

Introduction to Coding Theory Assignment 2

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1 Q1

(a)

$$000 \rightarrow 010p = 0.028227$$

$$100 \rightarrow 010p = 0.000873$$

$$111 \rightarrow 010p = 0.000873$$

Thus the decoded word is 000.

(b)

$$000 \rightarrow 011p = 0.000873$$

$$100 \rightarrow 011p = 0.000027$$

$$111 \rightarrow 011p = 0.028227$$

Thus the decoded word is 111.

(c)

$$000 \rightarrow 001p = 0.028227$$

$$100 \rightarrow 001p = 0.000873$$

$$111 \rightarrow 001p = 0.000873$$

Thus the decoded word is 000.

2 Q2

(a)

$$000 \rightarrow 010p = 0.147$$

$$100 \rightarrow 010p = 0.063$$

$$111 \rightarrow 010p = 0.063$$

Thus the decoded word is 000.

(b)

$$000 \rightarrow 011p = 0.063$$

$$100 \rightarrow 011p = 0.027$$

$$111 \rightarrow 011p = 0.147$$

Thus the decoded word is 111.

(c)

$$000 \rightarrow 001p = 0.147$$

$$100 \rightarrow 001p = 0.063$$

$$111 \rightarrow 001p = 0.063$$

Thus the decoded word is 000.

3 Q3

According to the maximum likelihood rule:

$$001 \rightarrow 000p = 0.005$$

$$011 \rightarrow 000p = 0.025$$

The decoded word is 011

However, the nearest neighbour to 000 is 001.