FUNCTIONAL PROGRAMMING

2020-2021 SPRING

HOMEWORK 1

In this homework, you are asked to write a Haskell program that will do basic operations on integer numbers using a digit list representation. For example, the number 2021 will be represented using the list [2,0,2,1]. The program will support different bases from 2 up to 16, using regular hexadecimal notation for digits greater than 9.

The user will run the program from the command-line (i.e. not in interactive mode) after building an executable for it. The behavior of the program will depend on command-line arguments. The first argument will be the name of the command and the second argument will be the base. The other arguments will depend on the command.

Assuming that the name of the executable is "homework1", possible uses of the program are described below.

- digit to character conversion command: d2c

  ```
  homework1 d2c base decimal_value
  ```

  If the decimal value is outside the digit range, the program should print an error message.

  Examples:

  ```
  homework1 d2c 16 14
  'E'

  homework1 d2c 8 5
  '5'

  homework1 d2c 10 14
  homework1: invalid digit
  ```

  Hint: You can use the "ord" and "chr" functions from the Data.Char module.

- character to digit decimal value conversion command: c2d

  ```
  homework1 c2d base digit_symbol
  ```

  If the resulting decimal value is outside the digit range, the program should print an error message.

  Examples:

  ```
  homework1 c2d 16 E
  14

  homework1 c2d 8 7
  7
  ```

homework1 c2d 8 A
homework1: invalid digit

- decimal number to digit list conversion command: n2l

  homework1 n2l base decimal_number

  Examples:

  homework1 n2l 8 21
  [2,5]

  homework1 n2l 16 140
  [8,12]

- digit list to decimal number conversion command: l2n

  homework1 l2n base digit_list

  Examples:

  homework1 l2n 8 2 5
  21

  homework1 l2n 16 8 12
  140

- digit list addition command: add

  homework1 add decimal_number_1 decimal_number_2

  This command will first print the digit list for the first number, then the digit list string in the given base. Then it will print the same lines for number 2.
  Then it will add the digit lists, print the resulting digit list and its decimal value.
  It must use the function written for the previous commands where applicable.

  Examples:

  /homework1 add 16 77 330
  [4,13]
  "4D"
  [1,4,10]
  "14A"
  [1,9,7]
  407

Notes

An input/output test file for automatically testing the program using the Calico test grader will be provided.

You cannot use anything that’s not covered in class.

You cannot use any library function other than “ord”, “chr” and “getArgs”.
You must explain your code using inline comments.