

## Installation of F# and First Programs

We use a flipped classroom approach in this course, which means that the exercise class comes before the lecture in the teaching slot Friday morning. The following tasks, that you are supposed to do before the first lecture, concern installation of F# and development of the first simple programs.

### Installation of F#

Concerning installation of F# you should consult [fsharp.org](https://fsharp.org). See also the recommendations in the **Overview** part under **Contents** in DTU Learn.

### First programs

An F# program for the factorial function  $n! = 1 \cdot 2 \cdot \dots \cdot n$ ,  $n \geq 0$ , is declared as follows:

```
let rec fact n =
    if n=0 then 1
    else n * fact(n-1);;
```

Computation in functional languages governed by function application and the computation of  $3!$  using `fact` is explained as follows:

```
fact(3)
↪ 3 * fact(3 - 1)      [n ↦ 3]
↪ 3 * 2 * fact(2 - 1)  [n ↦ 2]
↪ 3 * 2 * 1 * fact(1 - 1) [n ↦ 1]
↪ 3 * 2 * 1 * 1        [n ↦ 0]
↪ 6
```

where  $e_1 \rightsquigarrow e_2$  reads:  $e_1$  evaluates to  $e_2$ . The first step  $\text{fact}(3) \rightsquigarrow 3 * \text{fact}(3 - 1)$ , for example, is obtained from the declaration by substituting 3 for `n` in the `else` branch since the `n = 0` is false in this case. The subsequent steps have similar explanations.

1. Create a *script* file (extension `.fsx`) `fact.fsx` in your favourite editor (that from Visual Studio Code or that from Visual Studio or ...) containing the above declaration of the function `fact`.
2. F# Interactive is a tool that can be used to run programs interactively at the console or to execute scripts like that for `fact` above. See for example <https://docs.microsoft.com/en-us/dotnet/fsharp/tools/fsharp-interactive/>. Run the script `fact.fsx` and compute factorial values.
3. It is convenient to have F# Interactive running in a separate window in Visual Studio Code or Visual Studio. Try that.
4. Try to solve Exercises 1.4 and 1.6 from Chapter 1 in the textbook.