

LP104 Object-Oriented Programming
In-Class-Exercise 08 – Vector and String

In this lab, you are required to complete the following tasks. Your programs must pass the compilation and testing.

Q1. (String) Please implement a function `trim()` to trim the leading and trailing whitespace characters from a string.

Sample Output:

```
Task 1: Trimming whitespaces
Input your string:
    _str^oo^_str_
Before trimming: " _str^oo^_str_"
After trimming: "str^oo^str"
```

where “_” denotes a whitespace character

Hint:

- You may consider a string as an array of characters. Then you can access each element by its index. For example, `str[i]` ;
- You may use string methods, such as `length()`, `erase()` ;
- Don't write a hard code.

Q2. (Vector) Please implement a function `Calc_GPA()` to calculate the GPA of all the courses taken by a student. The GPA can be calculated by the following equation:

$$GPA = \frac{\sum_{i=1}^n C_i \times P_i}{\sum_{i=1}^n C_i}$$

where C_i denotes the credit for a course i and P_i denotes the points that the student got in the course i , and n denotes the number of courses taken by the student.

The conversion from the grades to the points is shown as the following table.

Conversion from Grades to Points (by Macau Univ. of Sci. & Tech.)

Scores	Grade	Points
93-100	A+	4.0
88-92	A	3.7
83-87	A-	3.3
78-82	B+	3.0
72-77	B	2.7
68-71	B-	2.3
63-67	C+	2.0
58-62	C	1.7
53-57	C-	1.3
50-52	D	1.0
40-49	F	0.0
<=39	O	0.0

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For example, the GPA of the student can be calculated as:

$$GPA = \frac{1.7 \times 6 + 2.3 \times 4 + 2.0 \times 3}{6 + 4 + 3} = 1.95$$

where we assume $P_1 = C$ and $C_1 = 6$ for course LP104, $P_2 = B^-$ and $C_2 = 4$ for course LP002 and $P_3 = C+$ and $C_3 = 3$ for course GE008.

Sample Output:

```
Task 2: GPA Calculator
How many courses that you have taken:
3
Please input the grade and the credit for course 1:
C 6
Please input the grade and the credit for course 2:
B- 4
Please input the grade and the credit for course 3:
C+ 3

Your total GPA of the above 3 courses is
1.95
```

Notice:

- Please implement your program by *vector* of C++ so that it can support dynamical arrays of **double** and **int**.
- The user first enters the number of courses n .
- The user then enters the grade of each course and its credits.
- You are allowed to submit your answer more than once. Each submission won't be overridden. But I will only mark your latest submission if you have more than one submissions.