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COMPUTER SCIENCE

9618/22

Paper 2 Fundamental Problem-solving and Programming Skills

October/November 2025

2 hours

You must answer on the question paper.

You will need: Insert (enclosed)

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use an HB pencil for any diagrams, graphs or rough working.
- Calculators must **not** be used in this paper.

INFORMATION

- The total mark for this paper is 75.
- The number of marks for each question or part question is shown in brackets [].
- No marks will be awarded for using brand names of software packages or hardware.
- The insert contains all the resources referred to in the questions.

This document has **20** pages. Any blank pages are indicated.



Refer to the **insert** for the list of pseudocode functions and operators.

- 1 (a) The table contains pseudocode examples.

Each example may contain statements that relate to one or more of:

- selection
- iteration (repetition)
- subroutines (procedures or functions).

Complete the table by placing **one or more** ticks ('✓') in each row.

Pseudocode example	Selection	Iteration	Subroutine
IF Status = FALSE THEN FOR Count ← 1 TO 20 CALL Reset (Count) NEXT Count ENDIF			
OTHERWISE : Status ← TRUE			
WHILE AllDone () = TRUE			
30 : NextChar ← 'X'			

[4]

- (b) Complete the table by giving the appropriate data type.

Variable	Example data value	Data type
Result	5.42	
MonthLetter	"JFMAMJJASOND"	
Birthday	15/11/2009	

[3]

- (c) Evaluate each expression in the table by using the data values shown in (b).

Write 'ERROR' if the expression contains an error.

Expression	Evaluates to
INT (Result) + 1 > 6	
NUM_TO_STR (LENGTH (MonthLetter))	
NUM_TO_STR (Result + "3.2")	
MID (MonthLetter, MONTH (Birthday) - 2, 1)	

[4]



2 Data is a global 1D array containing 20 elements of type REAL

An algorithm will:

- input a sequence of real values, one at a time
- assign each value to consecutive array elements, starting from index 1
- end when the value 99.9 is input, or all 20 elements have been assigned (the value 99.9 must **not** be stored in the array).

Complete the program flowchart to represent the algorithm:



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3 A text file `OldFile.txt` contains IDs, names and email addresses for members of a club. Three information items are stored for each member and each item is stored on a separate line.

The example shows the information for the first two members in the first six lines of the file:

Line in file	Information item	Example data
1	member 1 ID	"AB1234"
2	member 1 name	"Freddie Jones"
3	member 1 email address	"FreddieJ909@Cambridge.org"
4	member 2 ID	"BC2345"
5	member 2 name	"Sue Smith"
6	member 2 email address	"Sue1024@Cambridge.org"

The member ID string is always two letters followed by four digits.

The file design is to be changed so that information for each user is stored as a single line of the file, with the character `'\'` used as a separator between data items.

For example, the single line for member 1 will be:

`"AB1234\Freddie Jones\FreddieJ909@Cambridge.org"`

An algorithm will produce a new file `NewFile.txt` from the contents of `OldFile.txt`

Assume:

- `LineX`, `LineY` and `LineZ` are of type `STRING` and are used to store the three items of information for each member
- `NewString` is a temporary variable of type `STRING`
- `OldFile.txt` exists and contains valid data.

(a) The algorithm to create the new file is expressed in steps.

Complete the following numbered steps:

- Step 1 : open the file in
- Step 2 : open the file in
- Step 3 : read a line from and store in
- Step 4 : read a line from and store in
- Step 5 : read a line from and store in
- Step 6 : set `NewString` to
- Step 7 : write `NewString` to
- Step 8 : repeat from step until
- Step 9 : close both files.





(b) The character '\ ' has been chosen as a separator.

Explain why this is a suitable character.

.....
..... [1]

(c) Two new information items are to be stored for each member. Both new items are encrypted; they can each contain any character (including '\ ') and can be of any length up to a maximum of 99 characters.

For example:

Information item	Example data
member 1 ID	"AB1234"
member 1 name	"Freddie Jones"
member 1 email address	"FreddieJ909@Cambridge.org"
member 1 new information 1	"En/98&* (?\ /D7iP"
member 1 new information 2	"23\CoboL"

Explain the additional file design changes needed so that:

- all the information items for each member are stored on a single line of `NewFile.txt`
- it is possible to extract each information item after the line is read.

Assume the '\ ' character is not used in any email address.

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..... [3]

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(b) The pseudocode represents an algorithm to set the appropriate elements of the array to TRUE

Complete the pseudocode:

DECLARE EasyQ, HardQ : INTEGER

FOR EasyQ ← TO 15 STEP

FOR HardQ ← 0 TO STEP

CheckTotal[.....] ← TRUE

NEXT HardQ

NEXT EasyQ

[5]

(c) The array elements have been assigned the required values.

A module ValidateScore() will take an integer value representing a total score as a parameter. It will return TRUE if the total score is valid, or FALSE if it is not valid.

