DIGITAL TECHNOLOGY

Academic Year 2023-24
Prof. Barbara PERNICI

Exam 9/7/2024
Total time 1.30 h

Last name	
First name	
Matricola/Person code	
Signature	

Please remember that:
- *The exam is closed books.*
- *The use of cellular phones or any other electronic devices during the exam is forbidden.*

It is necessary to answer at least partially all the questions for a positive evaluation.
Given answers should be explained, lists of bullet items are insufficient to answer a question.

Please write the answer for each question on a separate piece of paper.

Question 1 [11 points]

Provide a synthetic general description of databases, data warehouses and data lakes and compare them in terms of structure, possible types of analyses, and functionalities.

Question 2 [11 points]

Illustrate the security properties and describe for each property if and how asymmetric cryptography can contribute to their enforcement.

[please turn over]

Question 3 [11 points]

Consider the following fragment of Python code:

```
import random as run
import pandas

def my_function(val=10):
    if not val:
        return run.randint(100, 500)
    else:
        return val

data = {"state":       ["Ohio", "Ohio", "Ohio", "Nevada", "Nevada", "Nevada"],
        "year":        [2000, 2001, 2002, 2001, 2002, 2003],
        "population":  [1.5, 1.7, 1.9, 2.4, 2.9, 3.2],
        "debt":        [100, False, 300, 75, False, 50]}

df = pandas.DataFrame(data)

df['new_debt'] = df['debt'].apply(my_function)

df.groupby("year").debt.sum()  # Write down which is the output of this line
```

1. Qualitatively explain what the program does and describe the expected output.

2. Implement a filter (selection) for the "df" dataframe. The resulting dataframe has to contain only the rows with "new_debt" over 250.

3. Explain the difference between a continue and break statement