Mark schemes

**Q1.**

(a)     **All marks AO2 (apply)**

|  |  |
| --- | --- |
| **Input string** | **Accepted by FSM?** |
| 111011x | NO |
| 1110x | YES |
| 111001x | NO |

**Mark as follows:**

**1 mark:** one row correct

**2 marks:** all rows correct

**2**

(b)     **All marks AO2 (apply)**

|  |  |
| --- | --- |
| Strings that start with zero or more 1s; | **A.** starts with any number of 1s as BOD |
| which may or may not be followed by a 0; | **A.** there can be at most one 0 in the string |
| and end with an x; | **A.** 'end' being by implication |

**NOTE:** 'ending with either x or 0x' **is worth two marks**

**NOTE:** **MAX 2** if answer is not fully correct

**3**

**[5]**

**Q2.**

**6 marks for AO2 (analyse)**

Graphical user interface, table

Description automatically generated

**1 mark** per group of correct labels:

X, W

F, D

H, I, G

Y, Z

E, C **A.** € ©

A, B

I. brackets around letters

**R.** any labels used more than once

**Max 5** if any errors

**[6]**

**Q3.**

(a)  **3 marks for AO2 (apply)**

|  |  |  |
| --- | --- | --- |
| **X** | **Result** | **Output** |
| 0 | 0 | - |
| 4 | 4 |  |
| 6 | 10 |  |
| 3 | 13 |  |
| 2 | 15 |  |
| −1 | 14 | 14 |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**1 mark** for correct X column (4, 6, 3, 2, -1);

**1 mark** for correct Result column (4, 10, 13, 15);

**1 mark** for final Result value (14) and Output column (14);

**Max 2** if any errors

**3**

(b)  **2 marks for AO2 (analyse)**

The result is wrong // The sentinel value should not have been used in the calculation; Subtract the last value // input first value before the WHILE loop and swap the instructions within the WHILE loop // add 1 to result after loop is finished;

**A.** not add the value if it is the sentinel value

**2**

**[5]**

**Q4.**

(a)  **All marks for AO2 (apply)**

**Table

Description automatically generated**

**1 mark** for correct x column and MyValue column;

**1 mark** for correct y column (0, 1, 0, -1);

**1 mark** for correct Boolean values in columns 4 and 6;

**A.** TRUE/true, FALSE/false, Yes/No, Y/N and any other suitable indicators

**1 mark** for final contents of Numbers correct;

**4**

(b)  **Mark is for AO2 (analyse)**

sort from largest to smallest;

**NE** Sort on its own

**A.** bubble sort;

**1**

**[5]**

**Q5.**

(a)     **Mark is for AO1 (understanding)**

Any number from the set of natural numbers;

{0,1,2,3,....}

**1**

(b)     **Mark is for AO1 (understanding)**

Any number from the set of irrational numbers;

Examples: square root of 2, pi, Euler's number (e)

**1**

**[2]**

**Q6.**

**2 marks are for AO2 (apply)**

110;01011;

**[2]**

**Q7.**

(a)     Analogue;

**1**

(b)     Converts analogue signals into digital (signals); digitises signal;

Transforms the analogue input into digital form;

**A** data instead of signal

**1**

**[2]**