

Computer Networks and Distributed Systems Exercise Sheet 11

Exercise 11.1 Hamming Distance

Determine the minimal Hamming distance of the following 16 bit words:
0000000000000000, 0000000111111111, 1010101010101010,
1111000000011111, 1111111100000000, 1111000000000000,
1111111111111111.

State your result and describe your approach.

Exercise 11.2 Hamming code

- a) Why are the positions 1, 2, 4, ... used as positions for the check bits?
- b) Determine the Hamming code (even parity) for the following 8 bit words:
 - i) 01010101
 - ii) 11110000
- c) You receive the following words in Hamming code (even parity). Correct possible 1 bit errors.
 - i) 000011100011
 - ii) 000100001111
 - iii) 111111110000
- d) By combining k code words in a block that is transmitted afterwards, it is possible to correct error bursts up to a particular maximal length. What is the maximal length? How is the data of a block transmitted?

Exercise 11.3 CRC-Codes

6 bit words $D(x)$ are encoded using CRC with the 3 bit generator polynomial $G(x) = 101$.

a) Compute the code words $T(x)$ for the following payloads:

i) $D(x) = 100110$

ii) $D(x) = 101010$

b) Check if the following code words $T(x)$ have been received without errors.

i) $T(x) = 10011001$

ii) $T(x) = 01100110$