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 The first three characters of a StudentID represent a tutor ID. Each student has one tutor.
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 8000 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
LoanStatus()	• called with two parameters of type STRING representing a StudentID and a BookID • outputs a message saying whether a given loan has been returned or not • outputs a warning message if a record of the given loan is **not** found

(a) Write efficient pseudocode for the module LoanStatus()

Assume that each combination of StudentID and BookID can occur only once.

[8]

(b) A second module is defined:

Module	Description
LoansPerTutor()	• called with a parameter of type STRING representing a tutor ID (as a reminder, the first three characters of a StudentID represent a tutor ID) • returns an integer value representing the number of books currently on loan to students who have the given tutor

Reminder: unused elements have the StudentID set to an empty string. These may occur anywhere in the array.

Write pseudocode for the module LoansPerTutor()

[7]

(c) It is decided to mark as unused all records for book loans that have been returned. The data for these records will first be written to a new text file for archive purposes.

(i) The archive program will automatically generate a meaningful filename each time it is run.

Outline a meaningful format to use for the filename.

[2]

(ii) There is a problem that will need to be overcome before the data items can be written to a text file.

As a reminder, the data items are:

Data item	Data type	Comment
StudentID	STRING	the unique ID of the student who has borrowed the book The first three characters of a StudentID represent a tutor ID. Each student has one tutor.
BookID	STRING	the unique ID of the book being borrowed
OnLoan	BOOLEAN	TRUE if the book has **not** been returned

Explain the problem.

[1]

(iii) One way of storing the data items in a text file is to store each data item on a separate line.

Identify **one** benefit and **one** drawback of this way of storing the data.

Benefit

Drawback

[2]