COMP 102: Computer & Programming Fundamentals I

Homework Assignment #1

Program design due on **3 July 1996 in class**

Final program due on **10 July 1996 in class**

Problem Description:

Every line in the real plane can be written in the following form:

$$Ax + By + C = 0$$

where the coefficients A, B, and C are real numbers. The coefficients of such a line can be determined when either (i) the x- and y-coordinates of two points are given or (ii) the x- and y-coordinates of one point and a slope is given. Design and implement a C++ program that would

1. ask the user to enter either (i) or (ii);
2. determine and output the equation of the line based on the input information (note that some of the terms should not be printed when they are zero); and
3. ask the user to enter the x- and y-coordinates of an arbitrary point and determine the distance of the point from the line.

Program Design (30%)

- Specify the input and output of the given problem.
- State any assumptions (if any) that you may have.
- Develop a solution (algorithm) similar to the examples given in Lecture 3.

Program Implementation (60%)

- Develop a C++ implementation of the above design. Turn in both a hard copy and a disk copy of your program.
    - correctness (40%)
    - program style and documentation (20%)

Test Cases (10%)

- List the test cases that you used in testing your program.
- For each test case, justify your choice.

IMPORTANT NOTE

Unless otherwise stated, the assignments you submit for grading must represent the results of your own independent effort. Suspected cheating will be referred to the relevant University authorities.

Always clean up the temporary working directory in the hard disk after working on a PC in the computer laboratory. Don't be so generous to let others read and copy your programs. You may get into trouble if another student's submission appears similar to yours.

Sample output (user input is in bold form):

Please enter a "1" if two points are given or "2" if one point and a slope are given:
1

Please enter the x- and y-coordinates of the first point:
0 0

Please enter the x- and y-coordinates of the second point:
0.5 0.5

The points that you have entered are (0.0, 0.0) and (0.5, 0.5).
The equation of the line is
0.5x - 0.5y = 0

Please enter the x- and y-coordinates of another point:
1.5 1.5

The distance from (1.5, 1.5) to the line is 0.0.