



- During the attendance check a sticker containing a unique code will be put on this exam.
 This code contains a unique number that associates this exam with your registration
- This number is printed both next to the code and to the signature field in the attendance check list.

Master EFV August 2023

Exam:	IN0000 / aptitude-08-2023	Date:	Tuesday 22 nd August, 2023
Examiner:	Prof. Dr.	Time:	10:00 – 11:30



Working instructions

- This exam consists of **8 pages** with a total of **3 problems**. Please make sure now that you received a complete copy of the exam.
- The total amount of achievable credits in this exam is 6 credits.
- · Detaching pages from the exam is prohibited.
- · Allowed resources:
 - one analog dictionary English \leftrightarrow native language
- The exam consists of Multiple-Choice questions only. Please note the following instructions:

Mark correct answers with a cross To undo a cross, completely fill out the answer option To re-mark an option, use a human-readable marking



- · Do not write with red or green colors nor use pencils.
- Physically turn off all electronic devices, put them into your bag and close the bag.

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Problem 1 Logical Thinking (2 credits)

There are three types of people on the island of truth-tellers and liars: Truth-tellers who always tell the truth, liars who always lie, and ordinary people who lie sometimes and tell the truth other times. Out of three people A, B and C, there is exactly one truth-teller, exactly one liar, and exactly one ordinary person. They make the following statements one after another:

A: I am an ordinary person

 $\boldsymbol{\mathsf{B}}\text{:}$ The statement by $\boldsymbol{\mathsf{A}}$ is true

C: I am not an ordinary person

Who is the ordinary person, who is the liar and who is the truth-teller among A, B and C?

A is a liar, **B** is a truth-teller and **C** is an ordinary person.

A is a truth-teller, **B** is a liar and **C** is an ordinary person.

A is an ordinary person, B is a truth-teller and C is a liar

A is a truth-teller, **B** is an ordinary person and **C** is a liar

A is an ordinary person, **B** is a liar and **C** is a truth-teller.

A is a liar, **B** is an ordinary person and **C** is a truth-teller

Additional area for notes. (Not considered for points)

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Problem 2 Theoretical Computer Science (2 credits)

Note: an *alphabet* Σ is a finite set.

Convention: a nondeterministic finite automaton (NFA) has exactly one start state.

Let A, B, C \subseteq Σ^* be languages. Which of the following statements is true?

 $|A||B| \le |AB|$ $A \cup B^* \text{ is countable.}$

 $\square A \neq B \implies A^* \neq B^*$

Additional area for notes. (Not considered for points)



Problem 3 AVL-Trees (2 credits)

Delete the element **1** from the following AVL-Tree. Choose the correct resulting tree from the choices below.



Additional space for solutions-clearly mark the (sub)problem your answers are related to and strike out invalid solutions.

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