

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

SUMMER EXAMINATIONS 1999

**FIRST YEAR BA INFORMATION TECHNOLOGY**

***CT100 PAPER 1***  
***PROGRAMMING AND LOGICAL FOUNDATIONS***

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Time allowed: THREE hours

**ANSWER QUESTION ONE AND THREE OTHER QUESTIONS**

1. (a) Write a program that finds and prints the median in a set of numbers. To find the median, the numbers must be sorted. If the number of numbers in the set is odd, the median is the middle number; if the number of numbers is even, the median is the average of the two middle numbers. Draw an IPO diagram for this problem and deskcheck your answer with sample data. [20]

- (b) Explain what is happening in the following code fragment:

```

FOR g = 1 to numg
  tot = 0
  FOR p = 1 TO nump
    tot = tot + score (p , g)
  NEXT p
  ave = tot / nump
  PRINT "game" ; g; "average"; ave
NEXT g
FOR p = 1 to nump
  tot = 0
  FOR g = 1 to numg
    tot = tot + score (p , g)
  NEXT g
  ave = tot / numg
  PRINT "player" ; p ; "average" ; ave
NEXT p

```

[20]

2. (a) Describe two different loop constructs and give an example of where each might be appropriate in a program. [8]
- (b) A vending machine sells items which cost less than £1. The machine accepts £1 as payment and gives the correct change as needed. Write the pseudocode for a program which calculates the number of 50-, 20-, 10-, 5-, 2-, and 1-pence pieces needed to give the change with as few coins as possible. [12]
3. (a) How might you easily search a sorted array to find a particular value? Illustrate your answer with a small example. [10]
- (b) Write pseudocode for a program which accepts two alphabetic characters, checks if they represent a valid abbreviation for a US state, and then prints the full name of the state. You should use arrays for processing. [10]
4. (a) An exercise club has special rates for students and older members (those over 65). If older members are married, the rate is £7 per month for each member; if they are unmarried (or only one spouse is a member), the charge is £7.50. The standard member rate is £12, and student rate is £7.50. There are no discounts for married regular members or married students.  
Draw a flowchart to calculate the membership charge for potential members. [12]
- (b) Write the pseudocode for a program which prints simple addition tables for adding the digits 1 to 10. Your program should produce 10 tables, each adding the base number to the digits 1 through 10. [8]
5. (a) Explain the following terms when used in computer programming:  
flag ; string variable ; argument ; sentinel ; constant [10]
- (b) A bakery packs 12 biscuits to a box and 12 boxes to a carton. Write the pseudocode for a program which calculates and prints the number of cartons produced, the number of boxes left over, and the number of biscuits left over for any given number of biscuits baked. [10]