

Written exam, Functional Programming**Thursday May 27, 2021**

Version 0.95 of May 25, 2021

These exam questions comprise ?? pages. Check immediately that you have all the pages.

The exam duration is 4 hours.

There are 4 questions. To obtain full marks you must answer all the subquestions satisfactorily.

You are allowed to use books, lecture notes, lecture slides, hand-ins, solutions to assignments, calculators, computers, software, on-line resources etc. during the examination. This includes any form of device that can execute programs written in F#.

You are allowed to use the .NET library including the modules described in the book, e.g., List, Set, Map etc.

If a subquestion requires you to define a particular function, then you may **use that function in subsequent subquestions**, even if you have not managed to define it yourself.

If a subquestion requires you to define a particular function, then you may **define as many helper functions as you want**, but in any case you must define the required function so that it has exactly the type and effect that the subquestion asks for.

The grading will favour functional solutions, i.e., solutions without side effects. Recursion is also favoured over loops. An imperative solution is of course preferred over no solution.

You should hand-in one file only, e.g., `ksfupr2021.<fsx,pdf>`. Do not use time on formatting your solution in Word or PDF.

You are welcome to use the accompanying file `may2021Snippets.fsx`. The file contains some of the code snippets included in the exam set for your convenience to copy into your solution.

You MUST include explanations and comments to support your solutions. You simply write them as comments around your code.

Your exam hand-in must be made by yourself and yourself only, and this holds for program code, examples, the explanations you provide for the code, and all other parts of the answers. It is illegal to make the exam answers as group work or to enlist the help of others in any way.

Your hand-in must contain the following declaration:

I hereby declare that I myself have created this exam hand-in in its entirety without help from anybody else.