

## Advanced Programming Exam – January 2026

*Questions.* Download a zip file with the code setup from LearnIT. Unzip it. Solve the tasks in the file `Exam.scala`. The exam consists of 9 questions to be solved within 4 hours. The questions are independent, in the sense that each can be answered even if the preceding questions had not been answered. However, answering earlier questions may make answering later questions easier.

*What can I use?* During the exam, you can access any static written materials, printed and online, but you are not allowed to communicate with anybody or with anything (AI bots). Using Copilot, ChatGPT, agentic coders, and similar language model technology is not allowed. By submitting your solution, you legally declare to have solved the problems alone, without communicating with anybody, and not using language models.

You can use all functions provided in the included files, as well as functions that we implemented in the course. If the source is missing in this folder, you can include it in `Exam.scala`, so that things compile on our side. You can use the standard library functions. Staying closer to the course API is likely to yield better solutions.

There is a skeleton test file (`Exam.test.scala`) in the bundle, that you can use to test your solutions. It does not contain any useful tests. It is just there to get you started with testing faster. We will not grade or see the changes in this file. Do not hand it in.

We do not recommend writing and running tests if you are pressed for time. It is a good idea to run and test, if you have time.

*Grading.* We require that your hand-in compiles. The directory has a project setup, so compilation with `scala-cli` shall work out-of-the-box. If you cannot make a fragment compile, put your solution in a comment, next to the three question marks. We will grade the solutions in comments.

We will check whether the file compiles by running

```
scala-cli compile .
```

Hand-ins that do not compile will fail the exam, as will the hand-ins that are presented in imperative programming style.

The answers will be graded manually. We focus on the correctness of ideas, the use of concepts, clarity, and style. We will use undisclosed automatic tests during grading, but not to compute the final grade, but to help us debug your code.

*Submission.* Keep the solutions within 80 character columns to make grading easier. Do not modify `Exam.scala` in other ways than answering the questions or adding imports and source of needed functions. Do not reorder the answers, and do not remove question numbers or comments from the file.

Submit the completed `Exam.scala` file and only this file to LearnIT. Do not convert to any other format. Do not submit the entire zip archive. The only accepted file format is `.scala`

**Hand-in:** `Exam.scala`.

Good luck!