Homework Set # 5

1. Write a essay about the development of the results on secure source coding including recent results (approx 1 page single column Word or LaTeX with at least 5 relevant references).

2. Provide a coding scheme with a sequential decoder which achieves the corner point (I) in the lecture. The level of details should be no less than in the lecture.

3. Show that the rate region in Theorem 2.12 [PhD thesis Villard] can be obtained from Theorem 2.1. Sketch the rate region which you obtain from Theorem 2.1 after setting $V = A$ and $W = C$ and compare it with the rate region in Theorem 2.12. Why are both achievable rate regions the same?

4. Show that $\Delta = 0$ if the SI C^n available at Bob is a stochastically degraded version of Eve's SI, i.e., there exists a joint pmf $p_{A\tilde{C}\tilde{E}}$ such that we have $p_{A\tilde{C}} = p_{AC}$ and $p_{A\tilde{E}} = p_{AE}$ as well as $A - \tilde{C} - \tilde{E}$.

5. We consider a three node setup where Alice wants to transmit losslessly an observation A^n to Bob. The communication between both is eavesdropped by Eve who has a correlated observation E^n. Moreover, Alice and Bob have both the side information (C^n, E^n). The sequences (A^n, C^n, E^n) are iid$\sim p_{ACE}$. Characterize the compression-equivocation rate region!