

**International Mathematics
TOURNAMENT OF THE TOWNS**

Senior P-Level Paper

Fall 2007.

- 1 [1] A straight line is colored with two colors. Prove that there are three points A, B, C of the same color such that $AB = BC$.
- 2 [2] A student did not notice multiplication sign between two three-digit numbers and wrote it as a six-digit number. Result was 7 times more that it should be. Find these numbers.
- 3 [3] Two players in turns color the squares of a 4×4 grid, one square at the time. Player loses if after his move a square of 2×2 is colored completely. Which of the players has the winning strategy, First or Second?
- 4 [3] There three piles of pebbles, containing 5, 49, and 51 pebbles respectively. It is allowed to combine any two piles into a new one or to split any pile consisting of even number of pebbles into two equal piles. Is it possible to have 105 piles with one pebble in each in the end?
- 5 [4] Jim and Jane divide a triangular cake between themselves. Jim choses any point in the cake and Jane makes a straight cut through this point and choses the piece. Find the size of the piece that each of them can guarantee for himself/herself (both of them want to get as much as possible).