Discrete Mathematics in Computer Science

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Exercise Sheet 1

Due: Thursday, September 30, 2021

In this exercise you should practice how to correctly write down mathematical proofs. Your proof should be formulated in such a way that it is clear and easy to follow. Write full, gramatically correct sentences; we do not accept simply lining up arguments.

Exercise 1.1 (3 marks)

Show the following statement with a *direct proof*.
For all sets A and B it holds that $A \setminus B = (A \cup B) \setminus B$.

Exercise 1.2 (3 marks)

Show the following statement with a *proof by contradiction*.
For all sets A, B and C it holds that if we have $(A \cup B) \subseteq C$ then we have $A \subseteq C$ and $B \subseteq C$.

Exercise 1.3 (2 marks)

Show the following statement with a *proof by contrapositive*.
For all sets A and B we have: If $(A \cap B) = A$, then $A \subseteq B$.

Exercise 1.4 (2 marks)

Refute the following statement.
For all sets A and B we have $A \setminus B = \emptyset$ if and only if $B \setminus A = \emptyset$.

Submission rules:
Upload a single PDF file (ending .pdf) generated using LaTeX. Put the names of all group members on top of the first page. Use page numbers or put your names on each page. Make sure your PDF has size A4 (fits the page size if printed on A4).