Math 6397 – Fall 2009 Name:

HOMEWORK #3

The goal of this homework is to implement the Discrete Haar Transform, from scratch, using Matlab. The files which you will write for this assignment will be applied in future assignments to implement other wavelet transforms and to test some applications.

As you probably know, Matlab has a toolbox which implements different types of wavelet transforms. However, you are not supposed to use this toolbox, but write your own code "from scratch" following the approach described in class. In particular:

(1) Write a Matlab function which computes the multilevel Discrete Haar transform. The inputs of the function will be: the signal x and the number of levels M (this, of course cannot exceed $L = \log_2 N$, where N is the length of x). The transform shall use convolution (`conv` in Matlab) and downsampling (`downsample` in Matlab), as described in class.

(2) Write a Matlab function which computes the multilevel Inverse Discrete Haar transform. The inputs of the function will be: the multilevel Haar transform signal X and the number of levels M. The transform shall use convolution (`conv` in Matlab) and upsampling (`upsample` in Matlab), as described in class.

Please, send your files to me by e-mail (`dlabate@math.uh.edu`). Before doing that, be sure to test your files to verify that they work as expected.