

Date Assigned: 9 September 2004.

Date Due: 15 September 2004 in class.

Suggested Reading: Sections 4.1-4.2 and Sections 5.1 through 5.7 of the text.

1. Exercise 4.2 of the text book.
2. Exercise 5.1, 5.4 and 5.5 of the text book.
3. What is the binary Huffman code for a source with n symbols that are all equally likely? First suppose that $n = 2^k$ where k is some positive integer. What happens for general n (i.e., n is not of the form 2^k for some k)?
4. *Bonus*:¹ For a source that takes 5 possible symbols, we saw in Exercise 5.5, an example of a probability distribution that has the same binary Huffman code as that for the equally likely distribution. Can you generalize this observation?
 - (a) What class of probability distributions have the same binary Huffman code as the equally likely distribution?
 - (b) More generally, can you characterize the *equivalence class* of probability distributions as defined by their binary Huffman code? *Note:* The binary Huffman code for a distribution is not unique: it is defined only up to a relabeling of 1's and 0's. In defining your equivalence class, you can ignore this choice of labeling.

¹This means that you do not need to turn in your solution. It is meant for those of you who like the class to be more challenging.