Discrete Structures

IIIT Hyderabad

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Tutorial 18

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Introduction

Question 1

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1.1 Find the minimum Hamming distance of the set of code words. Find the number of combinations of errors that can be detected. Also find the number of combinations of errors that can be corrected.

$$C = \{< 1000101010, 1100101111, 0000101101, 0111101101 >\}$$

1.2 Find the bit-wise XOR $\bigoplus$ between all the codes in C, and verify $H_C(x, y) = \min w(x \bigoplus y)\ \forall x, y \in C$.

Question 2

2.1 Let the matrix H be:

$$H = \begin{pmatrix} 1 & 1 & 0 & 1 & 0 & 0 \\ 1 & 0 & 1 & 0 & 1 & 0 \\ 0 & 1 & 1 & 0 & 0 & 1 \end{pmatrix}$$

1. Verify that this is a valid parity check matrix
2. Encode the message (1, 0, 0) and (1, 0, 1)
3. Decode the following messages and correct the errors if possible
   a. (1, 0, 0, 0, 1, 1)
   b. (0, 1, 1, 1, 1, 0)
   c. (1, 0, 0, 0, 0, 1)
   d. (1, 0, 0, 1, 0, 0)