

Exam 2

Functional Programming

2024-05-08

This exam has collaboration level 3 of the Computer Science Department Collaboration Policy.

You are explicitly allowed to use the following resources during the exam:

- The Idris interactive interpreter and program editor integration. In particular, you may – and probably should – use:
 - `:doc` to read documentation for an expression, type, or interface,
 - `:type` to inspect the type of a program expression or goal,
 - `:search` to find an expression in scope by its type.
- The lecture notes for this course.
- Your own lab and homework assignments that you have written for this course.
- Notes that you have written yourself, either on paper or on your computer, within reason. If you claim to have written 200 pages of notes that strongly resemble a textbook then I will be skeptical.
- Online resources that are directly linked from our course web page, including the Idris online documentation and standard library. It is intended that these not be necessary, and browsing them during the exam will slow you down, but if you wish to consult them then you may.

You are explicitly forbidden from using the following resources during the exam:

- Search engines, such as *Google*.
- Online question-and-answer forums, such as *StackOverflow*.
- Web sites providing reference implementations of algorithms, such as *Rosetta Code*.
- Any software tool, other than Idris itself, that can generate, suggest, analyze, translate, or correct code written in any programming language, such as *ChatGPT* or *Copilot*. If you have software that performs such functions installed on your computer then you *must* disable it during the exam. Failure to do so will be considered cheating.
- Communication with another person. To be clear, *before* the exam you may communicate freely, and ask and answer questions about the course material; but *during* the exam you may neither solicit nor provide such aid, either actively or passively. You may not discuss any aspect of the exam with another student in the course until after you have both completed the exam.

If there is a resource not described above that you wish to use then you should ask your instructor whether or not it is allowed. Please bear in mind the purpose of the exam: to assess your understanding of the concepts, and command of the skills, studied in the course.

Place your solutions in a module named **Exam2** in a file with path **exam/Exam2.idr** within your course git repository. Submit *only* your Idris source file and any modules that it **imports**. At the beginning of the file include a comment containing your name. Precede each problem's solution with a comment specifying the problem number. You must push your solutions to your course repository before leaving the exam, and not edit them again until after your exam has been graded. Your solutions will be pulled for marking at the end of the exam.

It is in your interest to respond to every question, even if you are able to write only a partial, or partially correct, solution in the time allotted. You will maximize the amount of partial credit that you earn by writing the parts of each solution that you do know, and using goals and comments to communicate your understanding of what is missing.

Recall that you may not use Idris's **rewrite** mechanism in your solutions. Instead, you should use functions definable in Idris, such as **cong**, **coerce**, and **transport** (or **replace**).