

OLLSCOIL NA hÉIREANN
The National University of Ireland

NATIONAL UNIVERSITY OF IRELAND, GALWAY

SUMMER EXAMINATION 1998

FIRST YEAR EXAMINATION

[CT102]

Algorithms and Information Systems

Prof. Bell
Dr. G. Lyons
Dr. C. Mulvihill

Candidates are required to answer any five questions.

All questions carry equal marks.

Time allowed: Three hours.

1. Develop an algorithm to sort the numbers in the array $b[0..N-1]$, $N > 0$. You may assume that the array contains only positive integers. Explain all stages of your development.
2. Develop an algorithm for run-length encoding, clearly explaining all your development. You may use the following information if you wish:
1111222233334444 could become 1(4)2(4)3(4)4(4) with such a scheme.
3. Develop an algorithm for determining if three given lengths can form a triangle, formulating a suitable rule for triangle formation in the course of your answer.
4. Develop an algorithm to count and report all grades in the following ranges:
0 to 39, 40 to 59, 60 to 69, 70 to 100. You may assume that the grades present sequentially in the input stream, and that a sentinel, -1, is in use.
5. Outline your understanding of the evolution of information systems. In the course of your discussion, state your understanding of databases, warehouses, and very high level interfaces.
6. Discuss the elements of a typical expert system, and give any example of your own devising where such a system might be usefully deployed.
7. Assuming the availability of a library containing code for searching, sorting and compression, discuss how these components could be used to find, manipulate and transfer information in a distributed system.
8. Outline the operation of a typical search engine, and discuss an application where it might be usefully deployed.