The 17th Balkan Mathematical Olympiad
Chisinau, Moldova, 2000

1. Find all functions of real variables such that for any real x and y we have :
$$f(xf(x) + f(y)) = y + f^2(x)$$

2. Let ABC be an acute-angled triangle and D the midpoint of BC. Let E be a point on segment AD and M its projection on BC. If N and P are the projections of M on AB and AC then the angular bisectors of angles NMP and NEP are parallel.

3. One has a rectangle of dimensions 50 x 90. What is the maximum number of rectangles of dimensions 1 and $\sqrt{2}$ that can fit in the large rectangle?

4. A positive integer n is called a power if there are a and b positive integer numbers greater than or equal to 2 so that $n = a^b$. Prove that for any n there is a set A of n powers so that for any subset B of A, $\frac{1}{|B|}\sum_{x\in B} x$ is also a power.