Problems for November 14, 2009

1. You are given a rectangular table with 4 rows and 7 columns. Place an integer in each of the squares so that the sum in each row will be 35 and and in each column - 20. Find several solutions.
2. Write three numbers in a row such that the sum of any two consecutive numbers is even, and the sum of all numbers - odd.
3. Place the numbers 0, 1, 2, 3, 4, 5, 6, 7, 8 in the cells of a 3x3 square so that each row, column and diagonal will have the same sum.
4. A group of students lined up in the school cafeteria, waiting for the cookies to be brought in. In the first 10 minutes of waiting more students came in, and between each two students of the old line another student had cut in. During the next 10 minutes this happened again: between each two people another one had cut it. Finally, 85 cookies were brought in and each student in the line has got 1 cookie. How many student had formed the original line?
5. Mary wants to plant 8 flowers in 7 rows, with 3 flowers in each row. Can she do that?
6. The mother has bought a box of sugar in cubes. The children have eaten first the top layer of 77 cubes, then the right hand side layer of 55 cubes and finally the front layer. How many sugar cubes were left in the box?
7. A hiker in a camp wants to cook 2 soft boiled eggs and 4 more hard boiled eggs (to eat them while on the trail). A soft boiled egg needs 2 minutes in boiling water, a hard boiled - 4 minutes. What is the least amount of time that this hiker needs if the cooking pot fits at most 4 eggs? The water in the pot is boiling now.
8. The subway system of the Small City has three lines, at least two terminal stations and at least two stations where one can transfer from one station to another. None of the terminal stations is also a transfer station. Draw a map of such a subway system if it is known that this can be done without lifting the pencil off the paper and without tracing any of the lines twice.

Homework

1. A group of four people has neither a group of three with the same last name, nor a group of three with the same middle name, nor a group of three people with the same first name. However, any two people in the group either have the same last name, or the same middle name, or the same first name. Is this possible?
2. Color some cells of the 4x4 square so that each colored cell has a common side with exactly three uncolored.
3. A master jeweler has 20 students which live in the 8 rooms of a house, as shown below on the picture. The jeweler is very suspicious about anyone coming into his house or leaving it, and each night he checks that the rooms along each wall of the house have a total of 7 students. One day 4 friends come over to visit the students.

2	3	2
3		3
2	3	2

(a) Change the arrangement to accommodate the students and their guests, so that the master does not get suspicious (in other words, there should still be 7 people in the rooms along each of the 4 walls); (b) The next day the guests has left and 4 of the students have left with them. Rearrange the 16 remaining students so that the jeweler will still find 7 students along each wall of the house.