Matematiska Institutionen
KTH

Homework number 5 to SF2736, fall 2011.

Please, deliver this homework at latest on Wednesday, December 7.

1. (0.2p) Use the technique with generating functions to find explicit expressions for the numbers a_n, if this sequence of numbers satisfies

$$a_n = a_{n-1} + 12a_{n-2}, \qquad n = 2, 3, 4, ...$$

and $a_0 = 0$, $a_1 = 7$.

2. (0.2p) Find the number of ways to color the edges of a tetrahedron in five colors.

3. (0.2p) Find a linear 1-error correcting code C, containing as many words as possible, among them the word 1110011010, and such the word 0001111101 cannot be corrected (or does not belong to C).

4. (0.4p) Find a binary matrix $\mathbf{H}$ such that the set of words

$$C = \{\bar{x} = (x_1, x_2, \ldots, x_n) \mid \mathbf{H}\bar{x}^T = \bar{0}^T\}$$

constitutes a 2-error correcting code of length $n = 10$ and with as many words as possible.