

OLLSCOIL NA hÉIREANN, GAILLIMH
THE NATIONAL UNIVERSITY OF IRELAND, GALWAY

SEMESTER II, SUMMER 2000 EXAMINATION

MASTERS IN INFORMATION TECHNOLOGY
MASTERS IN ENGINEERING SCIENCE

CT509: PROGRAMMING

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Dr. G. Lyons
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Time allowed: 3 hours

Answer any five questions

1. (a) Show how a string is represented in C++.

(b) Write a function (without using string library functions) that compares two strings (**str1** and **str2**), and returns: 0 if they are equal; a negative number if **str1** is less than **str2**; and a positive number if **str1** is greater than **str2**.

2. (a) Describe C++'s logical operators and how they are used.

(b) Given that $a = 1$, $b = 0$, $c = 1$ and $d = 0$, calculate the values of x , y and z after these statements have been executed.

$$x = a \parallel b \parallel d \ \&\& \ c;$$
$$y = !(a \parallel d) \ \&\& \ (!c \parallel d);$$
$$z = a \ \&\& \ b \ \&\& \ (!c \parallel !d) \ \&\& \ !d;$$

(c) Write a function that accepts an integer value and returns: 1 if it is in the range [0-40]; 2 if it is in the range [41-80]; and otherwise returns 0.

3. (a) Describe the general format of a function.
- (b) Write a function which accepts a integer array and the array size and returns the minimum, maximum and average values.
4. (a) Use examples to show program loops can be implemented using the While and For repetition structures.
- (b) Use an example to show a For structure which can be rewritten as an equivalent While statement.
- (c) Explain using a suitable example, the use of an event controlled loop.
5. (a) What is the general format for a structure in C++?
- (b) Define a structure to hold information on students, based on the following data definition:
- | | | |
|----------------|---|---------------------------------|
| Student Record | = | Name + Address + ID + Fee Paid |
| Name | = | alphanumeric value of length 20 |
| Address | = | Street + City + County |
| Street | = | alphanumeric value of length 20 |
| City | = | alphanumeric value of length 15 |
| County | = | alphanumeric value of length 15 |
| ID | = | integer |
| Fee Paid | = | floating point value |
- (c) Write a program that accepts information on a student.
- (d) Write a function which accepts and prints out information on an array of students using the structure and program defined in (c) and (d).
6. (a) Describe the use of pointer variables in C++.
- (b) Write a program which creates a dynamic linked list, where each node in the list is used to store a single integer value.

7. (a) Discuss, using a suitable example, the following terms used in defining a C++ class:

- Constructor
- Destructor
- Private members
- Public members

(b) Write the class member functions for the following class definition:

```
class String
{
public:
    String ();
    String (char* s);
    ~String ();
private:
    int length;
    char* buffer;
};
```

8. (a) Describe, using a suitable example, the C++ copy constructor and the situations in which it may be used.

(b) Describe using suitable examples, the use of the **friend** keyword.

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8. (a) Describe, using a suitable example, the C++ copy constructor and the situations in which it may be used.

(b) Describe using suitable examples, the use of the **friend** keyword.