General Information & Communication Technology I (350101) Fall 2015

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Contents

Assignment 1 (Elementary Python) Given Sep. 11., Due Sep. 18.

Problem 1.1 (Factorial)

Write a python function `factorial`, that given a number n as an argument computes the factorial function $n! = 1 \cdot 2 \cdot \cdots \cdot n$, where $0! = 1$. 10pt

What is the largest number n you can compute $n!$ for on your system?

Problem 1.2 (Fibonacci Numbers)

Write a python function `fib`, that given a number n as an argument computes the n^{th} Fibonacci number $f(n)$ and a function `fibseq` that outputs the first n elements of the Fibonacci sequence. The Fibonacci number $f(n)$ is defined recursively: $f(n) = f(n-1) + f(n-2)$, where $f(1) = 1$ and $f(2) = 1$. 10pt

Problem 1.3 (Count the Nines)

Write a python function `count-nines` that takes a list of integers as argument and returns the number of occurrences of the number nine in it. 15pt

Problem 1.4 (Squares)

Write a python function `squpto` that takes an integer n and prints all the square numbers that are smaller than or equal to n in ascending order. 15pt

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Note: For example `squpto(10)` prints

```
1
4
9
```

Problem 1.5 (Caught Speeding)

You are driving a little too fast, and a police officer stops you. Write a python function `ticket` that takes your speed (an integer) as input computes the Euro amount of your speeding ticket. If speed is 100 or less, the result is 0. If speed is between 101 and 120 inclusive, the result is 50. If speed is 121 or more, the result is 100. Unless it is your birthday – on that day, your speed can be 5 higher in all cases. 25pt

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Note: You can deterimine the current date via the `datetime` module, after importing it, you can set

```
today = datetime.datetime.now()
```

and get the current month and day by `today.month` and `today.day` (for details read the online specification).

It is OK to hard-code your birthday into the program, then you do not need to specify it as an input.

Problem 1.6 (Printing Triangles of Stars)

Write a function `prtri` that takes an integer n and an identifier string as argument and prints triangles $\frac{n \times n}{2}$ stars. The table below shows call patterns and outputs 25pt

`prtri(6,'lr')`	`prtri(6,'ur')`	`prtri(6,'ll')`	`prtri(6,'ul')`

`*`
`**`
`***`
`****`
`*****`
`******`
	`******`
	`*****`
	`****`
	`***`
	`**`
	`*`
		`*`
		`**`
		`***`
		`****`
		`*****`
		`******`
			`******`
			`*****`
			`****`
			`***`
			`**`
			`*`

Assignment 2 (Data Structures & Web Documents) Given Sep. 18., Due Sep. 28.

Problem 2.1 (Binary Number Conversion)
Write an python function `binary` that converts decimal numbers into binary strings and an inverse `decimal` that converts binary strings into decimal numbers. 20pt

Use the built-in type `int` as a representation for decimal numbers and the type `str` for binary numbers. Do not use the built-in functions `bin` and `int`, but program the conversion algorithm explicitly.

Problem 2.2 Write a python function `romval` that computes the integer value roman numerals. For instance `romval('MDCCLIX')` should return `1759`. 20pt

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Note: We recap the symbol/value relation for reference.

Symbol	$\hat{=}$	Value	Symbol	$\hat{=}$	Value
I	$\hat{=}$	1	V	$\hat{=}$	5
X	$\hat{=}$	10	L	$\hat{=}$	50
C	$\hat{=}$	100	D	$\hat{=}$	500
M	$\hat{=}$	1,000		$\hat{=}$	

Problem 2.3 (Recognizing Vowels)
Write a function that takes a character (i.e. a string of length 1) and returns `True` if it is a vowel, `False` otherwise. 10pt

Problem 2.4 Write a regular expression that recognizes roman numerals up to 3999 (i.e. `MMMCMXCIX`). Numbers of the form `MDCCLIX` should be recognized, but not `DMCXI` or `CXVIIII` 25pt

Problem 2.5 (Quiz for the TAs)
25pt

Your last assignment this semester is to give your TAs a quiz. We hope you will enjoy this :)
You need to create a form in HTML that contains the following:

1. Include at least 5 multiple choice questions.
2. All following concepts: button, radio button, check box, drop down box, text input.
3. At least one image and one working link.
4. Tables, lists.
5. Make it look nice overall (styles, colors . . .)

You can provide a fictive action attribute.