1 A program is being developed to help the manager of a shop control the stock.

(a) An identifier table has been used during the design stage.

Complete the identifier table:

Example value	Explanation	Variable name	Data type
`"Fruit"`	a category of stock that is sold in the shop		
`20/02/2025`	when an item was sold		
`12.67`	the cost of an item		
`TRUE`	to indicate if an item is in stock		

[4]

(b) A module `Sales()` is part of the stock control program.

The table contains pseudocode extracts from the module `Sales()`

Each extract may include all or part of:

- assignment
- selection
- iteration (repetition).

Complete the table by placing one or more ticks (✓) in each row:

Pseudocode extract	Assignment	Selection	Iteration
`Result ← CalculateTotal()`			
`WHILE IsClosed`			

`REPEAT`
`  INPUT Value`
`UNTIL Sales[4] > Value`			

`IF Sales[Current] <= 150 THEN`
`  Discount ← TRUE`
`ENDIF`			

`CASE OF Option`			

[5]

(c) Decomposition has been used to design the program to help the shop manager control the stock.

Describe decomposition.

.....

.....

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.....

.....

..... [3]

7 A coffee shop runs a computerised loyalty card system.

Customers are issued with a loyalty card with their name together with a unique customer ID.

Loyalty points are added to their card each time they spend money at the shop.

The following information is stored for each customer: ID, name, home address, email address, mobile phone number, date of birth, number of points, date of last visit and amount of money spent at last visit.

A new module will generate a personalised email message to each loyalty card customer who has not visited the coffee shop in the last three months. The message will include a unique voucher code which can be used to authorise a discount if the customer goes to the shop within the next two weeks.

(a) Identify **three** items of customer information that will be used by the new module **and** justify your choices.

Item 1 .....

Justification .....

.....

Item 2 .....

Justification .....

.....

Item 3 .....

Justification .....

.....

[3]

(b) Identify the computational thinking skill that you needed to use to answer part **(a)**.

..... [1]

(c) It is decided to adopt a formal program development life cycle model for the development of the new module.

The analysis of the new module is complete and the project moves on to the design stage. During this stage all the necessary algorithms and module designs will be defined.

State **three other** items that will be defined for the new module during the design stage.

1 .....

2 .....

3 .....

[3]

(d) Part of the coffee shop program contains three program modules as follows:

- Module `Init()` has no parameters and returns a Boolean.
- Module `Reset()` takes a string as a parameter and returns an Integer.
- Module `Check()` repeatedly calls `Init()` followed by `Reset()`.

Draw a structure chart to represent the relationship between the **three** modules, including all parameters and return values.

[3]

7 A coffee shop owner wants to introduce a computerised loyalty card system.

A programmer discusses the details of the system with the shop owner.

(a) Identify the stage of the program development life cycle that this discussion is part of **and** give a document that will be produced during this stage.

Stage .....

Document .....

.....

[2]

(b) The shop will give each customer a loyalty card that displays a unique customer ID as a bar code. A customer will be able to present their card each time they make a purchase. The system will scan the bar code, calculate points, and add them to the customer's total. When the customer next makes a purchase and presents their card, they will have the option to exchange points for a discount.

The designer decides that this activity will be handled by a new module. Decomposition will be used to break the problem of designing the new module down into sub-problems (sub-modules).

Identify **four** sub-modules that could be used in the design of the new module **and** describe their use.

Sub-module 1 .....

Use .....

.....

Sub-module 2 .....

Use .....

.....

Sub-module 3 .....

Use .....

.....

Sub-module 4 .....

Use .....

.....

[4]

7 A fitness club has a computerised membership system. The fitness club offers a number of different exercise classes.

The following information is stored for each club member: name, home address, email address, mobile phone number, date of birth and the exercise(s) they are interested in.

(a) When an exercise class is planned, a new module will send personalised text messages to each member who has expressed an interest in that exercise. Members wishing to join the class send a text message back. Members may decide **not** to receive future text messages by replying with the message 'STOP'.

The process of abstraction is used to filter out unnecessary information.

(i) State **one** advantage of applying abstraction to this problem.

.....

..... [1]

(ii) Identify **three** items of information that will be required by the new module.
Justify your choices with reference to the given scenario.

Item 1 required .....

Justification .....

.....

Item 2 required .....

Justification .....

.....

Item 3 required .....

Justification .....

.....

[3]

(iii) Identify **two** operations that would be required to process data when the new module receives a text message back from a member.

Operation 1 .....

