# LAB #5: Complex If and switch statements

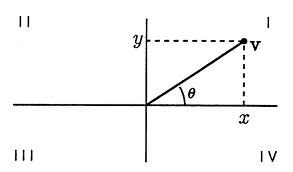
# Purpose:

1. Use **if, else** and **else if** statements
2. Use nested **if** statement
3. Use switch statement

**Lab 5.1**: Working with **Complex if** , **else** and **else if** statements [**6 points**]

Before starting the lab activity, create an empty C++ project called Lab5\_1. Then create a new, blank .cpp file, named lab5\_1.cpp in your project.

For this activity you are going to complete a program that prompts the user to input the x-y coordinate of a point in a Cartesian plane. The program should output a message indicating whether the point is the origin, is located on the x-(or y-) axis, or appears in a particular quadrant. For the points except origin, the program also output the angle between the radius-vector of the point and the positive x axis (measured counterclockwise from the positive x-axis, within the limits of (−180°, +180°). Answer in units of degree.



Hints:

(1) You may use the constant M\_PI defined in cmath library for π, but you should define \_USE\_MATH\_DEFINES before including the library. See example below.

#define \_USE\_MATH\_DEFINES

#include < cmath >

(2) Use the **double atan (double x)** function in cmath to compute the principal value of the arc tangent of x, expressed in the interval (-**π** /2 , + **π** /2) radians, and then convert it into degree.

Degree of θ = **atan ( y / x ) / π \* 180**

(3) In order to convert the radian into degree between −180° and +180°, you need to add 180° to the result, if the point is in the second quadrant, or subtract 180° from the result, if the point is in the third quadrant.

(4) You may need special solutions for the points on x-(or y-) axis.

A sample run of your program would be:

Sample run 1:

Enter x-coordinate: ***0***

Enter y-coordinate: ***0***

(0,0) is the origin

Sample run 2:

Enter x-coordinate: ***6***

Enter y-coordinate: ***0***

(6,0) is on the x-axis

The angle of the radius vector is 0

Sample run 3:

Enter x-coordinate: ***0***

Enter y-coordinate: ***-2***

(0,-2) is on the y-axis

The angle of the radius vector is -90

Sample run 4:

Enter x-coordinate: ***-4***

Enter y-coordinate: ***4***

(-4,4) is in the second quadrant

The angle of the radius vector is 135

**After you run the program, show the results to the lab TA before you do the next lab activity.**

**Lab 5.2**: Working with **switch** statements [**4 points**]

Save your lab5\_1.cpp file, and close Lab5\_1 project. Create an empty C++ project called Lab5\_2, and then create a new, blank .cpp file, named lab5\_2.cpp, in your project.

For this activity, you are required to use **switch** statements to complete the program that determine how many Frequent Flyer miles you can earn flying with Global Express Airlines. The program asks the user to enter actual miles that he or she has traveled and the ticket fare class, and then displays the number of award miles. ***Your program should have error handling for invalid inputs.*** The award miles are calculated by multiplying the actual miles and the conversion rate of the purchased fare class in the following table.

|  |  |
| --- | --- |
| **Class of service** | **Base miles rate** |
| First | 150% |
| Business | 125% |
| Economy | 100% |
| Discount Economy | 50% |
| Other | 0% |

A sample run of your program would be:

Sample run 1:

Enter the actual miles: ***1000***

1. First
2. Business
3. Economy
4. Discount Economy
5. Other

Enter the ticket fare class: ***2***

You have earned 1250 miles.

Sample run 2:

Enter the actual miles: ***6500***

1. First
2. Business
3. Economy
4. Discount Economy
5. Other

Enter the ticket fare class: ***4***

You have earned 3250 miles.

**Save your program for the second activity, compile, run and show the output of your program to the lab TA before the end of the lab period**.

**Please, return this printed lab page to the TA. Thank you.**

Fall 2001