

# Mid Term Exam 1

## Combinatorics

**№1** Find the asymptotic behavior of

$$K = \sum_{k=0}^{\lfloor \frac{n}{2} \rfloor} \binom{n}{k} = f(n) + O(g(n))$$

**№2**

A staircase consists of  $N$  steps. A person can jump over exactly 1 or 3 steps. Find the number of different ways in which people can climb the stairs.

**№3**

How many binary sequences of a length  $N$  exist if after every “odd” block of ‘0’ the block with even number of ‘1’ should follow?

**№4**

Find a number of colorings in RGB palette for Necklace with 4725 cameos.

**№5**

Find a general solution for recurrent relation:

$$F_n \cdot F_{n-2} \cdot F_{n-3} = 2F_{n-1}^2 \cdot F_{n-3} - F_{n-1} \cdot F_{n-2}^2$$