

Programming Design Homework Assignment S9

Due: 2022/4/30 23:00

※Notice:

1. Please follow the rules for homework assignments announced on the course website.
2. The standard template library and unrelated macros are not permitted in this assignment.

There are five questions in this assignment, question 1 - 3 are programming, and others are short answer questions.

PART I Programming (80% in total)

- Programming formats : (16%)

1. The structure of your program (4%)
2. Clear and readable code layout (4%)
3. Clear comments for understanding your program (4%)
4. The copyright and short description of each question (4%)

- Question 1: (32%)

Write a template function **maxn()** that takes as its arguments an array of items of type T and an integer representing the number of elements in the array and that returns the largest item in the array. Test it in a program that uses the function template with an array of ten **int** value and an array of seven **double** values. The program should also include a specialization that takes an array of pointers-to-char as an argument and the number of pointers as a second argument and that returns the address of the longest string. If multiple strings are tied for having the longest length, the function should return the address of the first one tied for longest. Test the specialization with an array of four **pointers-to-char**.

- Question 2: (16%)

Create a function, **plus ()**, that adds two values and returns their sum. Provide overloaded versions to work with **int**, **double**, and **string** types, and test that they work with the following calls:

```
int n = plus(3, 4);
double d = plus(3.2, 4.2);
string s = plus("he", "llo");
const char* s1 = "aaa"; const char* s2 = "bbb";
char* s3 = plus(s1, s2);
```

- Question 3: (16%)

Turn the **plus ()** function in Question 2 into a template, and test that it works for numeric types. Create a template specialization to test for **string** and **pointers-to-char**.

PART II Short answer questions (20% in total)

For short answer questions, please answer the question in your words as detailed as possible. Submit as text file named by the question number, such as "HWS9-Q4.txt".

● Question 4: (10%)

For Question 2 and Question 3, can you explain why the following call doesn't work? Suggest a solution to the problem.

```
d = plus(3, 4.2);
```

● Question 5: (10%)

Suppose the `song()` function has this prototype:

```
void song(const char * name, int times);
```

- a. How would you modify the prototype so that the default value for `times` is 1?
- b. What changes would you make in the function definition?
- c. Can you provide a default value of "O, My Papa" for `name`?