Tasks: Perform decimation and, calculate energy and power of a signal

1.   The operation of *signal dilation* (or *decimation* or *down-sampling*) is defined by

$$y(n) = x(nM)$$

where the sequence $x(n)$ is down-sampled by an integer factor M. For example, if

$$x(n) = \{\ldots., -2, 4, 3, -6, 5, -1, 8, \ldots.\}$$

then the down-sampled sequences by a $factor$ 2 are given by

$$y(n) = \{\ldots., -2, 3, 5, 8, \ldots.\}$$

Develop a MATLAB function **dnsample** that has the form to implement the above operation.

```
function [y,m] = dnsample(x,n,M)
% Downsample sequence x(n) by a factor M to obtain y(m)
```

2. Generate $x(n) = \sin(0.125\pi n), -50 \leq n \leq 50$. Decimate $x(n)$ by a factor of 4 to generate $y(n)$. Plot both $x(n)$ and $y(n)$ using subplot, and comment on the effect of down-sampling on signal.

2. For a given speech signal, perform the following operations:
   a) Read/load the voice file in MATLAB using in build '$audioread$' function

```
[x, fs] = audioread('LDC93S1.wav');
% read audio file// x- speech sample, fs is the sampling frequency
```

   b) Write a MATLAB script (function) which *segment* the speech signal "20 ms" duration without overlapping
   c) Calculate the *energy and power* of the data available in each segment.
   d) Plot the *energy and power* of signal for each segment.

Plot of speech sample
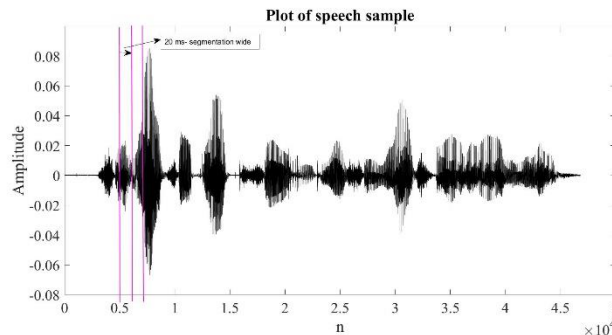
Structure of lab report

a) Title of the experiment → "Creation a document using MS office"

b) Your name   →   XYZ, Roll-no: 1234

c) About the experiments →

d) Content of the experiment (diagram/programme source code/flowchart) →

e) Your observation/what you learned →

After complementation of the LAB, document has to be uploaded in Google classroom
filename: StudentName_rollNo

Thank you!