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Computer Networks

Spring 2002

Assignment 9

Problem 28 (4 points)**:**
Suppose the information content of a packet is the bit pattern 1001110010011001.

(a) Show the outcome when applying the even parity scheme to this pattern. (1 point)

(b) What would be the outcome when using the 2-dimensional parity scheme on this bit pattern when organized in a 4×4 matrix? (1 point)

(c) Give a set of rules that would allow to detect and correct a single bit error in *any* place of a bit matrix resulting from the 2-dimensional parity scheme. (1 point)

(d) Show by counterexample that a double bit error cannot always be corrected. (1 point)

Problem 29 (2 points)**:**
What is the CRC code resulting from the bit pattern $D = 11111$ when using the generator $G = 1010$? Show all work. If you run into problems, you can find a much better explanation of CRC codes than in the book in the html file associated with chapter 5a in the syllabus list on the course web page.

Problem 30 (4 points)**:**
Consider the CDMA scheme. Suppose we have a sender 1 that uses the code

$$c = (1, 1, -1, 1, -1, -1, -1, 1).$$

(a) What would be the channel output if sender 1 wants to transmit the bit pattern 101? (1 point)

(b) Find a code c' for another sender 2 that is orthogonal to c (i.e. that does not cause interference problems on the receiver side). Recall that for this the dot product of c and c' has to be 0. (1 point)

(c) Compute the channel output for the case that sender 1 wants to transmit the bits 0 and 1 and at the same time sender 2 wants to transmit the bits 1 and 0. (2 points)