S-72.341 CODING METHODS

Tutorial 7

1. (Wicker, problem 7.1) Construct a generator and parity-check matrix for $\Re(2,4)$.

2. Consider the Reed-Muller code $\Re(2,5)$.
   a) What is the dimension of the code?
   b) What is the rate of the code?
   c) How many errors (denote this number by t) can the code correct?
   d) *(Bounded distance decoder)* Suppose that we use a bounded-distance decoder that corrects up to t errors. Find the probability of decoding error when the raw bit error probability is $\frac{1}{2}$.

3. (Wicker, problem 7.4) Show that $\Re(m-1,m)$ is composed of all 2^m-tuples of even weight. It is thus a simple parity-check code.

4. (Wicker, problem 7.8) Find the Reed algorithm checksums for $\Re(1,4)$.

5. (Wicker, problem 7.10) Use the Reed algorithm to decode the following noise-corrupted code words from $\Re(2,4)$.
   a) (0011,0111,0001,0111)
   b) (1100,1100,1011,1100)
   c) (0011,0011,0001,1000)
   d) (0101,0110,1110,0110)