

## Homework Set #1

The intention is that you do the exercises yourself. Oral discussion (without using pen/paper) between students is allowed, but the solution should be written down individually.

The homework must be submitted one day before each tutorial session either on paper (before 6 PM) or via email (before mid night).

Every correctly solved problem gives 1 point, partially correct gives 0.5 point, mostly wrong 0 point.

Numbers below refer to problems in the text book: Amos Lapidoth, “A Foundation in Digital Communication”.

1. Exercise 12.1
2. Exercise 12.2
3. Exercise 12.3
4. Exercise 13.1
5. Exercise 13.2

(Hint for Ex. 13.2: Consider the following example: Let  $X_\nu$  be a stochastic process defined as

$$\begin{aligned}
 X_\nu &= \left\{ \begin{array}{ll} -1 & \text{with prob.} = \frac{1}{2} \\ +1 & \text{with prob.} = \frac{1}{2} \end{array} \right\} \quad \text{for odd values of } \nu \text{ in } \mathbb{Z}, \\
 X_\nu &= \left\{ \begin{array}{ll} -\sqrt{\frac{3}{2}} & \text{with prob.} = \frac{1}{3} \\ 0 & \text{with prob.} = \frac{1}{3} \\ +\sqrt{\frac{3}{2}} & \text{with prob.} = \frac{1}{3} \end{array} \right\} \quad \text{for even values of } \nu \text{ in } \mathbb{Z}, \quad (1)
 \end{aligned}$$

and let  $Y_\nu = g(X_\nu) = X_\nu^4$ . Is  $X_\nu$  WSS? Is  $Y_\nu$  WSS? What can you conclude from this example?)

6. Exercise 13.3
7. Exercise 13.6
8. Exercise 13.7
9. Exercise 13.8

Solution due October 31, 2012

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