GX578

OLLSCOIL NA hÉIREANN, GAILLIMH
NATIONAL UNIVERSITY OF IRELAND, GALWAY

Summer Examinations 2001

First Year Industrial Engineering and Information Systems

First Year Management Engineering with Language

IE109: Computing & Information Systems

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Prof. O'Kelly,
Dr. Sheil.

Answer ***two*** questions from Section A and ***four*** questions from Section B.

Time allowed: **3 hours**

Section A

A1

(a) The following terms arise when describing typical PC hardware characteristics – write definitive/explanatory notes on each one:
Motherboard, Expansion Cards, Ports, Bus, Memory Cache [7 marks]

(b) Write a short essay on Computer Networks. Your essay should contain appropriate references to (at least) the following 'keywords': *LAN/WAN, Communications Protocols, Topology, Router, Network Operating Systems.* [9 marks]

A2

(a) What is the *Internet*? [2 marks]
List any four services which the Internet provides/facilitates. [2 marks]

(b) What is the primary objective of the *World Wide Web*? How is it realised? [3 marks]
What are *Uniform Resource Locators* (URLs) ? [1 mark]
Explain what the various components of the following URL represent:
http://www.nuigalway.ie/depts/names.htm [2 marks]

(c) Differentiate between *Browsers* and *Search Engines*. [4 marks]
AskJeeves is a *MetaSearch Engine* – what does this mean? [2 marks]

A3

(a) Broadly speaking, why use *Spreadsheet* programs? [2 marks]
Explain, verbally, or by means of a sketch, what the following terms represent:
workbook, worksheet, chart sheet, cells, rows, columns [3 marks]

(b) The following is an **EXCEL** worksheet.

Sample Worksheet

Investment #	Amount($)	Rate(%)	Duration(years)	Interest($)
1	640	1.22	5	40.00426849
2	731.5	1.78	12	172.4901303
3	4570	1.92	10	957.2658021
4	6792	1.29	20	1984.656472

Outline the steps which you would undertake (in **EXCEL**) to:

(i) produce the following edited version of this sheet, [5 marks]

(ii) employ the ***Chart Wizard*** to develop a chart to display *Interest versus Amount*, for all four investments. [6 marks]

A3 continued....

Sample Worksheet for Investment Analysis

Investment #	Amount($)	Rate(%)	Duration(years)	Interest($)
1	640.00	1.22	5	40.00
2	731.50	1.78	12	172.49
3	4570.00	1.92	10	957.27
4	6792.00	1.29	20	1984.66

Total Invested:- 12733.50

Total Interest:- 3154.42

.....edited worksheet.....

Section B

B1

What makes a computer program (i) *User-Friendly*? (ii) *Interactive*? [4 marks]

Write a User-Friendly, Interactive **FORTRAN 77** program to produce the slope and y-axis intercept of a line passing through two points.
Your program should accept values for the (x, y) coordinates of the points, from the user's keypad, and should direct output to the user's screen. [13 marks]

Hint: $y = mx + c$, $y - y_1 = \frac{y_2 - y_1}{x_2 - x_1}(x - x_1)$.

B2

Write a technical essay under the title:

