

Indian Institute of Science  
E9–252: Mathematical Methods and Techniques in Signal Processing  
Instructor: Shayan G. Srinivasa  
Homework #8, Fall 2017

Late submission policy: Points scored = Correct points scored  $\times e^{-d}$ ,  $d = \#$  days late  
**Assigned date:** Oct. 23<sup>rd</sup> 2017      **Due date:** Oct. 30<sup>th</sup> 2017 by end of the day

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**PROBLEM 1:**

Files *Imagination\_shounak.wav.wav* and *acoustic guitar music.wav* contain audio signals. Implement a wavelet based signal compression system using subband coding with uniform quantization. Implement any denoising applicable to these audio signals. The signal is sampled at 44.1 KHz using 24 bit quantizer.

- (1) Use Haar and Daubechies wavelet to implement the scheme.
- (2) Plot the reconstruction error vs. compression ratio.
- (3) Plot mean opinion score (from 10 subjects) vs. compression ratio.

(100 points)

Use any compression scheme of your choice following uniform quantization to achieve better compression.

(10 bonus points)

Note: Your report must include the original code along with your results.

Acknowledgement : The .wav files were recorded by Shounak Roy.