Energy Informatics

https://proglang.informatik.uni-freiburg.de/teaching/energy-informatics/2018ws/

Exercise Sheet 3 – Control structures and functions

2018-10-31

Exercise 1 (Functions and conditionals)

1. Write a function `line_point_distance(line, point)` where line is a list `[a, b, c]` defining a line $ax + by + c = 0$ in the plane and `point` is a list `[x0,y0]`. The function is to return the minimum distance of (`x0`,`y0`) to any point on the line.

2. 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 50 : steady
   - $f > 50$: decrease water supply
   - $f < 49$ or $f > 51$: disconnect

   Write a function that takes as input the frequency and returns the appropriate command.

3. Write a function `capacitance(epsilon_r, A, d)` to compute the capacitance of a capacitor.

   - `epsilon_r` is the permittivity constant of the material
   - `A` is the area of the capacitor's plates in square meters
   - `d` is the distance of the capacitor's plates in meters

Exercise 2 (Input/output and strings)

1. You are given the firstname and lastname of a person on two different lines. Your task is to read them and print the following:

   ```
   Hello firstname lastname! You just delved into python.
   ```

2. Modify the frequency function defined previously to output the command instead of returning it.

3. 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?

4. Write a function that reads three marks ranging between 0 and 100 inclusive on one line from stdin. Marks may be floating point numbers. Print the average of the marks correct to two decimal places. When unexpected input is given, the method should print an error message suitable for each different case (out of range input, or input of invalid type,...).

Exercise 3 (Halloween's day)

Write a program that takes a year as input and print the day of the week where Halloween takes place. You can use any method to determine the day of the week, such as Zeller's congruence (https://en.wikipedia.org/wiki/Zeller%27s_congruence).