Object-Oriented Programming Language

9/25/2018

Lab Assignment 3

Lab Grading Policy: Attendance 40%, Score 60%

In case you have difficulty in finishing the exercises on time, you should upload them by **Thursday noon** with a penalty of 20% on your score. No late submission is permitted after that. We will in general post the reference solutions **by Friday**.

Exercise 1 (30%): Write a C++ program that inputs 3 triangles each with three vertices. Store them in an array, and then determine if the given triangles are right triangles (直角三角形). You should define the following struct in proper header files with header guard. You should then include these types in your client code and report the vertex with the right angle.

```
struct Vertex {
    double x;
    double y;
};
```

```
struct Triangle {
    Vertex A;
    Vertex B;
    Vertex C;
    bool right;
};
```

A sample run of the program is as follows:

```
Input for the 1 triangle:
        Please input the x & y coordinates of the 1st vertex: 1 1
        Please input the x & y coordinates of the 2nd vertex: 1 -1
        Please input the x & y coordinates of the 3rd vertex: 0 0
Input for the 2 triangle:
        Please input the x & y coordinates of the 1st vertex: 1 1
        Please input the x & y coordinates of the 2nd vertex: 2 2
        Please input the x & y coordinates of the 3rd vertex: 0 1
Input for the 3 triangle:
        Please input the x & y coordinates of the 1st vertex: 1 1
        Please input the x & y coordinates of the 2nd vertex: 1 1
        Please input the x & y coordinates of the 3rd vertex: 1 1
Done reading Triangles.
Triangle 1 is a right triangle!
Triangle 2 is NOT a right triangle!
Triangle 3 is NOT a right triangle!
```

Exercise 2 (30%): Write a C++ program that inputs certain number of triangles each with three vertices. Store them in a vector, and then determine if the given triangles are right triangles (直角三角形). You should use the mentioned `struct`.

```
How many Triangles will you input? 3
Input for the 1 triangle:
        Please input the x & y coordinates of the 1st vertex: 1 1
        Please input the x & y coordinates of the 2nd vertex: 1 -1
        Please input the x & y coordinates of the 3rd vertex: 0 0
Input for the 2 triangle:
        Please input the x & y coordinates of the 1st vertex: 1 1
        Please input the x & y coordinates of the 2nd vertex: 2 2
        Please input the x & y coordinates of the 3rd vertex: 0 1
Input for the 3 triangle:
        Please input the x & y coordinates of the 1st vertex: 1 1
        Please input the x & y coordinates of the 2nd vertex: 1 1
        Please input the x & y coordinates of the 3rd vertex: 1 1
Done reading Triangles.
Triangle 1 is a right triangle!
Triangle 2 is NOT a right triangle!
Triangle 3 is NOT a right triangle!
```

```
How many Triangles will you input? 2
Input for the 1 triangle:
        Please input the x & y coordinates of the 1st vertex: 1 1
        Please input the x & y coordinates of the 2nd vertex: 1 -1
        Please input the x & y coordinates of the 3rd vertex: 0 0
Input for the 2 triangle:
        Please input the x & y coordinates of the 1st vertex: 1 1
        Please input the x & y coordinates of the 2nd vertex: 1 1
        Please input the x & y coordinates of the 3rd vertex: 1 1
Done reading Triangles.
Triangle 1 is a right triangle!
Triangle 2 is NOT a right triangle!
```