# BFNP–F2016, Functional Programming The IT University, Spring 2016

## Exercise 1

Last update 2016-01-30

This exercise sheet must be handed in via LearnIt by February 11th.

You are welcome, and encourged, to solve the assignments in pairs.

Your name must be part of the filename, e.g., `BFNP-01-<name1>-<name2>.fsx`, where `<name1>` and `<name2>` are the names of the two working together. Both `name1` and `name2` must upload the same file. An example: `BFNP-01-MadsAndersen-ConnieHansen.fsx`.

You can only upload one file and it must be of type `fs` or `fsx`.

It is important that you annotate your own code with comments. It is also important that you apply a functional style, i.e., no loops and no mutable variables.

**Exercise 1.1** Write a function `sqr:int->int` so that `sqr x` returns $x^2$.

**Exercise 1.2** Write a function `pow : float -> float -> float` so that `pow x n` returns $x^n$.

You can use the library function: `System.Math.Pow`.

**Exercise 1.3** Solve HR, exercise 1.1

**Exercise 1.4** Solve HR, exercise 1.2

**Exercise 1.5** Solve HR, exercise 1.4

**Exercise 1.6** Solve HR, exercise 1.5

**Exercise 1.7** Solve HR, exercise 1.6

**Exercise 1.8** Solve HR, exercise 1.7

**Exercise 1.9** Solve HR, exercise 1.8

**Exercise 1.10** Write a function `dup:string->string` that concatenates a string with itself.

You can either use + or ^. For example:

```
val dup : string -> string

> dup "Hi ";;
val it : string = "Hi Hi "
```

**Exercise 1.11** Write a function `dupn:string->int->string` so that `dupn s n` creates the concatenation of `n` copies of `s`. For example:

```
val dupn : string -> int -> string

> dupn "Hi " 3;;
val it : string = "Hi Hi Hi "
```

**Exercise 1.12** Assume the time of day is represented as a pair `(hh, mm):int*int`.

Write a function `timediff:int*int->int*int->int` so that `timediff t1 t2` computes the difference in minutes between `t1` and `t2`, i.e., `t2-t1`. A few examples:

```
val timediff : int * int -> int * int -> int

> timediff (12,34) (11,35);;
val it : int = -59
> timediff (12,34) (13,35);;
val it : int = 61
```

**Exercise 1.13** Write a function `minutes:int*int->int` to compute the number of minutes since midnight. Easily done using the function `timediff`. A few examples:

```
val minutes : int * int -> int

> minutes (14,24);;
val it : int = 864
> minutes (23,1);;
val it : int = 1381
```

**Exercise 1.14** Solve HR, exercise 2.2

**Exercise 1.15** Solve HR, exercise 2.8

**Exercise 1.16** Solve HR, exercise 2.9

**Exercise 1.17** Solve HR, exercise 2.10

**Exercise 1.18** Solve HR, exercise 2.13