Functional Programming

Home Assignment 1

Due: 26 Mar 2022 - 23:59

Instructions

- Please create a source file called ***hw1.hs*** and put all the answers there.
  The file should start with a comment which contains your **full name** (in English) and **ID**

  ```
  -- Montgomery Burns
  -- 15926535
  ```

- When writing a function - write both the **type** and the **body** of the function.

- **Important:** Please add the following line after the two comments:

  ```
  module HW1 where
  ```

  This line helps us to test your code.

- **Note:** Please make sure that the source file name is spelled **exactly as needed**. This also applies to **function names**.
- Be sure to write functions with **exactly the specified name** for each exercise. You may create additional auxiliary/helper functions with whatever names and type signatures you wish.
- Try to write **small functions** which perform just **a single task**, and then **combine** them to create more complex functions.
- **Note:** It's important to verify that the submitted sources compile without any errors. Failing to do so, might be very bad to your grade.

Exercises

1. Write a function **shiftString**, which shifts a String one character to the left and puts the first character last

shiftString "" = ""

shiftString "abcd" = "bcda"

shiftString "12345" = "23451"

2. Write a function **interleave**, which takes two Strings and returns a String. The returned string will be composed of the characters of the original strings. Its first, third, fifth … characters will be taken from the first string. The second, forth, characters will be taken from the 2nd string.

interleave "abc" "12345" **= "a1b2c345"**

interleave "abcd12" "" **= "abcd12"**

3. Write a function **block_split**, which takes a String and breaks it into a list of strings of length 1, 2, 3 … respectively.

block_split "1234567890" = ["1", "23", "456", 7890"]

block_split "hello" = ["h", "el", "lo"]

block_split "hi" = ["h", "i"]

4. Write a function **parity**, which takes a list of Int and returns either -1 or 1. The input list contains a permutation of the numbers 1, 2 … n where n is the length of the list. The function returns 1 if the permutation is even and -1 if it's odd. You can find the exact definition of the parity of a permutation in this Wikipedia article: https://en.wikipedia.org/wiki/Parity_of_a_permutation

parity [1,2,3] = 1

parity [1,3,2] = -1

parity [7,1,6,3,2,5,4] = 1

5. Write a function my_sqrt, which takes a positive number and computes its square root. You're allowed to use just the 4 basic arithmetic operations in this question. The result should be an approximation to the actual value and should not differ from it by more than 0.000001.