

- Please write all your Haskell functions from this exercise sheet into a single .hs-file and upload it in OLAT.
- You can use a template .hs-file that is provided on the proseminar page.
- The file should compile with ghci.
- Once the file has been uploaded, it cannot be changed or resubmitted!

Exercise 4.1 *Live exercise*

The *integer square root* of a positive integer n is defined as the greatest integer less than or equal to the square root of n .

$$\text{isqrt}(n) = \lfloor \sqrt{n} \rfloor$$

Define recursive Haskell functions `isqrtDown :: Integer -> Integer` and `isqrtUp :: Integer -> Integer` that find the integer square root of their argument using recursion, by counting up or down. You may want to use auxiliary functions for this.

Do you prefer one of your functions? Use `:set +s` in `ghci` and test your functions on large inputs (choose n large enough that executing one of your functions takes several seconds). Compare them in terms of efficiency and think about how you could improve your implementations.