



EXAMINATIONS - REPEAT - 2005/2006

MODULE: *Software Engineering 1 (EE102)*

COURSE: *B.Eng. in Info and Communications Engineering
B.Eng. in Mechatronic Engineering
B.Eng. in Electronic Engineering
B.Eng. in Digital Media Engineering
Common Entry into Engineering
Foundation to Engineering*

YEAR: *1 (one)*

EXAMINER: *Dr. Gabriel-Miro Muntean (ext. 7648)*

TIME ALLOWED: *not limited*

INSTRUCTIONS: *Answer ALL questions. Marks are indicated for each question.*

This booklet contains 5 pages, including the cover sheet.

Introduction

This is the documentation for the final assignment for the EE102 - Software Engineering 1 module. This is a **COMPULSORY** assignment. This assignment is worth 80% of the marks for this module! The assignment must be completed, and the formal report submitted, by email. Please consult the Laboratory Report Guidelines (Chapter 3) for detailed advice on how to prepare the report.

The report must be **also printed and submitted to the Lecturer in his office** located on the third floor, Research and Engineering Building. It must **also be e-mailed** to the following address:

ee102@eeng.dcu.ie

Note that your submission should include the report and commented listings of the C source files. Do not archive them (e.g. using Winzip). Do not include executable files.

Plagiarism

Plagiarism is the taking and submission of another person's thoughts or work as one's own. It is classified as a major offence under the DCU Disciplinary Code. Please note the following extract from the code:

“Serious academic offences (e.g. cheating) may, in addition to such reduction in marks or other action as the [Disciplinary] Committee may recommend to an Examination Board, be punished by suspension from the University in accordance with the provisions of this Code. Should the offence be repeated it shall result in expulsion.”

In the context of this assignment, you are encouraged to discuss the assignment with other members of the class (especially including public electronic discussion via ee102-talk@mallist.eeng.dcu.ie e-mail list), and collaborate in completing it. However, each person's report must be their own composition and must represent their own understanding and work. You may, if you wish, quote work from others, but this must be clearly attributed to the original author.

As an integral part of grading the assignment, you are required to make yourself available for oral interview on request. At such interview you must demonstrate to the satisfaction of the examiner that you understand all material presented in your report. If the examiner forms the opinion, as a result of such interview, that you have been guilty of plagiarism, then this will be formally reported to the University Disciplinary committee in accordance with the disciplinary code.

Any students required to attend for oral interview will be notified of this, by email. Interviews will take place during the semester 1 exam week, January 2006.

Exercise 1: Analysis (50%)

Consider the program **quad0.c**. This program is intended to calculate and output a table of x and y values for the quadratic function:

$$y = a * x^2 + b * x + c$$

The detailed operation should be as follows:

- The program should prompt for values of the three coefficients a, b and c.
- It should next prompt for “initial” and “final” values of the independent variable x as well as the increment (x_{step}) at which different values of y should be calculated.
- It should then calculate and print the table of values of the function (y).

Each row should contain a single x and y pair. The table should start at the initial x value. The x value should increase by x_{step} for each successive row. The table should continue as long as the x value is no greater than the specified final x value.

The program is poorly formatted, and contains a number of other defects. You are required to reformat the program in a way that makes it easier to read and understand, and to correct all other defects. Include copies of your modified program(s), in whole or in part, as necessary to illustrate the changes you make.

Remember to carefully record:

- (a) each defect,
- (b) an explanation of the defect and
- (c) your correction, in your formal report.

Furthermore, specify any tests you carry out in detail. Where appropriate, include quantitative details of both expected and actual output. In other words, you should carefully work out (by hand, or some other means) what you expect the output of this program to be for a small number of test data sets. You should then verify that the program behaves as expected when this data is used as input. Any discrepancy should be investigated with the reason for the discrepancy (and subsequent program modification) documented in your formal report. Test data sets used might address the following possibilities:

- using very small numbers;
- using very large numbers;
- unusual circumstances (e.g. “strange”, “incorrect” or “invalid” user input).

Exercise 2: Synthesis (50%)

Develop a program that acts as a calculator. You must offer the possibility to users to perform additions, multiplications, divisions and subtractions. Of course they have to be able to input numbers and to reset the current value. After each transaction print the result of the operation performed. Provide the user with the choice to print a history of the operations in the following format:

value operation value equal result

E.g.

0.00	addition	100.00	equal	100.00
100.00	division	25.00	equal	4.00
4.00	subtraction	1.00	equal	3.00
reset				
0.00	addition	50.00	equal	50.00

Repeated interactions with the calculator should be allowed.

Notes:

- provide messages every time the user has to input data
- write user-friendly messages everytime you output some information
- each time before repeating the sequence the user should be allowed to terminate the program
- providing a menu is optional but strongly encouraged.

Note that your program should:

- make appropriate use of indentation in order to make it easier to read and to indicate the control flow of the program;
- be adequately commented;
- be properly tested, including extreme cases.

If you have any problems with the submission of this assignment please email

ee102@eeng.dcu.ie

Program Listing

```
/*
 * quad0.c - a program to output a table of values for
 * any given quadratic function.
 */

#include <stdio.h>
#include <stdlib.h>

inv
main
(void)
{
char name[100];
float y, x, end_x, xstep, a, b, c
printf("Enter your name: "); gets(name);
    printf("Hello %s and welcome to quad0.c\n\n", name);
printf("Enter a value for a: "); printf("%f",&a);
printf("Enter a value for b: "); scanf("%f",&b);
    printf("Enter a value for c: "); scanf("%f",c);
printf("Enter an initial value for x: "); scanf("%f",&x);
    printf("Enter a final value for x: ");
    scanf("%f",&end_x);
printf("Enter a value for x_step: "); scanf("%s",&x_step);
while(x <= end_x){
{
    y = (a * x * x) + (b + x) + c;
    printf("%f %f\n",y,x);
    x += x_step;
}
return(EXIT_SUCCESS);}
```