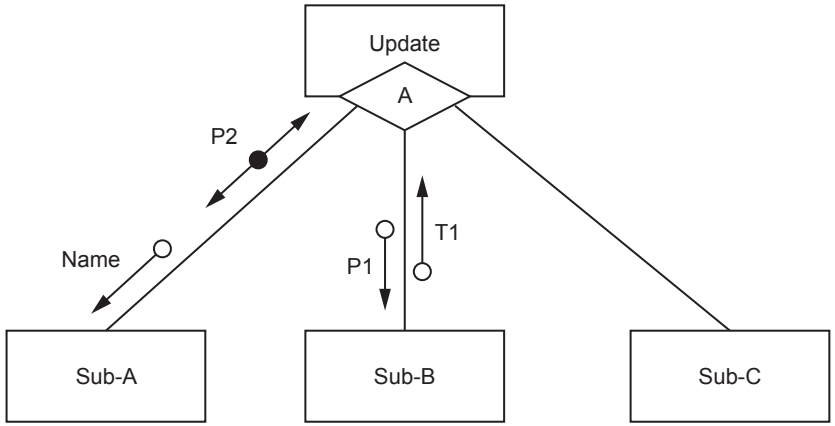
.....

Operation 2 .....

.....

[2]

(b) The structure chart illustrates part of the membership program:



Data item notes:

- Name contains the name of a club member
- P1 and T1 are of type real.

(i) Explain the meaning of the diamond symbol (labelled with the letter A) in the chart.

.....

.....

.....

..... [2]

(ii) Write the pseudocode module headers for Sub-A and Sub-B.

Sub-A

.....

.....

Sub-B

.....

.....

[4]

7 A fitness club has a computerised membership system.

The system stores information for each club member: name, home address, email address, mobile phone number, date of birth and exercise preferences.

Many classes are full, and the club creates a waiting list for each class. The club adds details of members who want to join a class that is full to the waiting list for that class.

When the system identifies that a space is available in one of the classes, a new module will send a text message to each member who is on the waiting list.

(a) Decomposition will be used to break the new module into sub-modules (sub-problems).

Identify **three** sub-modules that could be used in the design **and** describe their use.

Sub-module 1 .....

Use .....

.....

.....

.....

Sub-module 2 .....

Use .....

.....

.....

.....

Sub-module 3 .....

Use .....

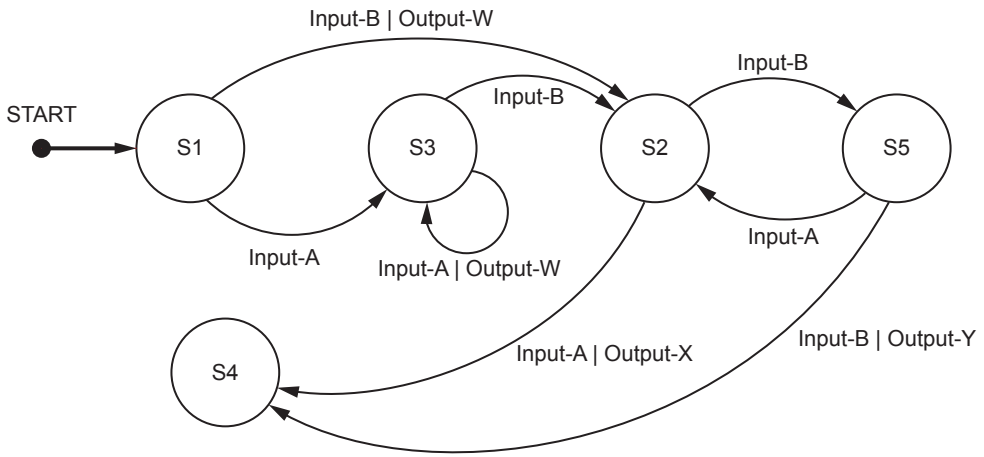
.....

.....

.....

[3]

(b) A different part of the program is represented by the following state-transition diagram.



(i) Complete the table to show the inputs, outputs and next states.

Assume that the current state for each row is given by the 'Next state' on the previous row. For example, the first Input-A is made when in state S1.

If there is no output for a given transition, then the output cell should contain 'none'.

The first two rows have been completed.

Input	Output	Next state
		S1
Input-A	none	S3
	Output-W	
	none	
Input-B		
Input-A		
		S4

[5]

(ii) Identify the input sequence that will cause the minimum number of state changes in the transition from S1 to S4.

..... [1]