

This is a combination of this year's homework and last year's.  
**SySc 545/645 ECE 563/663 Information Theory HW #1**      **9/30/03**  
**Due**      **10/7/03**

Chap. 2 problems 2,3,10,15,16 (except part *f*), 17,19

**SySc 545/645 ECE 563/663 Information Theory HW #2**      **10/12/04**  
**Due**      **10/19/04**

Chapter 2 numbers 22, 28, 29, 31, 33, and 34.

**SySc 545/645 ECE 563/663 Information Theory HW #3**      **10/19/04**  
**Due**      **10/26/04**

Chapter 3 numbers 1, and 7.

Chapter 4 numbers 2, 5, and 13. Note that Shannon outlined the treatment of problems like 5 and 13 in Appendix I of part one of his *Mathematical Theory of Communication* in the 1948 Bell System Technical Journal.

Extra problem: Given an irreducible aperiodic Markov process with transition probabilities specified by the matrix  $P_{i,j}$  and stationary distribution,  $\mu$ , for any initial distribution  $P_{x(0)}$

$$\lim_{n \rightarrow \infty} P_{x(0)} [P_{i,j}]^n = \mu.$$

Consider the claim that the convergence is uniform in the sense that

$$D(\mu || P_{x(0)} [P_{i,j}]^n) \geq D(\mu || P_{x(0)} [P_{i,j}]^{n+l})$$

for all positive integers  $n$  and  $l$  and all initial distributions  $P_{x(0)}$ .

Prove the claim or give a counterexample.

**SySc 545/645 ECE 563/663 Information Theory HW #4**      **10/21/04**  
**Due**      **11/2/04**

Chapter 4 numbers 9 and 12.

Chapter 5 numbers 8, 9, 12, 15, 17.

In problem 5.12  $k$  is fixed and  $\rightarrow$  means  $\lim_{n \rightarrow \infty}$

