C++ Strings

- For multiple-choice and essay questions: Present your work to the PDF file whose name is <StudentID>_Writing.pdf, where <StudentID> is your student number.
    - **Multiple-choice questions:** Pick the most probable choice and explain for each choice why you choose/do not choose it. There are sometimes multiple correct choices.
    - **Essay questions:** Give a comprehensive answer that covers all aspects of the problem
- For programming question: Write your source codes in C++/Python 3. Do not use any additional libraries/open source codes without permission.
    - **C++ programming language:** Name your Visual Studio solution such that the execution filename is <MSSV>_<Bi>.exe, where StudentID is your student number, B denotes programming questions, and i is the question index (e.g., B1, B2, etc.). Please submit the whole solution folder (after delete all bulky intermedia files). Do not include the execution file in your submission to avoid spreading dangerous virus.
    - **Python programming language:** name your Python files in a similar way to what described above
    - Programming questions sometimes require brief explanation. Present your work to the PDF file described above.
- TA supports solutions for multiple-choice and essay questions after the submission deadlines.
- Students can contact TA through email (Ms. Nguyễn Ngọc Thảo: nnthao@fit...).

A. Multiple-choice questions and essay questions (10 marks)

A.1. Which of the following header files is required for the C++-style strings?

    a. #include <string.h>
    b. #include <string>
    c. #include <iostream>
    d. #include <cstring>
    e. No answer is correct.

A.2. Given the following C++-style strings, s1 and s2.

```
string s1 = "Blueberry";
string s2 = "cobbler";
```

There may be three possible ways of concatenating two string objects in C++:

```
i)    string s3 = s1 + s2;
ii)   string s3 = s1.append(s2);
iii)  string s3 = strcat(s1,s2);
```

Which of the above is correct way of concatenating two string objects in C++?

    a. 1 and 2
    b. 2 and 3
    c. 1 and 3
    d. 1, 2, and 3

A.3. Given the following C++-style strings, s1 and s2.

```
string s1 = "telephone";
string s2 = "teleport";
```

Which of the following is the result of s1.compare(s2) and its corresponding reason?

    a. 0 since they have the same number of characters
    b. A value < 0 since s1 is lexicographically shorter than s2.
    c. A value < 0 since s1 is lexicographically longer than s2.
    d. A value > 0 since s1 is lexicographically shorter than s2.
    e. A value > 0 since s1 is lexicographically longer than s2.
    f. No answer is correct.

A.4. Which of the following methods is used to append more than one character at a time? (This may have multiple correct answers.)

    a. append
    b. add
    c. strcat
    d. operator +=

A.5. Which of the following methods is used to returns the length of the string, in terms of bytes? (This may have multiple correct answers.)

    a. size
    b. length
    c capacity
    d. data
    e. maxsize

A.6. What are the advantages of C++-style strings over C strings?

A.7. How many header files in C/C++ could be used for string manipulation? Differentiate them.

A.8. Fill in the below table with appropriate operators/built-in functions that correspond to certain operations in C++-style strings and C++ strings. Write None if there is no solution

	C strings	C++ strings
String assignment		
String comparison		
String concatenation		
Insert a string to an original string at a certain position		
Locate first occurrence of character in string		

A.9. What will be the output of the following C++ code? Explain why.

```cpp
#include <iostream>
#include <string>
using namespace std;
void main ()
{
    string str ("Blueberry cobbler ");
    for (size_t i = 0; i < str.length();)
        cout << str.at(i-1);
}
```

A.10. What will be the output of the following C++ code? Explain why.

```cpp
#include <iostream>
#include <string>
using namespace std;
int main ()
{
    string str("steve jobs is legend");
    str.erase(str.begin() + 5, str.end() - 7);
    cout << str << endl;
}
```

B. Programming questions (10 marks)

Students do not have to check the validity of the input.

B.1. Write a program that receives a full name and then prints out it in reverse order.

For example,   Input: Donald John Trump   →   Output: Trump John Donald

B.2. Write a program that shortens a string to n characters. If the string is already shorter than n, the function should not change the string.

For example,   Input: blueberry 4   →   Output: blue

Input: blueberry 10   →   Output: blueberry

B.3. Write a program that receives a string and then prints the set of words present in it, along with their numbers of occurrences. Assume that words are separated by space(s).

For example,   Input: two seats for two people

Output : two 2

seats 1

for 1

people 1

B.4. Write a program that capitalizes the first letter in every word. Assume the first letter is any letter at the beginning or preceded by a blank. All other letters should be turned into lowercase. For example, Input: i lOVe YOU →   Output: I Love You

B.5. Write a program that receives a string and then checks whether it contains digits only. Furthermore, if yes, convert the string to a decimal number.

For example,   Input: 123pay   →   Output: False

Input: 0123   →   Output: True, 123

B.6. Write a program that sorts an array of strings following the descending order of string lengths. Strings of equal length are sorted following the lexicographical order.

For example, Input: one table for two people → Output : people table for one two

B.7. Write a program that receives a string and then checks whether the string is a palindrome (case-insensitive).

For example,   Input: nurses run   →   Output: True

Input: horses run   →   Output: False

B.8. Write a program that receives a string and then eliminates all leading blanks from the left end of a string and all trailing blanks from the right end of a string. It also replaces all subsequent spaces within the string by a single space

For example,   Input: _ _ _Hello_ _how_are_ _ you_ _ _   →   Output: Hello how are you

(_ denotes a space, just for easy reading)

B.9. Write a program that receives a string and then checks whether the string is a pangram. (case-insensitive).

For example,   Input: The quick brown fox jumps over the lazy dog   →   Output: True

Input: I am a student   →   Output: False

B.10. Write a program that receives a string and a pattern (which is ensured to be shorter than the string) and then deletes any but one occurrence of the pattern in the string.

For example,   Input: two tea to two two two   →   Output: two tea to