**Digital Signal Processing – Lab 2**

1. Write MATLAB code that will take a sinusoid and quantize it using b bits. Use the sinusoid x(t) =sin(t) in the interval t=0:0.1:4\*pi. Quantize x(t) using b = 4, 8, 12 and 16 bits. For each case of b, plot the original signal, quantized signal and the quantization error.
2. Write MATLAB functions **delta(n), unity(n) and unitramp(n)** which will depict the elementary signals we read about in the class. Each of this functions, for a given value of n (n>0), plots the corresponding signals in the range of –n to n.
3. Write a MATLAB function that will take as input an arbitrary signal x(n) and divide it into Symmetric (even) and Antisymmetric (odd) parts and plots the three signals (original signal, even part and odd part) in the same plot.
4. Write a MATLAB function **sigshift** that takes a signal x(n) and a shift value k as inputs and returns the resulting signal y(n) = x(n-k).
5. Write a MATLAB function **sigfold** that takes a signal x(n) and returns the resulting signal y(n) = x(-n). Verify the correctness of your function by taking suitable signals as input/output and plotting them.
6. Write a MATLAB function **downsample** that takes a signal x(n) and a value d (d is an integer, d>1) and returns the down-sampled signal y(n) = x(dn). Verify the correctness by plotting suitable input/output signals.
7. Write a MATLAB function **sigadd** that takes two signals x1(n) and x2(n) as inputs and returns the resulting signal y(n) = x1(n)+x2(n).
8. Write a MATLAB function **sigmult** that takes two signals x1(n) and x2(n) as inputs and returns the resulting signal y(n) = x1(n)\*x2(n).