

Matematiska Institutionen
KTH

Homework number 5 to SF2736, fall 2013.

Please, deliver this homework at latest on Monday, December 16.

The homework must be delivered individually, and, in general, just hand-written notes are accepted. You are free to discuss the problems below with your classmates, but you are not allowed to copy the solution of another student.

1. (0.3p) Use the technique with generating functions to find explicit expressions for the members of the sequence a_n , $n = 0, 1, 2, \dots$, if this sequence of numbers satisfies

$$a_n = 3a_{n-1} + 4a_{n-2} + n, \quad n = 2, 3, \dots,$$

and $a_0 = 3$, and $a_1 = 2$.

2. (0.2p) Find a formula for the number of ways to color the edges of a regular hexagon in k distinct colors.
3. (0.2p) Are there any linear 1-error-correcting code C of length 12 satisfying the three conditions below:
 - (a) The number of words of C is 256.
 - (b) The word 111110000011 belongs to C .
 - (c) The word 000111000101 does not belong to C but can be corrected to a word of C .

Either find and describe such a code C if it exists, or disprove the existence of it.

4. (0.3p) Find an 1-error-correcting code in

$$Z_5^6 = Z_5 \times Z_5 \times Z_5 \times Z_5 \times Z_5 \times Z_5,$$

with as many words as possible.