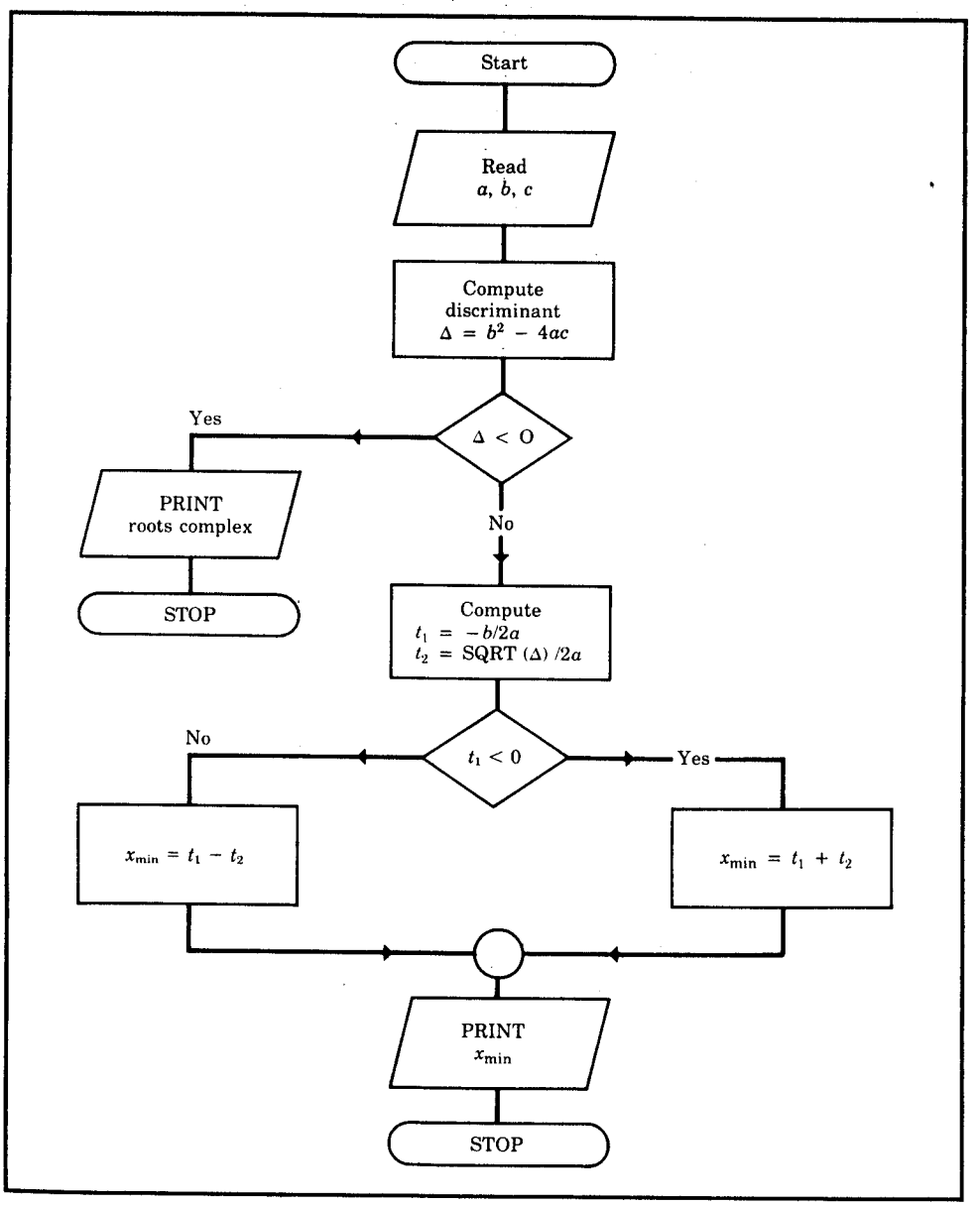
"A Disciplined Approach to Program Development".

Your essay should, as a minimum, demonstrate your understanding and appreciation of such concepts as: *Structured Programming, Modular Design, Top-Down Design/Analysis*, etc.
Note: Your answer to this question must be in the form of an **essay** - a cryptic listing of terms, concepts will attract minimal credit. [17 marks]

B3

Sketch the standard flowchart symbols and state the operation(s) represented by each. [5 marks]

Develop a program from the following flowchart, which represents the task of determining the smallest valued real root of the quadratic $y = ax^2 + bx + c$. [12 marks]



B4

State the general form of the **FORMAT** statement. [2 marks]

Write a FORTRAN 77 program which will accept values for:

(a) the number of ordinary hours worked by an employee,
(b) the number of overtime hours worked,
(c) the standard hourly rate of pay for this work,
(d) the hourly rate of pay for overtime.

Your program should then:

(i) compute the payment due to the employee,
(ii) 'echo' print the input data and print the payment due.

The output should be centered on the user's screen and should appear precisely as follows:

```
****************************************
      Standard Hours:          --.--
      Overtime Hours:          --.--
      Rate:                    --.--
      Overtime:                --.--

      Payment Due:             ---.--
****************************************
```

[15 marks]

B5

Differentiate briefly between *function subprograms* and *subroutine subprograms*. [5 marks]

Consider a function $f(x)$ evaluated at the set of equispaced points $x_0, x_1, \ldots, x_n$, where the interval between successive points is h.
The Extended Trapezoidal Rule approximation for the integral of $f(x)$ over the interval $[x_0, x_n]$ is given by

$$\int_{x_0}^{x_n} f(x)dx \cong \frac{h}{2}\{f(x_0) + f(x_n)\} + h\sum_{i=1}^{n-1} f(x_i).$$

Show how this rule may be derived. [5 marks]

Write a function subprogram **ETRAP(A, B, N)** incorporating the above rule, to produce an approximation to $\int_A^B f(x)dx$. Assume that the function to be integrated is available as the function subprogram **FN(X)**. [5 marks]

Specify the coding of **FN(X)** when the function to be integrated is $f(x) = \frac{1}{\sqrt{2\pi}} e^{-x^2/2}$. [2 marks]