

Computational Management Science 1

Final

registration number:
(Do not write your name on the test - just the 7 digit student id number.)

1. (6 points) Writing Code

(a) (3 points, ≤5 minutes) Functions

Write a function `sumproduct(first_iterable, second_iterable)` in Python that takes a two sequences of numbers with equal length and returns the sum of the product of the numbers. [e.g. `sumproduct((1, 3, 4), (9, 2, 3)) ⇒ 27`;
`sumproduct([3, 5], [2, 4]) ⇒ 26`]. Add a proper docstring to receive full points.

(b) (3 points, ≤5 minutes) Classes and data structures

Implement a simple data structure in Python. The data structure must be capable of storing a node of a doubly linked list (i.e. a data field and a link to a potential predecessor as well as a potential successor). Write a **minimalistic** class. You don't need to implement any functionality, just a class that stores the required data. Don't forget to write docstrings in order to receive full points.

2. (6 points, ≤ 10 minutes) Correct Mistakes

The following code contains 6 syntax errors/ typos. Clearly mark and correct the mistakes. (hint: you don't need to understand what the function does to correct the mistakes as there are no logical errors)

```
def ids_are_consecutive(node_list)
    """
    Return true if 'node_list' consists of unique consecutive ids.

    The lowest id must be 0.
    'node_list' does not have to be sorted by ids.
    """
    ids = sorted([n.id for n in node_list])
    return ids == list(range(sizeof(node_list)))
```

3. (6 points, ≤ 10 minutes) Python vs. C++

Name one thing you like about Python and one you dislike.

Do the same for C++. Also, name one thing you like about this course and one thing that should be improved in the future (be honest!).

4. (12 points) Reading and Understanding Code

What is the output of the following code snippets? Write exactly what the output of each snippet is if the snippet is the only content of a Python file. If the output is an error message, it is enough to write "ERROR". If there is no output, write "-"

(a) Simple calculation

```
print(10 ** 2 * 2)
```

(b) Loop

```
prices = (4.2, 5.8, 2.9)
total = 0.0
for price in prices:
    total += price
print("Total:", total)
```

(c) Function

```
import math
c1 = 3
c2 = 4
def perimeter_right_triangle(c1, c2):
    print('calculating the perimeter')
    return c1 + c2 + math.hypot(c1, c2)
perimeter_right_triangle(c1, c2)
```

(d) List

```
l = [5, 3, 2]
l.append(1)
print(sum(l))
```

(e) Statistics

```
l = [5, 3, 2]
print(calc_average(l))
```

(f) Sorting

```
l = [2, 4, 3]
print(sorted(l))
```

5. (5 points, ≤5 minutes) Assignment

(a) (3 points)

Briefly explain the difference between copy assignment and reference assignment.

(b) (1 points)

How can you convince C++ to use call by value?

(c) (1 points)

How can you convince C++ to use call by reference?

6. (6 points, ≤5 minutes) Writing Files

Write a Python function `write_matrix(filename, matrix)` => None that takes a filename string and a list of lists (matrix) of numbers. The function should write the contents of the matrix to a file with the given name. Any representation of the data is ok that as long as it allows to read the data back in from the file (but you don't need to implement the reading function, just the writing function). Don't forget to document the function in order to receive full points.

7. (7 points) Software Project Management

(a) (3 points)

Name at least one (distributed) version control system. What are the key benefits of such a system?

(b) (2 points)

Describe the purpose of a bug tracking system.

(c) (2 points)

What good does a code review system?