

Department of Software Engineering

A Standard Exam Template



Course name: Software Specification and Architecture Course Code: 2IW80, exam 2IW81

Date: May 1, 2021

Start time: 12:00

End time: 13:30

Number of pages: 1

Number of questions: 6

Maximum number of points/distribution of points over questions: 100; Part I: 20 multiple choice questions up to two points each; Part II: 4 modeling questions up to 20 points each. You should answer at least three of these questions. Should you decide to answer four questions, we will consider the three best solutions.

Other remarks: The exam questions have been inspected by Alexander Serebrenik, Kees Huizing, Sarmen Keshishzadeh and Anton Wijs.

Grade Table

Question:	1	2	3	4	5	6	Total
Points:	0	0	0	0	0	0	0
Score:							

Instructions for students and proctors

Permitted examination aids (☒ means you can use, ☐ means you cannot use):

- ☒ Notebook
- ☒ Calculator
- ☒ Lecture notes/books
- ☒ Other:

Important:

- it is not permitted to leave the examination room within 20 minutes of the start of the examination, unless stated otherwise
- examination scripts (fully completed examination paper, stating name, student number, etc.) must always be handed in
- the house rules must be observed during the examination
- the instructions of examiners and proctors must be followed
- cell phones should be turned off and placed on tables facing down.
- examinees are not permitted to share examination aids or lend them to each other

The following actions will **in any case** be deemed to constitute fraud:

- using another person's proof of identity/campus card (student identity card)
- having a mobile telephone or any other type of media-carrying device in your clothes
- using, or attempting to use, unauthorized resources and aids, such as the internet, a mobile telephone, etc.
- having any paper at hand other than that provided by AU, unless stated otherwise
- visiting the toilet (or going outside) without permission or supervision

1. Is it true that $x^n + y^n = z^n$ if x, y, z and n are positive integers?. Explain.
2. Prove that the real part of all non-trivial zeros of the function $\zeta(z)$ is $\frac{1}{2}$
3. Compute

$$\int_0^\infty \frac{\sin(x)}{x}$$

4. Given the equation $x^n + y^n = z^n$ for x, y, z and n positive integers.
 - (a) For what values of n is the statement in the previous question true?
 - (b) For $n = 2$ there's a theorem with a special name. What's that name?
 - (c) What famous mathematician had an elegant proof for this theorem but there was not enough space in the margin to write it down?
 - i. Who actually proved the theorem?
 - ii. How long did actually take to solve this problem?
5. Prove that the real part of all non-trivial zeros of the function $\zeta(z)$ is $\frac{1}{2}$
6. Write the Mandelbrot set algorithm.