## Informatics problems

1. Define the value of variable *d* upon running the following program:

```
a: = [4,3,4,5,2]; b: = a[1];
c:=a[1]; for i from 2 to 5
do if b < a[i] then b: =
a[i]; if c > a[i] then c: =
a[i]; d: = c-b;
```

2. An ATM is stocked with bank notes of different denominations. Once a customer attempts to withdraw an amount of money, the ATM program identifies the number and denominations of bank notes to be dispensed and the possibility of dispensing the amount requested. The process is as follows. First, the highest-denomination bank notes are dispensed. If there is a shortage of such bank notes in the ATM, or the amount requested is exceeded when adding one more bank note of this kind, the ATM starts dispensing the second-highest denomination bank notes, and so on, until the amount dispensed equals the amount requested; or these amounts are not equal, while no smaller denominations are available in the ATM. The interesting fact here is that the performance of the aforementioned algorithm is optimal if any of the two available denominations can be evenly divided by the other one. Please draw a flow chart showing how withdrawal requests are handled by the ATM. Given are the initially available number of bank notes by denomination and a list of withdrawal requests. Please identify the withdrawal requests to be covered and those to be declined. Please note that the number of bank notes available in the ATM decreases with each satisfied withdrawal request.

## Mathematics problems

1. Monty Hall dilemma. The game is as follows. The participant is given the choice of three doors: Behind one door is a car; behind the other two doors are scooters. The car is equally likely to be behind any of the three doors. The goal is to choose the door with the car behind it. The game host offers the player to pick a door. Once the choice is made, the host—who knows for a fact what is behind each door—opens one of the other doors to reveal a scooter and offers the player to switch the doors. Is it to the player's advantage to change his or her choice?

2. Fifteen boys picked nuts. They collected 100 nuts altogether. Prove that at least two boys collected the same number of nuts.