

**ECE 499/599 Data Compression/Information Theory
Spring 06**

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**Homework 1
Due 04/18/06 at the beginning of the class**

Problem 1: Do problem 3 in chapter 2 of the textbook. (3pts)

Problem 2: Do problem 4 in chapter 2 of the textbook. (4pts)

Hint: First show that $f(x) = -x\log x - (a-x)\log(a-x)$ is maximum for $x = a/2$, then use this fact to prove whether $H(Q)$ is greater or smaller than $H(P)$.

Problem 3: For a certain exam, 75% of the participating students in the exam pass, 25% do not pass. Of the students who have passed, 10% own a car. Of the students who have failed, 50% own a car. (6pts)

- a) How much information does one receive if one is told the result of a student's exam?
- b) How much information is contained in the announcement of a student who has passed that he does or does not have a car?
- c) How much uncertainty remains concerning the car ownership of a student if he announces the result of his exam?

