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Faculty of Exact Sciences - Department of Computer Science
Level: Master 1 (2025-2026)
Module: Developing maintainable software -Typical solution-

Answer the questions: 6pts

1- In modern software engineering, what is software architecture?

Software architecture is the set of early decisions that affect how expensive later changes are.

2- How do we design (model) a software in the eXtreme Programming framework?

Using both **code** and **tests**.

3- Do we use software debugging in the eXtreme Programming framework? Why?

In XP we don't plan a separate debugging phase because quality is built in through practices like test-driven development and continuous testing, which prevents bugs rather than fixing them later

Exercise 1: 7pts

The subject of this development task is a function that calculates the sum of a list of numbers. Using three TDD steps, write an initial test and the code required to make it pass. Then write a second test and update the code to ensure that it meets the new requirements.

- Imports are not required.
- Write a clean code.

Test 1:

```
def test_sum_function_is_callable():
    sum([])
```

Code 1 (version 1):

```
def sum(numbers: list[int]):
    pass
```

Test 2:

```
def test_sum_0_returns_0():
    assert sum([0]) == 0
```

Code 2 (version 2):

```
def sum(numbers: list[int]):
    return 0
```

Test 3:

```
def test_sum_0_and_1_returns_1():
    assert sum([0,1]) == 1
```

Code 3 (version 3):

```
def sum(numbers: list[int]):
    if numbers[0] + numbers[1] == 1:
      return 1
    return 0
```

Exercise 3: 7pts

Refactor the following class in accordance with clean code practices, SOLID principles, and clean architecture.