Master 1 informatique
UFR mathématique et informatique
Université de Paris

Université de Paris

Programmation avancée - Homework 1

- Language: C++
- Starts 21/09, Due 27/09
- Platform: Moodle
- You should only provide the cpp files (1/exercise). You can also provide a README.txt that explains how to compile and run your programs.
- For each exercise, you can only include the headers that are mentioned in the instructions. You do not have to use all of them. Including a header not mentioned in the instructions will be considered as cheating and treated accordingly.
- If any problem or something is not clear, contact Sylvain Lobry by email (@u-paris.fr).

Exercise 1: It's (almost) Christmas time!

- **Headers**: iostream
- **File name**: ex1.cpp

In this exercise we will draw a Christmas tree with the characters '*' and '|'.

You will be given on the standard input the height of the tree (minus the trunk) in the form of an integer. If this integer is 2 or less, you should print the message "Tree is too small." followed by a new line. Otherwise, you need to print a tree of the requested height.

Here are two examples:

```
slobry@Sylvains-Mac Homeworks % ./Christmas
5
    *
   ***
  *****
 *******
*********
   | |
slobry@Sylvains-Mac Homeworks % ./Christmas
2
Tree is too small.
```

On a given line, you will use spaces to put the character to the desired position. The last '*' or '|' of a line should be immediately followed by a new line (i.e. do not put spaces after) and the last line should be followed by a new line.

Exercise 2: Quiz!

- **Headers**: iostream
- **File name**: ex2.cpp

In this exercise, you need to code a program which will answer some questions about the first lecture. Here are the questions:

1- According to the TIOBE index, what is the most popular language today?
   a. Java
   b. Python
   c. C
   d. C++
2- How do we call a language that has been designed to realize a single paradigm?
   a. Single paradigm language
   b. Simple language
   c. Pure language
   d. Mono language
3- A declarative programming language...
   a. Specify the results to the program
   b. Specify the instruction to the program
4- What was the initial name of C++?
   a. Complex C
   b. D
   c. Super C
   d. C witch classes
5- When was the first C++ standard published?
   a. 1998
   b. 1999
   c. 2000
   d. 2001
6- Which IO stream does not exist?
   a. ctest
   b. cin
   c. clog
   d. cerr
7- Can you use malloc to allocate an element, and use delete to deallocate it?
   a. Yes
   b. No
8- How do you access the element pointed by the iterator it?
   a. ->it

   b. *it
   c. !it

9- Which container exists in C++98
   a. Dict
   b. Vector

The program needs to read the questions it will answer on the standard input. At each run, 5 questions will be asked. An example of an input is “1 2 3 4 5”. As a result, it will need to output the correct answers separated by a space (you should not output a space after the last answer, but a new line). Here is an example of an output (warning: answers in this example are wrong!!):

```
slobry@Sylvains-Mac Homeworks % echo "3 4 5 6 7" | ./quiz_wrong
c d a b c
```

You can assume that the input is valid.

Exercise 3: Vector multiplication

- **Headers**: iostream, vector
- **File name**: ex3.cpp

The goal of this exercise is to do a pointwise multiplication between two vectors entered on the input stream.

The first integer given on the input, n, is the size of one vector, followed by 2n integers. The first n integers are the value of the first vector, the following n integers are the value of the second. Each of the 2n + 1 is separated by either a space or a new line. You can assume that the input is valid.

You will print the resulting vector on the standard output, followed by a new line.

Here is an example:

```
slobry@Sylvains-Mac Homeworks % ./vector
4
1 2 3 4
5 6 7 8
5 12 21 32
```