7 A program is being developed to implement a customer loyalty scheme for a coffee shop.

Each customer has a unique customer ID starting at `10001` with this value increasing by one each time a new customer joins the loyalty scheme.

For example, the third customer who joins the loyalty scheme is given the customer ID `10003`

The loyalty scheme is limited to 1000 customers.

A customer is awarded a loyalty point every time they buy a coffee.

The programmer has decided to use a global 2D array `Loyalty` of type `INTEGER`. The array `Loyalty` is made up of 1000 rows and 2 columns. Each row relates to one customer; column 1 contains the unique customer ID and column 2 contains the number of customer loyalty points.

Rows in the array `Loyalty` that are not currently being used have the value of Column 1 set to `99999`

The array is sorted in ascending order by customer ID.

The programmer has defined a program module:

Module	Description
`FindCustomer()`	• called with parameter of type `INTEGER` representing a customer ID • searches the `Loyalty` array for this customer ID • the search will stop as soon as the customer ID is found • the search should efficiently deal with the situation when the customer ID is **not** stored in the `Loyalty` array • if the customer ID is found, return an integer value representing the loyalty points, otherwise return `−1`

(a) Write efficient pseudocode for module `FindCustomer()`

.... [8]

(b) A customer can claim a free coffee for every 11 loyalty points.

The programmer has defined a second program module:

Module	Description
`PointsReport()`	• output the customer ID for each customer who has 11 or more loyalty points • output the average loyalty points for all customers in the `Loyalty` array along with an appropriate message

Write efficient pseudocode for module `PointsReport()`

Assume the array contains the data for at least **one** customer.

.... [7]

(c) The programmer decides to amend the customer ID; it will be stored as a `STRING` instead of an `INTEGER`. This means that the 2D array `Loyalty` can no longer be used.

(i) Explain why the 2D array `Loyalty` can no longer be used.

.... [1]

(ii) Explain how a 1D array could be used to store both the loyalty points and the amended customer ID.

.... [2]