8 A program is being developed to manage student book loans from a college library.

The programmer has defined a record type to define each loan.

The data items are:

Data item	Data type	Comment
`StudentID`	`STRING`	the unique ID of the student who has borrowed the book
`BookID`	`STRING`	the unique ID of the book being borrowed
`OnLoan`	`BOOLEAN`	`TRUE` if the book has **not** been returned

The programmer has defined a global array `Loan` to store 7000 loan records.

There are more elements in the array than books in the library. Unused elements have the `StudentID` set to an empty string. These may occur anywhere in the array.

The programmer has defined a program module:

Module	Description
`CountLoans()`	• called with a parameter of type `STRING` representing a `StudentID` • counts the number of books currently on loan to the specified student • counts the number of books that the student has already returned • output both counts together with a suitable message

(a) Write pseudocode for module `CountLoans()`

.... [7]

(b) As a reminder, a global array `Loan` stores 7000 loan records with data items for each loan record:

Data item	Data type	Comment
`StudentID`	`STRING`	the unique ID of the student who has borrowed the book
`BookID`	`STRING`	the unique ID of the book being borrowed
`OnLoan`	`BOOLEAN`	`TRUE` if the book has **not** been returned

A new module is defined:

Module	Description
`NewLoan()`	• called with two parameters of type `STRING` representing a `StudentID` and a `BookID` • searches the array for an unused loan record • if found, updates the loan record and returns `TRUE`, otherwise returns `FALSE`

Write efficient pseudocode for `NewLoan()`

.... [7]

(c) When a book is returned, the loan record will have its `OnLoan` data set to `FALSE`

A new procedure `Archive()` will mark these records as unused after first saving them for future reference.

Explain how these records can be saved for future reference.

.... [2]

(d) It is decided to extend the program so that a new module `Reminder()` will send an email to the student three days before the book is due to be returned.

Outline the changes that will need to be made to the data stored and how this data will be used to generate the reminder email.

Data ....

Use ....

[2]