

School of Informatics

WRITTEN EXAMINATION

Course Software Testing G1F, 7.5hp

Sub-course

Course code IT373G

Credits for written examination 5hp

Date 2025-12-04

Examination time 14:15-19:30

Examination responsible: Andras Marki

Teachers concerned

Instructions

- ☐ Take a new sheet of paper for each teacher.
- ☒ Take a new sheet of paper when starting a new question.
- ☒ Write only on one side of the paper.
- ☒ Write your name and personal ID No. on all pages you hand in.
- ☒ Use page numbering.
- ☒ Don't use a red pen.
- ☒ Mark answered questions with a cross on the cover sheet.

Examination results should be made public within 18 working days

Good luck!

Total number of pages: 3

Grading

This exam contains five sections. Each section examines the student with respect to one or two of the learning goals specified in the course plan. In order to pass the exam, a student must pass all five sections during that (single) exam. For your convenience, each section lists the relevant examination criteria.

=====

Section 1

Examination criteria: (i) The student can describe the process for model-driven test design (mdtd) as well as its different activities, and (ii) The student can describe the advantage of agile approaches such as test-driven development (tdd) and briefly describe the tdd approach.

Question 1

Explain why model-driven test design makes the activity of test design easier, and also how the MDTD approach supports giving responsibility for different testing activities to testers with various skills and backgrounds.

Question 2

The TDD approach is an agile test-first software development model with both advantages and drawbacks. Describe at least three advantages and two drawbacks.

The level of detail and number of arguments determine the grade.

=====

Section 2

Examination criterion: The student can explain the limitations of software testing

Question 3

Assuming that you have a test process with high quality, you are using the strongest of criteria, and you no longer find any faults in the system – why is it that you still cannot guarantee that the software is correct? Note: This is a question with many answers, so you should elaborate on this and give at least three arguments.

The number of arguments and examples determines the grade.

=====

Section 3

Examination criterion: The student can explain the given test techniques in sufficient detail

Question 4

Restricted inactive clause coverage (RICC):

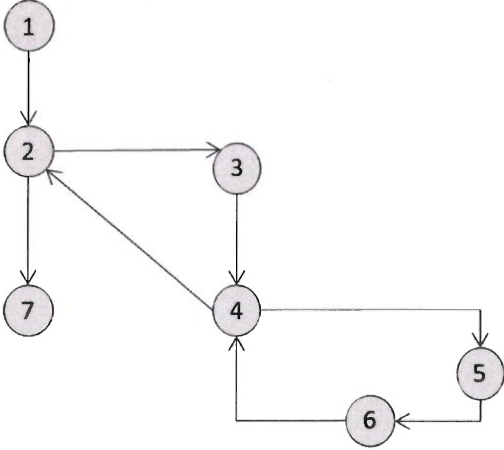
- 1. Describe the technique (i.e., how it works)
- 2. List the RICC test requirements for predicate P (i.e., required rows) based on the table below.
Give all feasible alternatives for each clause.

Row	A	B	C	Predicate P	P _A	P _B	P _C
1	T	T	T	T	T	F	T
2	T	T	F	F	T	F	T
3	T	F	T	T	T	F	T
4	T	F	F	F	F	F	T
5	F	T	T	F	T	F	T
6	F	T	F	T	T	T	T
7	F	F	T	F	T	F	F
8	F	F	F	F	F	T	F

Question 5

Edge-pair coverage:

- 1. Describe the technique with your own words (i.e., how it works)
- 2. List the test requirements for edge-pair coverage of the graph below:



Question 6

Mutation, the AOR mutation operator

- 1. Describe the AOR operator with your own words (i.e., how it works)
- 2. List the AOR mutants for the given code fragment

```
if ((m4 != 0) || ((m100 == 0) && (m400 != 0)))
    daysIn[2] = 28;
else
    daysIn[2] = 29;
    numDays = day2 + (daysIn[month1] - day1);
for (int i = month1 + 1; i <= month2-1; i++)
    numDays = daysIn[i] + numDays;
```

Question 7

For a higher grade, also: Compare and contrast CACC and RACC. Your comparison should focus on (i) the effectiveness with respect to the probability of exposing failures, (ii) the cost with respect to the number of test requirements, and (iii) the usability with respect to infeasible test requirements.

=====

Section 4

Examination criteria: (i) *The student can explain the common concepts in software testing and test automation, and (ii) The student can describe the main functionality given by a test automation framework such as JUnit.*

Question 8

Explain the following concepts: *test coverage criterion*, *test case* and *test suite*. In addition, use an example to describe how these three concepts are related.

Question 9

During the lectures, we have talked about the RIPR model, which stands for reach, infect, propagate and reveal. Describe the model, and for each of the four steps, explain what is required for a test execution to lead to a failure.

Question 10

One of the key features of JUnit is the automation of tests. How do you formulate an automated test that tests for null? Use the method `sum(int[] x)` for your example test. This method returns the sum of the values in the array `x`, which is an array of integers.

Level of detail determines the grade.

=====

Section 5

Examination criterion: *The student can give at least one very good argument for why the use of coverage criteria helps testers get high-quality tests.*

Question 11

In this course, we have discussed several advantages of using coverage criteria. Two of the advantages concern the quality of the test set and test maintenance. How does the use of coverage criteria help the tester improve the test set, and how does it make it easier to maintain the test set?

The number of arguments and the level of detail determine the grade.