Tutorial 9 Exercises

COMP526: Efficient Algorithms

02–03 December, 2024

Exercise 1. In lecture, we showed that the $(7,4)$-Hamming code can be used to correct a single error in a 7-bit codeword that encodes a 4 bit message. Suppose we use $(7,4)$-Hamming codes to detect, but not correct, errors. What is the maximum number of errors that can be *detected* using a $(7,4)$-Hamming code?

Exercise 2. You your friend agree to encode the beginning of the alphabet using the following scheme that uses 4 bits per character:

A	0000	I	1000
B	0001	J	1001
C	0010	K	1010
D	0011	L	1011
E	0100	M	1100
F	0101	N	1101
G	0110	O	1110
H	0111	P	1111

You receive the following message that your friend encoded using a (7,4)-Hamming code:

```
0010011 1101000 1000000 1010111]
```

What was the original message sent by your friend? Which bits were corrupted in the transmission of the message?