The 9th Balkan Mathematical Olympiad
Athens, Greece, 1992

1. Let m, n be positive integers and $A(m,n) = m^{3^{4m}+6} - m^{3^{4m}+4} - m^5 + m^3$. Find all n so that for every m we have A(m, n) is divisible by 1992.

2. Prove that for every positive integer n we have $\left(2n^2+3n+1\right)^n \geq 6^n \left(n!\right)^2$.

3. Let ABC be a triangle and D, E, F be points on sides BC, CA, AB, different from the vertices, so that the quadrilateral AFDE is cyclic. Prove that $4\frac{area(DEF)}{area(ABC)} \leq \left(\frac{EF}{AD}\right)^2$.

4. For every integer $n \geq 3$ find the smallest positive integer $f(n)$ that has the property: for every $f(n)$ numbers in the set $\{1, 2, \ldots, n\}$, one can find among these three numbers x, y, z that are pair-wisely prime.