universität innsbruck

Logic	26S	LVA 703026 + 703027
Lecture 1		March 5 + 12, 2026

Exercises for March 5

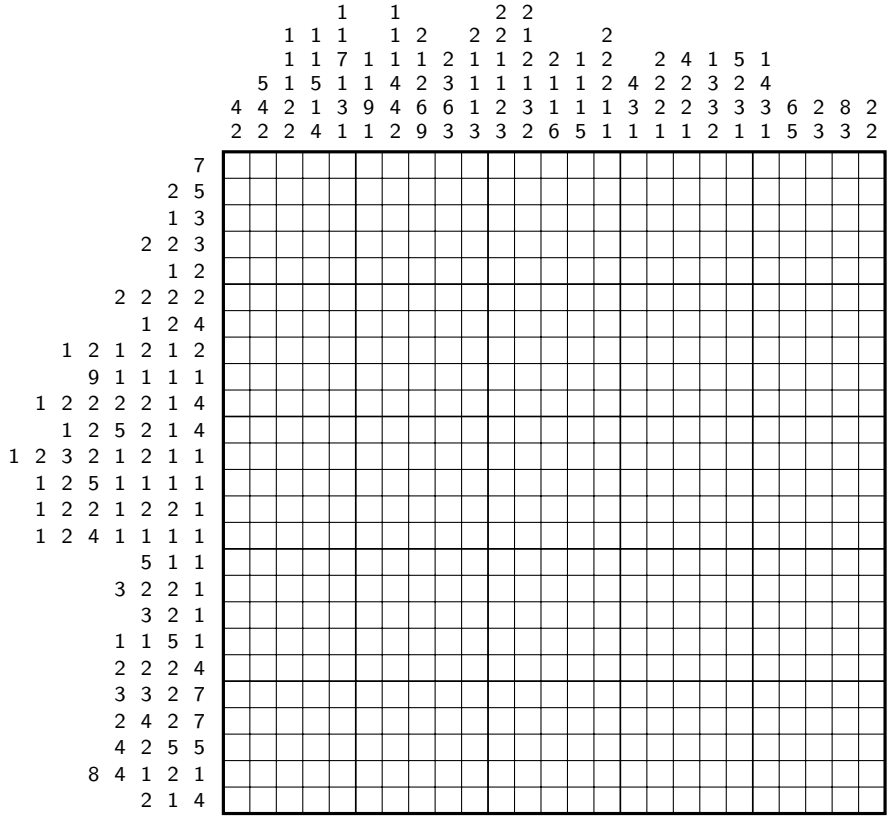
Solved exercises must be marked and solutions (as a single PDF file) uploaded in OLAT. The (strict) deadline is 7 am on March 5.

⟨3⟩ 1. Master the Greek alphabet.

⟨4⟩ 2. Solve the following Sudoku puzzle:

	1		6					
4						7		
			2					
7				4				
							5	6
							2	
6	2	8				3		
			5		1			
3								

⟨4⟩ 3. Solve the following picture logic puzzle:



Exercises for March 12

Solved exercises must be marked and solutions (as a single PDF file) uploaded in OLAT. The (strict) deadline is 7 am on March 12.

⟨3⟩ 1. For each of the propositional formulas

$$\varphi = p \vee \neg(p \vee \neg q) \to \neg p \to q \qquad \psi = \neg(p \to (\neg(q \to (r \vee \neg p))))$$

   (a) draw the parse tree and list all subformulas,

   (b) compute the truth table,

   (c) determine satisfiability and validity.

⟨2⟩ 2. Determine which of the following semantic entailments are true.

   (a) $p \to q,\ r \to s \vDash p \wedge r \to q \vee s$

   (b) $p \wedge \neg q \vDash (p \to \bot) \vee (\top \to q)$

⟨2⟩ 3. Transform the propositional formulas of Exercise 1 into conjunctive normal form.

⟨3⟩ 4. A *disjunctive normal form* (DNF) is a disjunction of conjunctions of literals.

   (a) Explain how a truth table can be used to obtain an equivalent DNF and illustrate your procedure on the truth tables obtained in Exercise 1(b).

   (b) Show that the satisfiability of DNFs is efficiently decidable.