

**MATHEMATICAL OLYMPIAD 2004**  
**5–6 grades**

**Calculators are prohibited!**

1. On the island of Nevermind some people are liars; they always lie. The remaining habitants of the island are truthlovers; they tell only the truth. Three habitants of the island, A, B, and C met this morning.

A said: "All of us are liars".

B said: "Only one of us is a truthlover".

Who of them is a liar and who of them is a truthlover?

2. Pinocchio has 9 pieces of paper. He is allowed to take a piece of paper and cut it in 5 pieces or 7 pieces which increases the number of his pieces. Then he can take again one of his pieces of paper and cut it in 5 pieces or 7 pieces. He can do this again and again as many times as he wishes. Can he get 2004 pieces of paper?
3. In Dragonland there are coins of 1 cent, 2 cents, 10 cents, 20 cents, and 50 cents. What is the largest amount of money one can have in coins, yet still not be able to make exactly 1 dollar?
4. Find all solutions  $a, b, c, d, e$  if it is known that they represent distinct digits and satisfy the following:

$$\begin{array}{r} a \ b \ c \ d \\ + \ a \ c \ a \ c \\ \hline c \ d \ e \ b \ c \end{array}$$

5. Two players play the following game. On the lowest left square of an  $8 \times 8$  chessboard there is a rook. The first player is allowed to move the rook up or to the right by an arbitrary number of squares. The second player is also allowed to move the rook up or to the right by an arbitrary number of squares. Then the first player is allowed to do this again, and so on. The one who moves the rook to the upper right square wins. Who has a winning strategy?