

2005 - Exercises II.

1. Decide, if C is a linear code.
 $C = \{20402, 40205, 03033, 23433, 43235, 00002, 20400, 40203, 03034, 20403, 40202, 03035, 23430, 00005, 03032, 23432, 43234, 00004, 23431, 40204, 03031, 23435, 00000, 43231, 40200, 03030, 23434, 20401, 43230, 43232, 20404, 40201, 00001, 00003, 20405, 43233\}$.
2. Prove that C^\perp is a linear code (for C linear code).
3. Estimate as exact as possible upper and lower bound for $A_2(20, 7)$, $A_3(20, 7)$, $A_5(20, 7)$ using suitable estimation formulas.
4. Knowing that Hamming code was used, decode the received codeword $y = 111111111100000$.
5. Let G be a generator matrix of a binary linear code C and assume that each row in G has even weight. Prove that C only contains codewords of even weight.
6. Prove the following theorem related to coset properties (one from the lecture). Suppose C is a linear $[n, k]$ -code over $GF(q)$. Then
 - (a) every vector of $V(n, k)$ is in some coset of C ,
 - (b) every coset contains exactly q^k elements,
 - (c) two cosets are either disjoint or identical.