Tutorial 7

Question 1

Suppose a transmission channel has a bit error rate of 10^{-3}. Bit errors occur at random and independent of each other. Suppose that the following code is used. To transmit a 1, the codeword 111 is sent. To transmit a 0, the codeword 000 is sent. The receiver takes the three received bits and decides which bit was sent by taking the majority vote of the three bits. Find the probability that the receiver makes a decoding error.

Question 2

Let $g(x) = x^3 + x^2 + 1$. Consider the information bits (1, 1, 0, 1, 1, 0).

(a) Find the codeword if $g(x)$ is used as the generating polynomial.

(b) Can $g(x)$ detect single errors? Why?

Question 3

Let $g(x) = x^3 + x + 1$. Consider the information bits (1, 1, 0, 1, 1).

(a) Find the codeword if $g(x)$ is used as the generating polynomial.

(b) Suppose that the codeword in part (a) has a transmission error in the second bit. What does the receiver obtain when it does its error checking?