

## CA146 Tutorial 3

When you have finished the tasks, or at least as many as you were able to do, ask a tutor to sign off to confirm this.

### 1 Practice with simple “if” statement and logical operators

1.1 Type in, compile and run the following program:

```
#include <iostream>
using namespace std;

int
main()
{
    // This program defines some variables and assigns them values.
    // Then, it uses the variables to demonstrate how simple if
    // statements and the various logical operators work.
    // (Notice how parentheses are used to make it clear the
    // order in which calculations are done.)

    // Part 1:
    int p, q; float x;
    p = -3; q = 9; x = 3.5;

    // Part 2:
    cout << "Conditions satisfied: " << endl;
    cout << "(" << p << ", " << q << ", " << x << ")" << endl;

    if ((p == -3) && (q >= 9) && (x < 7.0)) {
        cout << "(p == -3) && (q >= 9) && (x < 7.0)" << endl;
    }

    if (((p != -3) || (q >= 9)) && (x < 7.0)) {
        cout << "((p != -3) || (q >= 9)) && (x < 7.0)" << endl;
    }

    if (!(p == -6) || (q < 9) || (x > 7.0)) {
        cout << "!(p == -6) || (q < 9) || (x > 7.0)" << endl;
    }
    return (0);
}
```

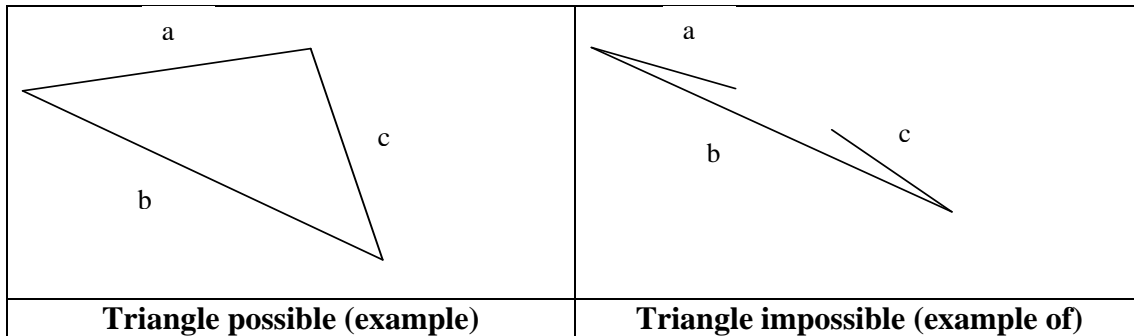
**NB:** Check the results carefully to make sure you understand exactly how the program works to produce the different outputs.

1.2 Modify the program 1.1 so that the values of the variables are changed (for example to  $p = 60$ ,  $q = -100$  and  $x = -0.3$ ). Now change the numbers inside the conditions of the if statements so that each remains true.

# CA146 Introduction to Programming in C++

## 2 Practice with “if...else” statements

2.1 Type in, compile and run the following program, the purpose of which is to take in the values of three variables a, b and c as input (from the user). The values must each be greater than zero. The program then determines whether or not a, b and c can form a triangle.



```
#include <iostream>
using namespace std;
```

```
int
main()
{
    float a, b, c;

    cout << "Enter values for a, b and c (separated by spaces)" << endl;
    cin >> a >> b >> c;
    cout << "You entered a, b, c = " << a << ", " << b << ", " << c << endl;

    if ((a <= 0) || (b <= 0) || (c <= 0)) {
        cout << "ERROR: Non-positive value entered" << endl;
        return (0);
    }

    // Check for a possible triangle
    if ((a <= (b + c)) && (b <= (c + a)) && (c <= (a + b))) {

        cout << "These values can form a triangle" << endl;

        // ** Add checks here for isosceles and equilateral

    } else {
        cout << "These values CANNOT form a triangle" << endl;
    }
    return (0);
}
```

2.2 Extend the above program so that it can determine whether a, b and c can form an isosceles triangle (when  $a = b$  or  $b = c$  or  $c = a$ ) or even an equilateral triangle (when  $a = b$  and  $b = c$ ). This will require you to add extra conditional statements at the point marked \*\* in the program. Test your solution with the data sets {12, 6, 5}, {12, 6, 7}, {6.5, 6.5, 8} and {8, 8, 8}.

## CA146 Introduction to Programming in C++

2.2 Write a program that reads in three numbers and prints them out in decreasing order.

2.3 Write a program to determine how much a person pays to go to the cinema. A user inputs their age and the program displays how much they should pay on the basis of the following rules:

- Under 5, free
- 5 to 12, half price
- 13 to 54, full price
- 55 and over, free

The full price is 10 euro.