

# QUESTION 7.



2 A programmer uses an Integrated Development Environment (IDE) for all program development.

(i) Describe what is meant by an IDE.

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.....  
.....[2]

(ii) Name **three** features you would expect to be available in an IDE to help initial error detection or debugging.

1 .....  
.....  
2 .....  
.....  
3 .....  
.....[3]





The program records the following data for each product:

- product code
- product description
- product retail price

The text file `PRODUCTS` stores each data item on a separate line, as shown below:

File `PRODUCTS`

0198
Plums (10kg)
11.50
0202
Onions (20kg)
10.00
~
0376
Mango chutney (1kg)
02.99
~
0014
Mango (10kg)
12.75

The program uses the variables shown in the identifier table.

Identifier	Data type	Description
<code>PRODUCTS</code>	TEXT FILE	Storing the code, description and retail price for all current products
<code>PCode</code>	ARRAY[1:1000] OF STRING	Array storing the product codes
<code>PDescription</code>	ARRAY[1:1000] OF STRING	Array storing the product descriptions
<code>PRetailPrice</code>	ARRAY[1:1000] OF REAL	Array storing the product retail prices
<code>i</code>	INTEGER	Array index used by all three arrays



- (i) The first operation of the program is to read all the product data held in the file PRODUCTS and write them into the three 1D arrays.

Complete the pseudocode below.

```

OPEN .....
i ← 1
WHILE .....
    READFILE ("PRODUCTS", ..... )
    READFILE ("PRODUCTS", ..... )
    READFILE ("PRODUCTS", ..... )
    .....
    .....
ENDWHILE
CLOSE "PRODUCTS"
OUTPUT "Product file contents written to arrays"
    
```

[5]

When Ahmed designed the PRODUCTS file, he considered the alternative file structure shown opposite.

It stores one product per line in the text file.

File PRODUCTS

0198	Plums (10kg)	11.50
0202	Onions (20kg)	10.00
~		
0376	Mango chutney (1kg)	02.99
~		
0014	Mango (10kg)	12.75

- (ii) State **one** benefit and **one** drawback of this file design.

Benefit .....

.....

Drawback .....

..... [2]



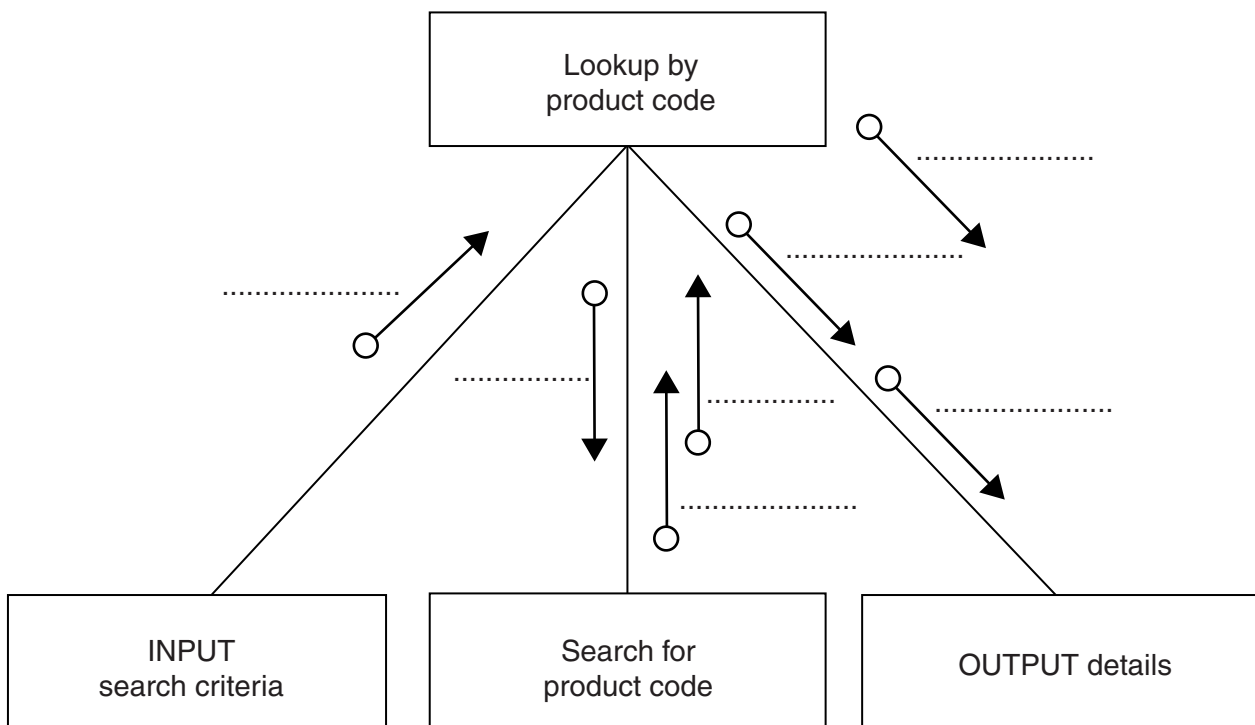
(d) To code the 'Search by product code' procedure, Ahmed draws a structure chart with different stages.

