Targil 7.
This targil is about groups and groupish ideas. Groups are popular in IMC.
For those who don't know: use wikipedia
http://en.wikipedia.org/wiki/Group_(mathematics)

1. Consider Rubik's cube (קוביה הונגרית). Is it possible to find a certain sequence of moves, such that you can solve the cube from any situation, if you repeat that specific combination of moves sufficiently many times?

2. Consider a table:

1	2	3	4	5	6	7
7	1	2	3	4	5	6
6	7	1	2	3	4	5
5	6	7	1	2	3	4
4	5	6	7	1	2	3
3	4	5	6	7	1	2
2	3	4	5	6	7	1

You are allowed to flip each two rows and to flip each two columns. How many different tables can You get by a sequence of such steps?

3**. We play the following game. On the circle, we have some red and blue points (always at least two). We can insert a red point into certain arc, and flip the colors of the ends of that arc (red changed to blue, blue changed to red). Conversely, if we have at least three points, we can erase a red point, simultaneously flipping the colors of its neighbors.
In the beginning of the game, we have only two points on the circle and both are blue. Can we perform a sequence of moves, so that in the end we shall have only two colored points, and both red?

4*. Let G be a finite group. For arbitrary subsets U,V,W of G, denote by N_{UVW} the number of triples (x,y,z) in $U \times V \times W$, for which xyz is the unity.
Suppose that G is partitioned into three sets A, B and C (i.e. sets A,B,C are pairwise disjoint and G = AUBUC).Prove that $N_{ABC} = N_{CBA}$.

5**. Let G be a group of $2^k(2m+1)$ elements and suppose it has an element of order 2^k. Prove that all the elements of odd order (together with the unit element) form a subgroup.