Task 2: software design and development (part A)

A new coffee shop is organising an event for its opening day. At this event, a lucky-dip promotion will be available, where customers can win a discount off their bill.

Below is the analysis and design for a program to calculate customers' bills:

Program analysis
A program is required to calculate a customer's bill. The user will enter the number of items on the bill and then enter the item type for each item (coffee, tea or biscuit). The program will calculate the bill. The bill can then be reduced by using a random value from 1 to 10:

- random value = 1 the customer pays nothing
- random value = 2 to 6 the customer pays half the bill
- random value = 7 to 10 the customer pays the full bill

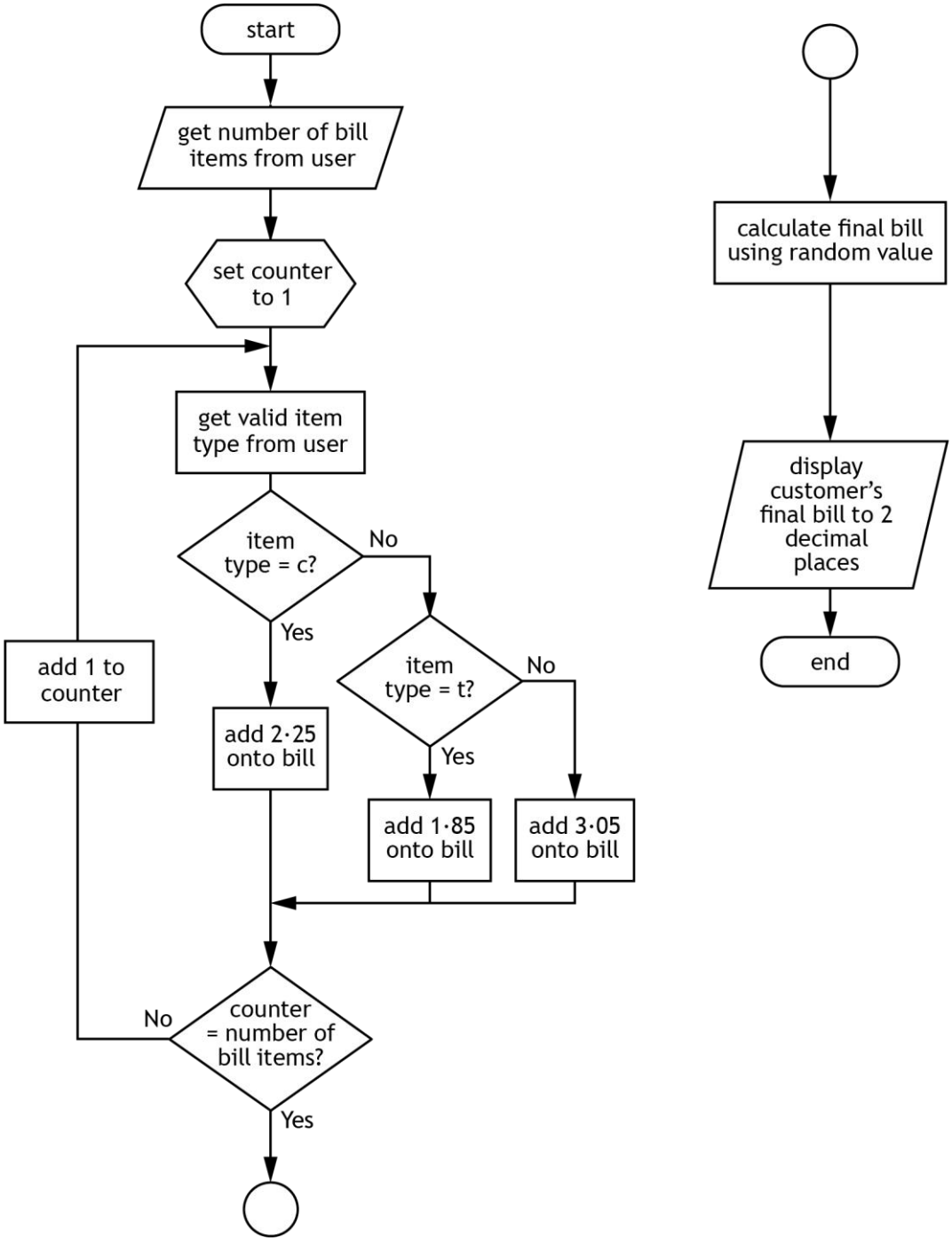
Assumptions
- any number of items can be entered by the user

Inputs
- the number of items on the bill
- the item type for each item on the bill
  - c = coffee
  - t = tea
  - b = biscuit

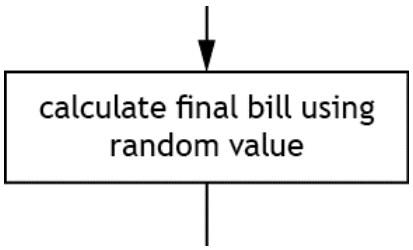
Processes
- generate a random value between 1 and 10
- calculate the total cost of the items on the bill where:
  - coffee = £2.25
  - tea = £1.85
  - biscuit = £3.05
- use the random value to calculate the final bill

Outputs
- the random value
- the cost of the final bill

Program design (flowchart)



2a The flowchart contains the following process:



Using the information provided in the program analysis, expand the design to show how this process could be carried out. You can use a flowchart, structure diagram or pseudocode design.

(3 marks)

- Check your answers carefully, as you cannot return to part A after you hand it in.
- When you are ready, hand part A to your teacher or lecturer and collect part B.

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Task 2: software design and development (part B)

Program design (completed flowchart)

2b Using the program analysis and the design, implement the program in a language of your choice.

Ensure the program matches the flowchart provided on page 17.

(15 marks)

Print evidence of your program code.

2c (i) Your program should be tested to ensure it produces one of three different random outputs.

Use the following data to do this:

Number of items: 4
Item 1: coffee
Item 2: tea
Item 3: tea
Item 4: biscuit

State the possible values (outputs) for the final bill produced from this test data.

Run your program to show that it produces one of these three outputs.

Print evidence of the test run showing inputs and outputs.

(2 marks)

(ii) Complete the test table below to check the validation for the item type.

Type of test	**Test data**	
Normal	Number of items – 3	c, t, b
Exceptional	Number of items - 1	

Run your program to show the result of the exceptional test data.

(1 mark)

Print evidence of the test run.

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2d With reference to your code, evaluate your program by commenting on the following:

Efficiency of your program code **(2 marks)**
Robustness of your completed program **(1 mark)**
Readability of your code **(1 mark)**

Candidate name_____ Candidate number_____