**Lab 10**

**Task 1:**

**(i)** yes

**(ii)** yes

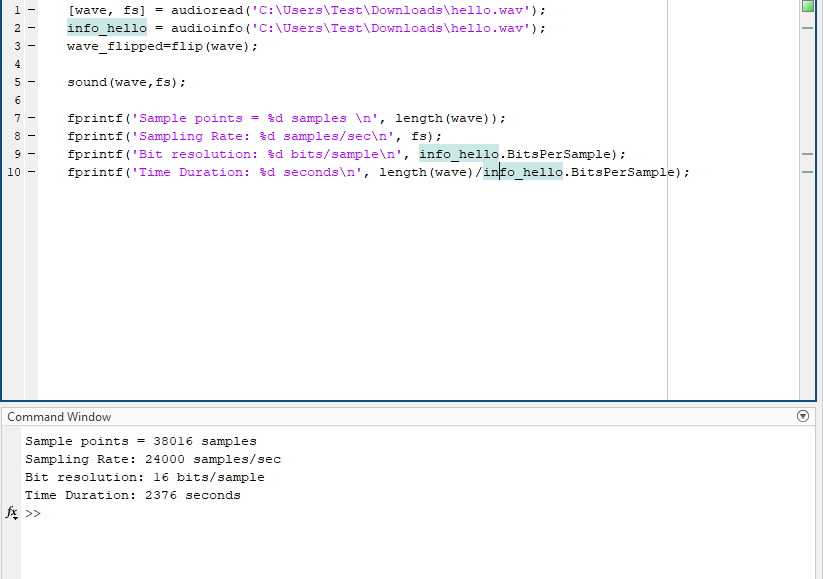
**(iii)** It still sounds like ‘we are you’

**Task 2:**

**(i) Number of Samples :** 38016 samples

**(ii) Sampling Rate :** 24000 Samples/second

(iii) **Bit resolution :** 16 bits/sample

(iv) **Time Duration :** 2376 seconds

**Task 3:**

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Code :

[wave, fs] = audioread('C:\Users\Test\Downloads\birthday.wav');

mul\_wave\_1 = -1\*wave;

mul\_wave\_2 = 10\*wave;

wave\_sqrt1 = sign(wave) .\* sqrt(abs(wave));

wave\_sqr = wave.^2;

wave\_flipped=flip(wave);

subplot(6, 1, 1);

plot((1:length(wave)) / fs, wave);

title('Original Audio Waveform');

xlabel('Time (seconds)');

ylabel('Amplitude');

subplot(6, 1, 2);

plot((1:length(mul\_wave\_1)) / fs, mul\_wave\_1);

title('Multiplied by -1 Audio Waveform');

xlabel('Time (seconds)');

ylabel('Amplitude');

subplot(6, 1, 3);

plot((1:length(mul\_wave\_2)) / fs, mul\_wave\_2);

title('Multiplied by 10 Audio Waveform');

xlabel('Time (seconds)');

ylabel('Amplitude');

subplot(6, 1, 4);

plot((1:length(wave\_sqrt1)) / fs, wave\_sqrt1);

title('Each sample replaced by its square root');

xlabel('Time (seconds)');

ylabel('Amplitude');

subplot(6, 1, 5);

plot((1:length(wave\_sqr)) / fs, wave\_sqr);

title('Squared Audio Waveform');

xlabel('Time (seconds)');

ylabel('Amplitude');

subplot(6, 1, 6);

plot((1:length(wave\_flipped)) / fs, wave\_flipped);

title('Flipped Audio Waveform');

xlabel('Time (seconds)');

ylabel('Amplitude');

sound(mul\_wave);

**Task 4:**

Difficulty in listening the audio with 1KHz sampling rate

**Code:**

[wave, fs] = audioread('C:\Users\Test\Downloads\birthday.wav');

info\_wave=audioinfo('C:\Users\Test\Downloads\birthday.wav');

% Load the original audio file

fs\_1=4/3;

new\_fs\_1 = round(fs \* fs\_1); % New sample rate after decrease

wave\_resampled\_1 = resample(wave, new\_fs\_1, fs); % Resample the signal

fs\_2=2/3;

new\_fs\_2 = round(fs \* fs\_2); % New sample rate after decrease

wave\_resampled\_2 = resample(wave, new\_fs\_2, fs); % Resample the signal

fs\_3=1/3;

new\_fs\_3 = round(fs \* fs\_3); % New sample rate after decrease

wave\_resampled\_3 = resample(wave, new\_fs\_3, fs); % Resample the signal

fs\_4=1/6;

new\_fs\_4 = round(fs \* fs\_4); % New sample rate after decrease

wave\_resampled\_4 = resample(wave, new\_fs\_4, fs); % Resample the signal

sound(wave\_resampled\_4,new\_fs\_4);

fs\_5=1/12;

new\_fs\_5 = round(fs \* fs\_5); % New sample rate after decrease

wave\_resampled\_5 = resample(wave, new\_fs\_5, fs); % Resample the signal

fs\_6=1/24;

new\_fs\_6 = round(fs \* fs\_6); % New sample rate after decrease

wave\_resampled\_6 = resample(wave, new\_fs\_6, fs); % Resample the signal

sound(wave,fs);

pause(2);

sound(wave\_resampled\_2,new\_fs\_2);

pause(2);

sound(wave\_resampled\_3,new\_fs\_3);

pause(2);

sound(wave\_resampled\_4,new\_fs\_4);

pause(2);

sound(wave\_resampled\_5,new\_fs\_5);

pause(2);

sound(wave\_resampled\_6,new\_fs\_6);

**Task 5:**

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**Code:**

[wave, fs] = audioread('C:\Users\Test\Downloads\sunday.wav');

sound(wave,fs);

fs\_1=147/320;

% Decrease the sample rate

new\_fs = round(fs \* fs\_1); % New sample rate after decrease

wave\_resampled = resample(wave, new\_fs, fs); % Resample the signal

figure;

subplot(2, 1, 1);

plot((1:length(wave)) / fs, wave);

title('Original Audio Waveform');

xlabel('Time (seconds)');

ylabel('Amplitude');

subplot(2, 1, 2);

plot((1:length(wave\_resampled)) / fs, wave\_resampled);

title('Resampled Squared Audio Waveform');

xlabel('Time (seconds)');

ylabel('Amplitude');