

2022-09-15 - Pearls of Computer Science Core - Algorithmics Diagnostic

Cursus: B-CS-MOD01-1A-202001021/202001022 B-CS Pearls of
Computer Science Module - 202001021/202001022 – DIAGNOSTIC
TEST

Tijdsduur: 1 uur

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Inhoud:

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Cursus: B-CS Pearls of Computer Science Module - 202001021/
202001022 – DIAGNOSTIC TEST

Welcome to the ungraded digital diagnostic test for Pearl 001 Algorithmics.

- You may use **1 A4 sheet with your own notes** for this test, as well as a simple calculator.
- **Scientific or graphical calculators, laptops, mobile phones, books etc. are not allowed. Put those in your bag now (with the sound switched off).**
- Please use the **BBB/Canvas chat for any question** during the exam.
- You have enough time to familiarize yourself with the Remindo environment. Make good use of it! The real test has more questions (100 points total).

Total number of points: 35

Aantal vragen: 5

1 Question 1a

5 pt.

Suppose you execute the following assignments in Python

```
clubs = ["Dance", "Theatre", "Sports"]
members = [68, 162, 92]
```

Here *clubs* is a list of club names at the University of Twente, and *members* is a list of the corresponding (fictional) number of active members in each club.

Write a Python condition (*not* an **if** statement) that tests whether the "Dance" club is the smallest of the three clubs.

2 Question 1b

5 pt.

Suppose you execute the following assignments in Python

```
clubs = ["Dance", "Theatre", "Sports"]
members = [68, 162, 92]
```

Here *clubs* is a list of club names at the University of Twente, and *members* is a list of the corresponding (fictional) number of active members in each club.

Assign to a new list '*smallest*' both the name and the number of active members of the club with the fewest active members.

3 Question 1c

5 pt.

Suppose you execute the following assignments in Python

```
clubs = ["Dance", "Theatre", "Sports"]
members = [68, 162, 92]
```

Here *clubs* is a list of club names at the University of Twente, and *members* is a list of the corresponding (fictional) number of active members in each club.

Write a sequence of assignments that is **as short as possible**, resulting in a change to '*members*' after which the number of active members are ordered from lowest to highest.

(NB: It is *not* correct to assign an entirely new value to *members*. You *must* modify the list by swapping elements.)

4 Question 5a

10 pt.

Consider the following list

[8, 20, -4, 4, -18, 6]

Show how bubble sort sorts this list by writing down the list after every single modification.

5 Question 6

10 pt.

After having studied all week for the Algorithmics test you lie awake one night and wonder if one could get an even faster search algorithm than binary search.

Then it dawns on you: *ternary search*! Rather than dividing a list into two equal parts, *ternary search* divides the list into *three* equal parts (left, middle, right) and then determines in which of these three parts the search value lies (if any).

Can this idea be realized, ie. could such an algorithm work in practice?

If not, why not?

If so, what would be the complexity of *ternary search* -- In particular, would it be fundamentally faster than binary search? Explain your answer.

Thank you! Your answers were saved. You can check Canvas for the solution of the questions.

Please remember that the **real test tomorrow has more questions** (100 points total rather than the 35 points you saw here)!