ID2090 : Introduction to Scientific Computing
2nd Semester (Mar-2022 to Jun-2023)

Assignment : 1

On “our Ubuntu VM” we configured for this course with the IP address 10.24.8.242, there are two directories at the following paths containing a bunch of test files.

```
/var/home/assignments/data-files
/var/home/assignments/tar-files
```

You have permission to read these files. Your assignment includes two steps – one to login to 10.24.8.242 and perform the tasks as given below; another to login to moodle and upload stuff to indicate you have submitted the assignment.

Important: (a) The scripts should be readily executable and should contain your roll number in lower case letters in one of the comment lines. (b) If the script is executed without any argument, it should exit elegantly by displaying a helpful line. (c) Assume that the path of the argument is either absolute or relative to the current directory. (d) Your script `assn1a.sh` shall have a comment line that contains your roll number in lower case. (e) Before submitting, make sure that your script works for all the test files provided in the above listed directories. (f) Your script will be tested against a new test file too – this will be similar but not identical to the available test files.

[Q1, 6 marks] Write a script that takes the name of any of the data files as a command line input and outputs the data as asked in the file itself. The file contains unknown number of header lines starting with the # character. The header is followed by unknown number of data lines in two or more columns. The header shall contain which column is taken as x, which as y. The output should contain three columns x, y, z separated by a space and ensuring that the value of z for each row is as given in the header. Assume that the formula for z will always be of the type z=a*x+b*y+c where a,b,c are real numbers as constants. An example usage of the script with a single argument (one of the files in the above mentioned directory) should be as follows:

Commands you run
`cd $HOME` `./assn1a.sh /var/home/assignments/data-files/data-file-1.txt`
Output expected, without the header lines and only the columns asked, is a file name as shown below. The output file will have three columns separated by a space. Your output file will be compared to that in the data-files folder. This comparison is not bit-by-bit but using the sum of square of differences of the third columns (total numerical error). This is to account for small numerical error in reading the numbers and writing them out in specific format with certain decimal places. The total numerical error shall be below a threshold for the script to pass the test.
`data-output-1.txt`

[Q2. 6 marks] Write a script that takes one of the tar file names as a command line input and outputs the file that is at the deepest level in the tar file. Assume that the directory level depth is relative to the current directory where the tar file would be untar-ed.

Commands you run
`cd $HOME` `./assn1b.sh /var/home/assignments/tar-files/t1.tar`
Output expected
`e1`

[Q2, 4 marks] In your `$HOME` directory, keep a file `assn1c.json` which should contain the following fields as described across. Once you create this json file, do not edit the script files because their MD5SUM would change.

JSON Field	Description
filename-a	Path of the script file (relative to your home directory) you are submitting for the assignment as listed above (string) (eg., `./assn1a.sh`)
size-a	Size of the file `./assn1a.sh` in bytes (integer)
md5sum-a	MD5SUM of the file `./assn1a.sh` (string)
filename-b	Path of the script file (relative to your home directory) you are submitting for the assignment as listed above (string) (eg., `./assn1b.sh`)
size-b	Size of the file `./assn1b.sh` in bytes (integer)
md5sum-b	MD5SUM of the file `./assn1b.sh` (string)
rollno	Your roll number in lower case letters as mentioned in one of the comments in the script file (string)
name	Your full name (string)
ip	Any one of the IP addresses from where you logged in to “our Ubuntu VM” to prepare this submission (string)

Note: (a) The json file will be parsed and verified irrespective of the script file working correctly or not. (b) Use the command “w” to see who is currently logged in and you can see the IP address from where you logged in under the column “FROM” against your username. (c) You can verify if your `assn1c.json` file is in the proper format using the site `https://jsonlint.com/`

Important:
Demonstrate the execution of the script on a terminal and take a screenshot. You will need to upload the screenshot on moodle to indicate that you have completed the assignment. Ensure that your screenshot contains a timestamp using the command “`date`”.

Do not delete the files in your `$HOME` folder meant for assignment until the course evaluation is complete.

--- end of Assignment 1 ---