Algorithmics	Student information	Date	Number of session
	UO:UO277653	18/03/2021	6
	Surname: Stanci		
	Name: Stelian Adrian		

Escuela de Ingeniería Informática
Universidad de Oviedo

Universidad de Oviedo
Universidá d'Uviéu
University of Oviedo

Activity 1. Execution times.

N	tGreedy1 O(1)	tGreedy2 O(nlogn)	tGreedy3 O(nlogn)
100	0	5	2
200	0	8	2
400	0	8	5
800	0	21	21
1600	0	64	60
3200	0	151	140
6400	0	317	315
12800	0	678	658

Activity 2. Answer the following questions.

- Explain if any of the greedy algorithms involves the optimal solution from the point of view of the company, which is interested in maximizing the number of “pufosos”.

  From the point of view of the company, the best one is the second, as it is the one that results in the most pufosos spent.

- Explain if any of the greedy algorithms involves the optimal solution from the point of view of the player, who is interested in minimizing the number of “pufosos”.

  In this case, the player wants to spend as little pufosos as possible, so the best would be the third one, as it saves a lot more pufosos compared to the other two.

Algorithmics	Student information	Date	Number of session
	UO:UO277653	18/03/2021	6
	Surname: Stanci		
	Name: Stelian Adrian		

- Explain the theoretical time complexities of the three greedy algorithms, according to the implementation made by each student, depending on the size of the problem n.

The first algorithm does not make any change over the original input, it just returns the same, so the complexity is O(1).

In the second and the third ones we need to sort the input, so the complexity is higher. In this case we choose the Quicksort sorting algorithm, using the median of three as a strategy for picking the pivot.

The complexity of the second and third algorithms is the same as the Quicksort algorithm, O(nlogn). In the second case we also copy the inverted array, so that brings up the time a bit in comparison with the third one.

- Explain if the times obtained in the table are in tune or not, with the complexities set out in the previous section.

We calculate some theoretical values, taking into account the complexity and using this formula:

$$t2 = \frac{f(n2)}{f(n1)} * t1$$

With t2 being the new time, n2 the new size, and n1 and t1 being the previous size and previous time, respectively:

N	tGreedy1	tGreedy2	tGreedy3
3200	0	140	131

6400	0	304	285
12800	0	656	615

We can see that the empirical data adjust pretty well to the theoretical values, so we can conclude that the times are in tune.