**6th Mathematical Contest of Friendship
in Honor and Memory of Grand Duchy of Lithuania**

28 September 2014

1. Determine all functions $f : \mathbb{R} \to \mathbb{R}$ such that
$$f(xy + f(x)) = xf(y) + f(x)$$
   holds for any $x, y \in \mathbb{R}$.

2. An isosceles triangle ABC with $AC = BC$ is given. Let M be the midpoint of the side AB and let P be a point inside the triangle such that $\angle PAB = \angle PBC$.
   Prove that $\angle APM + \angle BPC = 180°$.

3. In a table $n \times n$ some unit squares are coloured black and the other unit squares are coloured white. For each pair of columns and each pair of rows the four squares on the intersections of these rows and columns must not all be of the same colour. What is the largest possible value of n?

4. Determine all positive integers $n > 1$ for which $n + D(n)$ is a power of 10, where $D(n)$ denotes the largest integer divisor of n satisfying $D(n) < n$.