
Exercise Set 12
Quantum Computation

Exercise 1 *The Steane code*

The Steane code is a $\text{CSS}(C_1, C_2)$ code constituted with two classical codes:

$$C_1 = \text{Hamming}(7, 4) \text{ and } C_2 = C_1^\perp$$

- (a) Give parity the check matrix of C_1 and generator matrix of C_2 . Check that $C_2 \subset C_1$. How many errors are corrected by C_1 and C_2^\perp ?
- (b) What are the parameters of Steane's code (length, dimension of vector space, number of errors corrected)?
- (c) Construct states (codewords) belonging to $\text{CSS}(C_1, C_2)$.