

Week 3

Problem 4:

Given an array of bottles and an array of corks we tell the user if the corks where plugged correctly. In order to do it, we do a binary search with each cork over the array of bottles (we can easily change it to a true or false function if needed):

```
Bottles:
1 2 3 4 5
Corks:
4 2 1 5 3 |
Bottle closed at index 3
Bottle closed at index 1
Bottle closed at index 0
Bottle closed at index 4
Bottle closed at index 2
```

Problem 6:

Given a function (x^2) we obtain an array of numbers, where we need to find the minimum (decreasing array, minimum, increasing array). The minimum is where the river is found. In order to find the minimum, we do a divide and conquer algorithm when we compare the middle element "m" with $m + 1$ and $m - 1$. If the bridge at m is lower than at $m+1$ and higher than at $m-1$, then the river lies at the left side of m. If not, it lies at the right side.

```
Bridge:
5 4 3 2 1 6 7 8 9
The river is 5 meters from the beginning of the bridge
```

Issues on the exercise:

We are only working with whole numbers. If there are more than one minimums, the only possibility is that these are together and the bridge in the minimum forms a straight line, so we take into account the furthest one. We couldn't find a way to find the minimum of a given function in Java (we would need to it mathematically for every given function).