Exercise Sheet No. 10 - Programming

Energy Informatics
Winter 2015-2016

Exercise 1: (Calculator)
In this exercise we will explore some basic programming techniques, find out what happens when using operators in certain ways.

- Arithmetic with different typed inputs
- String index out of range
- negative index into string
- string[x:y]

Exercise 2: (Functions)

- Develop converter functions:
  - Two functions to convert distances between KM and Mile (and back)
  - Two functions to convert temperatures between Centigrade and Fahrenheit (and back)
- Write a function that takes two numbers considered as (x,y) coordinates and computes the distance of this point to the origin.
- Define the function cube_volume, which accepts the length of a side of an equilateral cube and computes its volume. If you have time, consider defining cube_surface, too.
- Define the function bool_imply. It consumes two Boolean values, call them sunny and friday. The answer of the function is True if sunny is False or friday is True.
- Define the function string_insert, which consumes a string and a number i and which inserts “.” at the i^{th} position of the string. Assume i is a number between 0 and the length of the given string (inclusive). How would you deal with the empty string?
- Improve midnight by trying to do each operation at most once: define variables that contain values that are needed at least once.
- Python also supports complex numbers. Find out how to extend midnight to return complex roots, too.
Exercise 3: (More functions)
Develop some other function that requires case distinction to work

- A hydroelectric power plant wants to translate the frequency $f$ of the AC output into directives for controlling its turbines.
  - $f < 50$: more water
  - $f \sim 50$: steady
  - $f > 50$: decrease water supply
  - $f << 50$ or $f >> 50$: disconnect
- Write a function that recognizes a palindrome
- Write a function that reverses a string (or list)