

Introduction to Coding

Exercise 1: A $(5,3)$ code computes the two parity bits as: $p_0 = d_0 \oplus d_1$ and $p_1 = d_1 \oplus d_2$ where d_i is the i 'th data bit. What codeword is transmitted when the data bits are $(d_0, d_1, d_2) = (0, 0, 1)$? How many different codewords are there in the code? What are the first four codewords? In general, how many codewords are there for an (n, k) code?

Exercise 2: What is the Hamming distance between the codewords 11100 and 11011? What is the minimum distance of a code with the four codewords 0111, 1011, 1101, 1110?

Exercise 3: A (5,2) block code has codewords constructed as $d_0, d_1, d_0 \oplus d_1, d_0, d_1$. Is this a linear code? List the codewords. What is the minimum weight of this code? What is the minimum distance?

Exercise 4: What is the code rate of a code with 4 codewords each of which is 4 bits long? *Hint: If a code has 2^k codewords, what is k ?*

Exercise 5: The data rate over the channel is 50 Mb/s; a rate $1/2$ code is used. What is the throughput?