Reading Assignment: Read Chapter 6 sections 6.1, 6.2, 6.3, 6.5

1. Exercise 5.6.6, p. 5-27

2. Exercise 6.1.2, p. 6-6. Your expressions should be in terms of the Q-function.


4. Exercise 6.3.1, p. 6-14

5. Exercise 6.3.4, p. 6-20.

6. A channel code with codebook \( C = \{00001, 11101, 00110, 11110\} \) is used on a BSC with transition probability \( p < 1/2 \).
   (a) Find the source length, code length and code rate.
   (b) Make a suitable encoding table.
   (c) Find an optimum codeword decoding rule.
   (d) How many distinct optimum codeword decoding rules are there?
   (e) Find an exact expression for the block error probability of an optimum decoding rule. Simplify as much as possible.
   (f) Find the minimum distance and error correcting capability \( t \).
   (g) Find an expression for the simple upper bound for the block error probability in terms of \( p \) and \( t \).
   (h) Compare (e) and (g) assuming \( p = .01 \).

7. Exercise 6.5.3, p. 6-38. Skip the simplex code. In Part c you should order the codes based on their error probabilities, but you need not actually find expressions for their error probabilities. Part d should say "Find upper and lower bounds to their error probability." Use the union upper bound. ("length" means "Euclidean length")

8. Exercise 6.5.5, p. 6-39. In part b, you do not have to compare to the simplex code.

Please write your solutions neatly and in the order given here.

When asked to prove something, you must use the proper words of justification. It is not sufficient simply to write formulas without the words that indicate the argument being used. Try to be as brief and precise as possible.

Note, there are other worthwhile practice problems in this Chapter.