

Lab 02 : Programing Techniques

I. Overview and Objectives

Programming techniques involve writing algorithms and programs as we have done in the previous lab but there is more to it than simply translating simple algorithms into C programming language. Sometimes, problems require a more modular approach and often things are not working as intended and "debugging" (finding and fixing programming errors) is required to make the programs work correctly.

The learning objective of this lab is to become familiar with modular programming with the use of predefined and user-defined functions. In this lab also you will be asked to "debug" programs that contain errors in order to identify the error messages given by the compiler, their causes and how to fix them.

Reading and related topics: Course slides lesson 03. Book chapter 3.

II. Lab Tasks and Submission Guideline

Solve the following two problems. The first problem will deal with programming errors and the other one with problem solving using built-in and user-defined functions.

Copy the report for problem 1, write the algorithm and C program for problem 2 and include all of them in one written lab report (the errors form, the algorithm, the C program source code, and screenshot of the program execution). Save your report in .pdf format and submit it on D2L. You should submit your lab at the end of your lab session or soon after. In all cases it must be submitted before the deadline indicated in the D2L dropbox or it will not be accepted for marking.

Problem 1: This [Google Drive Folder](#) contains thirteen C programs that have errors in them. For each of the programs, identify the errors and their causes and make changes to make them work. Enter your findings in the [errors form](#).

Problem 2: Write a simple algorithm that calculates the speed of sound (a) in air of a given temperature (t).

For this program you must use this formula:

$$a = 1086 \sqrt{(5t + 297) / 247}$$

Note that the formula gives the speed (a) in feet/sec and uses the temperature (t) in degrees Fahrenheit. You must convert both units (search online for the conversion formulas) because the temperature will be in degrees Celcius and the expected speed in km/h. Write your solution as a sequence of steps that can be followed in order.

Next, write a C program that asks the user for the temperature in degrees celsius and give the answer in kilometers per hour. You must write a user-defined function for the formula that calculates the speed of sound. Your function must be named **spsound** and take as argument the temperature in degrees celsius.

Have fun!

