

This is **not** a collaborative assignment; you must design, implement and test the solution(s) on your own. You may not consult or work with anyone other than the course instructor or TAs. In addition, you may not include solutions or portions of solutions obtained from any source other than those provided in class. Obtaining or *providing* solutions to any homework problems for this class is considered academic misconduct. If you are not sure what this means, consult the class syllabus or discuss it with the course instructor.

This assignment requires writing a single Python script that must be submitted online *prior* to the due date/time. Late submissions will not be accepted. Name your source code: `hw4.py` Submit your source code file using the appropriate homework submission link on the Moodle website.

The total point value for programming assignments will be awarded for solutions that are *complete, correct, and well constructed*. A "well constructed" program entails good design, appropriate comments and general readability (descriptive names for variables and procedures, appropriate use of blank space, etc.). The following will result in a score reduction equal to a percentage of the total possible points:

- Incorrectly named/submitted source file (10%)
- Constraints not followed (40%)
- Failure to execute due to syntax errors (30%)

Note that your work will be graded using, and must function correctly with, the current version of Python 3 on CSE Labs UNIX machines. If you complete your programming assignment using a different system, it is your responsibility to ensure your programs work on CSELabs machines *prior* to submitting them.

#### A. (20 points) **Summary Statistics**

Write a Python program that will input student test scores, store them in a list and then compute and output the following summary statistics: number of scores entered, maximum score, minimum score, average score, and the population standard deviation of the entered scores.

The "population" *standard deviation* of a collection of scores is a measure of variation defined as:

$$\sqrt{\frac{1}{N} \sum_{i=1}^N (x_i - \mu)^2}$$

Where  $x_i$  are the individual scores,  $N$  is the total number of scores and  $\mu$  is the *mean* score (average).

Your program must do the following:

- Implement a while loop to enter as many scores as the user wishes and construct a list of the entered score values (integers). Terminate data entry when the user enters a sentinel value consisting of any negative score.
- As each score is entered, verify that it is in the range [0,100] and do not add any invalid scores to the list.
- Compute and output the summary statistics as described above. Determine the minimum and maximum values without sorting the list in any way or using the `min()` and/or `max()` functions.

Constraints:

- Use only while loops in your program (no for loops, no user defined functions)
- Do not import any modules; use only built-in functions and simple arithmetic operations
- The only list method you are allowed to use is `.append()`, which may be used to create the score list

- Do not use the built-in functions min(), max() or sorted()
- Do not use any math module functions.

Example:

```
Enter a score: 10
Enter a score: 20
Enter a score: 105
Invalid score... re-enter
Enter a score: 30
Enter a score: 20
Enter a score: 10
Enter a score: -1
-----
Number of scores: 5
Maximum score: 30
Minimum score: 10
Average score: 18.0
Standard dev.: 7.48
```