The procedure uses the variables shown in the identifier table.

Identifier	Data type	Description
SearchCode	STRING	Product code input by the user
ThisIndex	INTEGER	Array index position for the corresponding product
ThisDescription	STRING	Product description found
ThisRetailPrice	REAL	Product retail price found

You can assume that before the procedure is run, all the product data is read from file PRODUCTS and then stored in three 1D arrays as described in **part (c)(i)**.

Label the structure chart to show the input(s) and output(s).



[4]







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..... [8]





- (b) The value of `UserID` should be unique for each user but a problem has occurred and repeated `UserID` values may have been issued.

The array is sorted by `UserID`, so any repeated `UserID` values will appear in consecutive array elements.

A procedure, `FindRepeats` is required.

This will:

- compare each element with the previous element and output the `UserID` and `UserName` if the `UserID` is repeated
- output the total number of `UserIDs` that are repeated.

For example, the `UserNameArray` contains the following entries.

Array element	Comment
<code>123456</code>	
<code>122222Jim Moriarty</code>	
<code>123456</code>	
<code>123456Fred Smith</code>	
<code>123456Eric Sykes</code>	Repeated User ID
<code>123456Kevin Turvey</code>	Repeated User ID
<code>222244</code>	
<code>222244Alice Chan</code>	
<code>222244Myra Singh</code>	Repeated User ID
<code>333333</code>	
<code>333333Yasmin Halim</code>	
<code>444444</code>	

For this example, the output is:

```
123456Eric Sykes
123456Kevin Turvey
222244Myra Singh
There are 3 repeated UserIDs
```

If no repeated `UserIDs` are found, the output is:

```
The array contains no repeated UserIDs
```





(c) (i) The `FindRepeats` procedure forms part of a program.

Name **three** stages in a program development cycle.

- 1 .....
- 2 .....
- 3 ..... [3]

(ii) The program containing `FindRepeats` will be created using an IDE.

State what is meant by IDE.

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

(iii) Name **two** features provided by an IDE that assist in the program development cycle.

- 1 .....
- .....
- 2 .....
- ..... [2]

(iv) The procedure, `FindRepeats`, is written assuming there are 100 elements in `UserNameArray`.

In the main program, the global array, `UserNameArray`, has been declared with only 50 elements.

State the type of error this will cause.

- ..... [1]

## QUESTION 10.



- 4 Programming languages provide built-in functions to generate random numbers. To be truly random, the frequency of each number generated should be the same.

You are required to write program code to test the random number generator of your language.

The test should:

- generate a given number of random numbers between 1 and 10 inclusive
- keep a count of the number of times each number is generated
- calculate the expected frequency of each number 1 to 10
- output the actual frequency of each number 1 to 10
- output the difference between the actual frequency and the expected frequency.

The program code should be written as a procedure. In pseudocode, the procedure heading will be:

```
PROCEDURE TestRandom(Repetitions AS INTEGER)
```

The parameter, *Repetitions*, contains a value representing the total number of random numbers that should be generated.

The following example shows the expected output for the procedure call, `TestRandom(200)`.

The expected frequency is 20.

Number	Frequency	Difference
1	17	-3
2	21	1
3	12	-8
4	28	8
5	20	0
6	19	-1
7	21	1
8	16	-4
9	24	4
10	22	2





(b) Name **three** features of a typical IDE that would help a programmer to debug

Explain how each of these could be used in the debugging of the `TestRandom` from **part (a)**.

Feature 1 .....

Explanation .....

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Feature 2 .....

Explanation .....

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Feature 3 .....

Explanation .....

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[6]

(c) The procedure is developed and run using the call `TestRandom(200)`. No system errors are produced.

To ensure that the procedure works correctly, you need to check the output.

Describe **two** checks you should make to suggest the program works correctly.

1 .....

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2 .....

.....

.....

[2]





(c) The student is learning about file handling.

She has been told that there are different file modes that can be used when opening a file. She wants to make sure that the existing contents are not deleted when the file is opened.

Identify **two** file modes she could use **and** describe their use.

Mode .....

Description .....

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Mode .....

Description .....

.....

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[4]

(d) The student has completed the design of her program and is ready to use an Integrated Development Environment (IDE).

Describe the features of an IDE that she can use to write, translate and test her program.

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[3]





**Question 3 begins on the next page.**

## QUESTION 12.



- 2 (a) A structure chart is often used in modular program design. One feature shown in the chart is the sequence of module execution.

State **four** other features that may be shown.

Feature 1 .....

.....

Feature 2 .....

.....

Feature 3 .....

.....

Feature 4 .....

.....

[4]

- (b) Identify and describe **one** feature of an Integrated Development Environment (IDE) that can help with **program presentation**.

Feature .....

Description .....

.....

[2]

- (c) **By value** is one method of passing a parameter to a subroutine.

Identify and describe the other method.

Method .....

Description .....

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[2]

- (d) Explain the term **adaptive maintenance**.

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[2]

