

OLLSCOIL NA hÉIREANN
NATIONAL UNIVERSITY OF IRELAND, GALWAY

WINTER 2000 EXAMINATION

MASTERS IN INFORMATION TECHNOLOGY (NUI, G / IMI PROGRAMME)

Modern Programming Languages – CT509

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Time Allowed: 3 hours

Answer any five questions

1. Use the Software Development Method (Analysis, Design and Code) to solve the following problem:

Write a program that calculates the average monthly rainfall. The main inputs are the number of days in the month, and the rainfall for each day. The program outputs the average rainfall.

2. (a) Describe the general format of a function.
(b) Write a function that accepts three numbers, and returns the maximum value.
(c) Draw a flow chart representation of the solution from part (b).
3. (a) Describe the general format of the if-else-if selection statement, and illustrate its flow of control using a flow chart.
(b) Write a function that takes as input a customer's age, and calculates the discount that applies, according to the following table:

Age	Discount
Less than or equal to 10	50% (0.5)
Greater than 10 and Less than or equal to 16	30% (0.3)
Greater than 16 and less than or equal to 21	15% (0.1)
Otherwise	0% (0.0)

4. (a) Explain the workings of a 1-dimensional array. Show how it is declared, and how its elements may be referenced.

(b) Write a function called **isInArray** that accepts an array of integers, the size of the array, and a number to search for. The function should search through the array and if it finds the number it should return **true**, otherwise it returns **false**.
5. Write logical functions (i.e. functions that return a boolean value) for each of the following problems:
 - (a) Write a function that takes an integer and returns true if it's divisible by 10, and false otherwise.
 - (b) Write a function that accepts a grade and returns true if it's within a valid range [0..100], and false otherwise.
 - (c) Write a function that accepts two numbers, and returns **true** if the numbers are both divisible by 10, and false otherwise. [Hint: Try and make use of the solution to part(a).]
6. (a) Describe the general format of a while statement, and illustrate its flow of control using a flow chart.

(b) Write a program that accepts a list of numbers (sentinel value = -1), and calculates the maximum and the minimum.
7. (a) Write a class definition for a Customer. Important data includes: name, surname, dateofBirth. Write methods to set and get data for each of the attributes defined, and a method that displays all the customer's details.

(b) Write a short program that (1) creates a customer object; (2) sets their e-mail address; and (3) displays their personal details.
8. (a) Describe the ArrayList class, and list three of its most important methods.

(b) Using Java's ArrayList, write a container class (AccountManager) for a Bank Application. The role of this class is to manage the creation of account objects. It should also contain a function **findAccountByNumber**, which accepts an account number, and returns the object handle that matches the account number. [There is no need to write the Account class, assume it exists, and has a method called **getNumber**]. Finally, this class should also provide a method called **getNumberOfAccounts**, which returns the number of live accounts in the system.