GECG10069 (561085) F25: Introduction to Programming (C++)

Lab 4 : Literals & Variables

What you will learn from Lab 4

In this laboratory, you will further explore special output symbols and practice using variables in your programs.

TASK 4-1 : #DEFINE V.S. CONST NUMBER

✔ Figure out why coercion happened

✔ Try two different PI_1 & PI_2

```
#include <iostream>
#include <cmath>
#include <cstdlib>
#include <ctime>
using namespace std;

#define PI 3.1415926

int main() {
    int a = 5, b = 2;
    cout << "a / b = " << a / b << endl;

    double x = 5.5;
    // cout << "x % 2 = " << x % 2 << endl;

    int angle = 90;
    cout << "sin(90) = " << sin(angle) << endl;

    // 沒有 srand()，rand() 每次結果一樣
    cout << "Random number (1~100): " << rand() % 100 << endl;

    double y = 2.5;
    cout << "floor(2.5) = " << floor(y) << endl;
    cout << "ceil(2.5) = " << ceil(y) << endl;
    cout << "round(2.5) = " << round(y) << endl;

    return 0;
}
```

EXERCISE 4-1: RANDOM NUMBER

Write a C++ program that reads two integers a and b from the user, and then generates a random integer between them (inclusive).

Requirements

Your program should work no matter which number is larger.

- If the user enters 5 10, the random number should be between 5 and 10.
- If the user enters 10 5, the random number should still be between 5 and 10.

Sample Input - 1
2 10
Sample Output - 1
STDIN 2 10 Output: 5

Exercise 4-2: height of the longest side

You're asked to write a C++ program that calculates the height of the longest side of a triangle.

Hero's Formula

$$A = \sqrt{s(s-a)(s-b)(s-c)} \cdot s = \frac{a+b+c}{2}$$

- a, b, c = the lengths of the sides of a triangle
- A = the area of the triangle
- s = the semiperimeter of the triangle

Sample Input
3 4 5

Sample Output
Output: The height of the longest side: 2.4

Hint

- Find the area first, then the height.
- You may use max({a, b, c}) in C++11 or later to directly find the largest side.