

## VG101 — Introduction to Computer and Programming

### Assignment 7 (01/12/2016)

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- Write each exercise in a different file
- Include simple comments in the code
- If applicable, split the implementation over several functions
- Write a single README file per assignment
- Archive all the files in a zip file and upload it onto Sakai

#### Ex. 1 — Simple I/O in C++

Write a short C++ program which prompts the user for the current year, the user's current age, and another year. The program should calculate the age that the user was or will be in the second year entered.

#### Ex. 2 — Basic C++ programming

Write a short C++ program which displays a menu for the user to choose between converting US dollars into Chinese RMB and Chinese RMB into US dollars. The user inputs the amount and the precision, then the program display the corresponding result.

*Hint:* use 1.00 USD = 6.20350 CNY as the exchange rate

#### Specifications.

- First prompt the user to choose the option, and then gets the input (amount and precision)
- Precision means "how many digit are expected in the final result", e.g. 123.456 has precision 6

#### Ex. 3 — File I/O in C++

Rewrite exercise 4 from homework 6 using C++ file I/O style.

#### Specifications.

- The binary, input, and output files are expected to be in the same directory
- Do not use absolute paths
- Do not prompt the user
- Output the resulting matrices in the order "addition, multiplication, transpose"

#### Partial sample output (ex. 4)

```
$ ./h7 -ex3
1 2 3
2 3 4
5 6 7

9 8 7
4 3 2
5 7 2
```

**Ex. 4 — Basic programming**

Let the sequence  $(u_n)_{n \geq 0}$  of integers be defined by

$$\begin{cases} u_0 = a \\ u_{i+1} = \begin{cases} \frac{1}{2}u_i, & \text{if } u_i \text{ is even} \\ 3u_i + 1, & \text{if } u_i \text{ is odd} \end{cases} \end{cases}$$

1. Write a function which prompts the user for  $a$  and determines  $N$  such that  $u_N = 1$ .
2. Write a function which prompts the user for a value  $M$ , and returns  $A$ , the value of  $2 \leq a \leq M$ , such that  $N$  is maximized.

**Input specifications**

- Prompt the user for a function to run
- Get the parameters from the user

**Ex. 5 — IDEA survey**

Complete the IDEA survey and get a +5 bonus on the assignments.