# Homework 4: Testing

1. An algorithm has been written to calculate the average of a set of numbers entered by the user. Each data item should be an integer value between 0 and 100.

(i) List **five** data items that you would use to test the routine, stating in each case the purpose of the test. [5]

(ii) Do these tests comprehensively test the algorithm? If not suggest an additional test that would test some previously untested aspect of the program, explaining what this is. [2]

2. The following algorithm counts the number of gaps in a piece of text held in an array ***sentence***. A gap is defined as one or more spaces. For example, (represent a space with a dot • for clarity), the sentence “I•am•••late•for••class” has four gaps.

Assume that sentence [i] is the ith character of the sentence

gapcount = 0

previousCharSpace = FALSE

FOR i = 1 to len(sentence)

IF sentence[i] = “ ” THEN

IF previousCharSpace = FALSE THEN

gapcount = gapcount + 1

ENDIF

previousCharSpace = TRUE

ELSE

previousCharSpace = FALSE

ENDIF

ENDFOR

OUTPUT gapcount

If the array ***sentence*** contains the characters “Good••to•go” (where the dots are used here for clarity to represent spaces, but will be held as spaces in the array) complete a trace table showing the contents of each variable as it changes. The column headings and the first line of the trace table are given below. [5]

|  |  |  |  |
| --- | --- | --- | --- |
| **i** | **sentence.char(i)** | **gapcount** | **PreviousCharSpace** |
| **1** | **G** | **0** | **FALSE** |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

3. The following algorithm is intended to determine whether an element is in a solid, liquid or gaseous state. Temperatures are accurate only to the nearest integer.

OUTPUT “Please enter temperature in celsius”

temperature = int (USERINPUT)

IF temperature >= -273 and temperature <= 25

OUTPUT “Solid”

ELSE

IF temperature >26 and temperature < 40

OUTPUT “Liquid”

ELSE

IF Temperature >= 40

OUTPUT “Gas”

ELSE

OUTPUT “Not found”

(i) Complete the following test plan, adding 4 more useful tests. [6]

(ii) Which of the tests gives an unexpected result? [1]

(iii) Correct the line in the algorithm which contains a logic error. [1]

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Test** | **Test data** | **Reason for test** | **Expected result** | **Actual result** |
| 1 | -7 | Boundary data | Solid | Solid |
| 2 | -6 |  |  | Not found |
| 3 | 30 |  |  | Liquid |
| 4 |  |  |  |  |
| 5 |  |  |  |  |
| 6 |  |  |  |  |
| 7 |  |  |  |  |

[Total 20 marks]