



**Первый международный математический турнир  
разновозрастных команд «Дважды Два»**

5 ноября 2012 г

**Олимпиада по играм и алгоритмам (юниоры)**

1. At the checkered squares of  $4 \times 4$  invisible ink isolated one square X. You can to choose any of the original square box  $2 \times 2$  and find out whether it is X. As for the least number of questions you can find the location of X?
2. Of the four coins one false. It differs from the real weight, but do not know it is easier or harder. Weight of this coin, the 5 There is one mass of 5 g weight as with two weighings on a beam balance to find the counterfeit coin, having ascertained in this case, it is easier or harder this?
3. There are two piles of 11 stones. For the course are allowed to take two stones from one pile and one from the other. The player who cannot make a move. Who wins in a particular game?
4. Display consists of lights, buttons, gathered in a square  $101 \times 101$ . When you click on it and all the buttons that are with her in the horizontal and vertical rows, change their state (non-burning light bulb included, and burning off). How far the least number of clicks you can light all the light bulbs, if initially they were all off?
5. Two boys are playing a game: three piles in front of them, which are 10, 15 and 20 matches respectively. Over the course of one match is allowed to take any of a handful than the one from which the match was taken by the previous stroke (first course can be taken from any pile.) The winner is the first person to take the last match of any piles. Who has a winning strategy in this game - the one who makes the first move or his partner?
6. With the numbers from 1 to 100 do such actions. First, all the numbers are white. At the k-th step of the numbers are multiples of k repaint (from white to black, and from black to white). How many black numbers will be after one hundredth step?

Time to resolve - 3 hours (180 minutes)