***You need to write a semi-formal report for this portion of project.***

Discrete convolution is defined in the time domain as



Using any one of Matlab, python, C, C++, or Java, you are going to make a **generalized discrete convolution program**. The built in convolution function in the Matlab is “**conv**”. After making your version of convolution (you call your function as “**my\_conv**”) and you can compare with the built in “conv” with some samples.

Assume



1. Stem x and h.
2. Find and stem the output, using your code (“**my\_conv**”) with given x and h.
3. Compare your output with built in function “conv”(make sure that your output should be the same otherwise your code is not working)
4. Read “filter” in the Matlab (help filter) and write what it does.
5. Do the following:

using the Matlab.

And plot the output of the **my\_conv vs. filter**. And write what the differences are

Equation for DTFT (Discrete Time Fourier Transform) is defined as



Collect your voice for about 10 seconds **using sampling rate of**. It means that the maximum frequency contained in your voice is up to.

Define your voice as 

1. Plot your voice using Matlab or other tools
2. Make Matlab program of using **two for loops**. And plot frequency response of your voice (magnitude and phase response) (your plot is in the range of  or in terms of frequency)
3. Get the following filter coefficients using built in function “**fir1**” (finite impulse response 1 dimensional filter)



1. Write what the definitions of 100 & 500/8000 mean in the and write why I wrote 500/8000
2. Stem each  in the time domain (where n=1,2,3, & 4) (use “subplot”)
3. Plot each in the frequency domain using the program that you made in the previous part, DTFT, and plot each 
4. Do the convolution of your voice () vs. 4 different filters in the part (h). You call each output as . Plot them in the time domain and frequency domain (of course magnitude vs. phase in the frequency domain) using your program that you made in the previous part
5. Listen to the each output and write your opinions that what happened in each part
6. Write what you learned in this mini project