**Question 3**

Blair is working towards achieving his ‘Community Volunteer’ badge at Scouts. To gain the award he must complete 10 volunteer sessions that are over 2 hours long.   
Blair has designed a program that will read details of previous volunteer sessions from a text file, ask him to enter any new sessions and then tell him if he has completed 10, 2 hours sessions. If he has the program should list all the sessions over 2 hours so that he can take the list to his Scout leader. The program will also write any new sessions entered to the text file.   
An example of how the data will be organised in the text file is shown below.

Tennis Coaching,153

Church Café,180

Tennis Coaching,95

volunteering activity

Sample Text File (comma separated)

time in minutes

Blair’s design for the program is shown below.

1. initialise required variables and data structures
2. read all volunteer sessions from text file and store in two arrays
3. ask for and store any new volunteer sessions (validate all inputs)
4. count the number of volunteer sessions that are over 2 hours long
5. if there are over 10, 2 hour sessions counted: display a list of all the sessions (activity and time) over 2 hours
6. write any new sessions to the text file

a) Using as many rows in the table as you think you require, list all the variables and arrays that should be declared to implement step 0 of the algorithm. You should include their data types. (3)

|  |  |  |
| --- | --- | --- |
| Name | Variable or Array | Data Type |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

b) The data input of any new volunteer sessions, in line 2 of the algorithm, should be ‘validated’.   
Define suitable ‘valid values’ for the two inputs and describe how you would ensure only valid values are entered by the user. (2)

Input 1: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Input 2: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

c) Using pseudocode or in a programming language of your choice, write code in the box below to show how step 3 of the algorithm would be implemented as a function. You should include:

* any appropriate variables and arrays you named in question a)
* parameter passing of values
* a suitable name for the function (7)

function for step 3 of algorithm

d) Step 1 of the algorithm describes reading data from a text file and step 5 describes writing data to the text file. When implementing these two steps what must be done at the beginning of step 1 and what should be done at the end of step 5? (2)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

e) Using pseudocode or in a programming language of your choice, write code in the box below to show how step 5 of the algorithm would be implemented as a procedure. You should include:

* any appropriate variables and arrays you named in question a)
* parameter passing of values
* a suitable name for the procedure (7)

procedure for step 5 of algorithm