

Experiment No. 11

Title: Implementation of I/D sampling rate converter.

Objectives:

- 1) To upsample and interpolate the signal
- 2) To downsample and decimate the signal
- 3) To implement two stage sampling rate converter

MATLAB Simulations:

Consider a discrete time signal $x(n) = \sin(2\pi fn)$, for $0 \leq n < 30$ and $f = 0.05$.

Q.1. Write a program in MATLAB to plot the upsampled and interpolated the signal $x(n)$ by a factor $I = 2$.
[Useful MATLAB functions: *upsample*, *interp*].

Q.2. Write a program in MATLAB to plot the downsampled and decimated the signal $x(n)$ by a factor $D = 3$.
[Useful MATLAB functions: *downsample*, *decimate*].

Q.3. Write a program in MATLAB to plot, the signal $x(n)$ sampled by a non-integer factor $I/D = 3/4$. [Useful MATLAB functions: *interp*, *decimate*].

Conclusion:

- 1) What is difference between upsampling and interpolation? (Compare output of Q.1).
- 2) What is difference between downsampling and decimation? (Compare output of Q.2).
- 3) Whether I/D and D/I give same answer for non-integer multirate sampling?