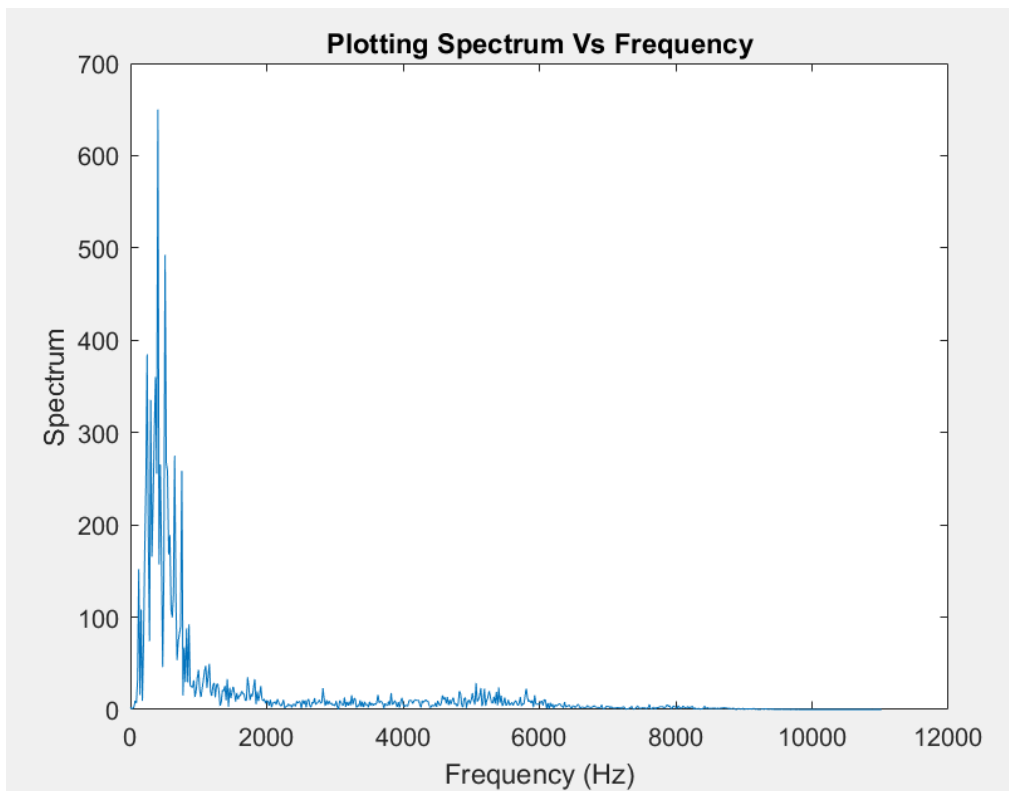
Matlab code:

```
[x,fs] = audioread('Muhammad_Aldacher_ee210.wav');

N = length(x);
n = 0:N-1;

OM = 0:0.005:pi;
X = exp(-j*OM'*n)*x;

fq = OM*fs/(2*pi);
figure
plot(fq,abs(X))
title('Plotting Spectrum Vs Frequency')
xlabel('Frequency (Hz)'); ylabel('Spectrum')
```