

# Assignment 6: Alloy

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## 1 Instructions

1. Install Alloy Analyzer  
<https://alloytools.org/download.html>.
2. Your randomly-assigned problem is in the Section 2 of this document.
3. Specify your problem in the Alloy (programming) language. Describe individual lines of code in your report.
4. Perform specified checks or simulations of your individual specification (problem).
5. Your report should address following points:
  - Your name,
  - Copied description of your problem,
  - Description to individual lines of your code,
  - Description of the results.
6. Upload your report and code to the CW System.
7. **In a case of problems/errors/questions, please contact me on MS Teams or by email.**

## 2 Individual problems

### Sudoku

Solver: **Fau, Nicolas**

Solve the sudoku problem in the figure below. Grey fields are fixed. White

fields will be empty. Your specification of this problem in Alloy should find the solution (meaning the values for all white/empty fields) currently present in the figure.

Sudoku rules: <https://en.wikipedia.org/wiki/Sudoku>.

1	4	5	2	8	9	3	7	6
7	2	6	5	3	1	8	4	9
9	8	3	7	6	4	1	2	5
6	1	9	4	2	7	5	3	8
3	7	4	1	5	8	9	6	2
2	5	8	3	9	6	4	1	7
8	6	2	9	4	3	7	5	1
4	9	7	6	1	5	2	8	3
5	3	1	8	7	2	6	9	4

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### Student's passage through a university

Solver: **Palaffre, Raphaël**

Model a situation of how a student can pass through a set of classes in uni. The model will contain: **classes**, **departments**, **students**. All classes are either **introductory** or **advanced**. Some classes may be **facultative**, the advanced ones will have at least one prerequisite. Each class belongs to exactly one department. Please ensure that no class contains unnecessary prerequisites, i.e. prerequisites of prerequisites. Each student is part of exactly one department. Students are divided into categories: **freshman**, **sophomore**, **junior**, **senior**. Each department has its own set of classes. Each department has a set of mandatory classes for students wishing to graduate in that department. After completing a class, student is awarded a mark: **A**, **B**, **C**, **D**, **F**. To graduate, one must be a senior, have finished all mandatory classes of his/her department with at least C and at least one

facultative subject with at least D.

- Verify that there exists an instance of the model, in which at least one student can graduate.
  - Verify that all advanced classes are covered by prerequisites.
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## The Da Vinci Code

Solver: **Stolp, Hendrik**

This riddle has been inspired by a book/movie The Da Vinci Code. Imagine you are Tom Hanks a.k.a Robert Langdon. Use your logic (utilizing Alloy, of course) and fill in the remaining symbols into the grid. Remember that symbols in each row and each column have to be different. Symbols with the same background color have to be different as well. Please, fill in the remaining fields **using Alloy**.