Describe the algorithm for ValidateScore() using four steps.

Do not use pseudocode in your answer.

Step 1

.....

Step 2

.....

Step 3

.....

Step 4

.....

[4]

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5 A program is developed to satisfy a specific customer requirement.

The project follows a program development life cycle model. This model divides the development process into several different stages.

(a) The table lists some of the development activities.

Complete the table by writing the name of the life cycle stage for each activity:

Activity	Name of life cycle stage
a structure chart is produced	
a program is modified to allow it to run on new hardware	
the programmer identifies the customer's requirements	
an Integrated Development Environment (IDE) provides context-sensitive help such as 'auto-complete'	

[4]

(b) Alpha and beta testing has been completed. The final testing stage is carried out by the customer.

Identify this final testing stage.

..... [1]



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6 A string function `Compare()` will compare two strings.

The function will:

- take **four** parameters:
 - two strings, `String1` and `String2`
 - a character, `Position`, to indicate whether `String1` will be compared with the start ('s'), or the end ('e') of `String2`
 - a Boolean, `CaseMatters`, to indicate whether an upper case character and lower case character (for example, 'A' and 'a') are regarded as different (`TRUE`), or as the same (`FALSE`)
- return `FALSE` if `String2` has fewer characters than `String1`
- return `TRUE` if the comparison is true, otherwise return `FALSE`

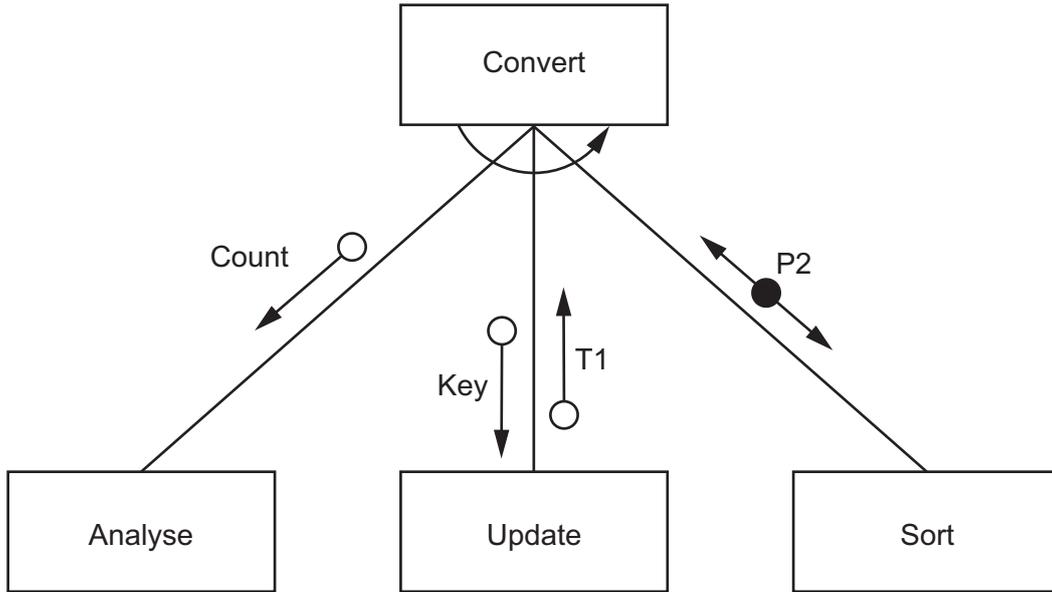
For example:

Parameter				Return value
String1	String2	CaseMatters	Position	
"Cat"	"Catalogue"	TRUE	's'	TRUE
"CAT"	"Catalogue"	TRUE	's'	FALSE
"CAT"	"Catalogue"	FALSE	's'	TRUE
"Cat"	"Catalogue"	TRUE	'e'	FALSE
"GUE"	"Catalogue"	FALSE	'e'	TRUE
"Catalogue"	"Cat"	TRUE	's'	FALSE





7 The structure chart shows part of a program design:



(a) Explain the meaning of the curved arrow symbol in this structure chart.

.....

.....

.....

..... [2]

(b) The program designer has noted that:

- Count is the number of elements in an array
- T1 is a value representing the number of elements in an array that have been modified
- Key is of type `STRING`

Write the pseudocode module headers for analyse, update and sort.

Analyse:

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Update:

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Sort:

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[4]



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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
<code>CountLoans()</code>	<ul style="list-style-type: none"> called with a parameter of type <code>STRING</code> representing a <code>StudentID</code> 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





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

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

A new module is defined:

Module	Description
<code>NewLoan()</code>	<ul style="list-style-type: none"> called with two parameters of type <code>STRING</code> representing a <code>StudentID</code> and a <code>BookID</code> searches the array for an unused loan record if found, updates the loan record and returns <code>TRUE</code>, otherwise returns <code>FALSE</code>





(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.

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.....

..... [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

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Use

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..... [2]

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