Indian Institute of Science

E9-251: Signal Processing for Data Recording Channels

Instructor: Shayan G. Srinivasa

Home Work #2, Spring 2014

Late submission policy: Points scored = Correct points scored $\times e^{-d}$, d = # days late

Assigned date: March 4th 2014 **Due date:** March 20th 2014

PROBLEM 1: Solve problems 5.5, 5.8, 6.1, 11.10 and 11.12 from Bergmans. (100 pts.)

NOTE: Your solution should include the original Matlab code along with necessary mathematical derivations whenever required.

PROBLEM 2: Consider the longitudinal recording channel with transition response $h(t, w) = \frac{V_p}{1+\left(\frac{2t}{w}\right)^2}$, where, t is the position, w is the pulse width at half maximum, and V_p is the pulse amplitude. Suppose we intend to design a partial response target of the form $(1 - D)(1 + D)^m$.

(1) Derive the MMSE based linear equalizer for this set up. You may assume that the length of the equalizer is $2N + 1$ with a center tap.

(2) Suppose we have jitter noise due to only position with variance σ_t^2 and additive white Gaussian noise of variance σ_g^2. What is the noise variance after equalization? Is the noise correlated?

(25 pts.)