universität innsbruck

Functional Programming	WS 2024/2025	LVA 703025
Exercise Sheet 2, 10 points		Deadline: Tuesday, October 22, 2024, 8pm

- Mark your completed exercises in the OLAT course of the PS.
- For exercise 2 you can use a template .hs file that is provided on the proseminar page.
- Upload your modified .hs file in OLAT.
- Your .hs file must be compilable with ghci.

Exercise 1 *Parsing expressions* **5 p.**

Construct an abstract syntax trees for each of the following expressions:

1. `cube 4 + 1` (1 point)
2. `(x <= 4) || (y == (5 + 3)) && not z` (2 points)
3. `x * y * z + sin (4 + 1)` (2 points)

Remark: Function applications (e.g., `cube 4`) bind stronger than operator applications (e.g., `8 * 3`). Also note the precedence rules for logical operators: `&&` has higher precedence than `||`, in the same way as `*` has higher precedence than `+`.

Exercise 2 *Datatype definitions* **5 p.**

In this exercise you should design datatypes for planning a trip. You can use the Haskell template provided on the course website for this exercise.

1. Each trip has some destination and takes place on some date. Moreover, for each trip one can choose one method of transportation from the following: car, train, bike or walk. Lastly, there is also a packing list for things to bring on the trip.

   Define a datatype in Haskell called `Trip` to represent such a trip. Of course, you may also define auxiliary other datatypes. (2 points)

2. Define the following trips in your Haskell program: (1 point)
   (a) a trip to visit grandma in Salzburg on October 26, 2024, where you bring some Tyrolean Speck as a gift
   (b) on November 2, 2024, you want to ride your bike to Telfs to go swimming - pack snacks and your swimming gear!
3. Consider the trip to Telfs as specified in (b). (2 points)
   - Draw the tree that corresponds to the trip.
   - Is the representation unique?