

## Assignment IV (Array)

*Submit all the programs separately against each assignment in the Moodle System. Provide the result in a separate output file (named, result\_<assgn><no>.txt). Use standard output redirection feature to generate the output file.*

*Hints. If you run the program with the following command*

```
./a.out >result.txt
```

*Output of your program (generated by printf(.) function) will be written in the file result.txt. You need to provide input from your keyboard, by remembering the sequence of inputs to be given or writing them in a text file in the same sequence.*

*Otherwise you may use the redirection for the standard input file, such as,*

```
./a.out <input.txt
```

*For the above all your printing by printf(.) function would be displayed on your monitor.*

*For both reading from a file and writing to a file use the following.*

```
./a.out <input.txt >result.txt
```

*If you execute the program multiple times, you may concatenate the outputs in a single file by using the following redirection command:*

```
./a.out >>result.txt
```

*or*

```
./a.out <input.txt >> result.txt
```

---

1. Write a program, which reads unit prices of N (to be read) items in INR in an array of real number. The program also reads another array of size N, where it stores the number of units to be procured for the items maintaining the same order of price list. It should print the following:  
(i) Maximum unit price from the list, (ii) total cost of procurement (iii) total number of items procured, and (iv) the item for which the maximum amount of INR is spent.

For example, for 3 items (N=3), the unit price list (in INR) and the number of items to be procured are given as follows:

Unit Price List: 1000.00, 1200.00, 800.00

Number of items to be procured: 5, 3, 0

For the above input the program prints the following:

- (i) Maximum unit price: Rs. 1200.00
- (ii) Total cost of procurement: Rs. 8600.00
- (iii) Total number of items procured: 8
- (iv) The item for which the maximum expenditure is made: Item 1.

Provide output for the following input data set. Assume that the sequence of unit prices preserve the order of number of items procured:

(i) N=5

Unit Price List: 5.0, 12.54, 50.65, 27.85, 19.34

Number of items to be procured: 10, 32, 0, 25, 18

(ii) N=10

Unit Price List: 15.0, 102.65, 77.25, 18.34, 19.85, 8.25, 32.83, 125.00, 45.34, 16.86

Number of items to be procured: 15, 25, 20, 0, 10, 12, 0, 8, 35, 30

2. Write a program to read scores (an integer within [0,100]) of a subject for N (to be read) students in a class. Compute the mean( $\mu$ ) and standard deviation ( $\sigma$ ) of the distribution and print them. The students are graded according to the following policy. Suppose x is the score of a student then the grade awarded to the student would be as follows:

EX, if  $x \geq \mu + 1.5 * \sigma$

A, if  $\mu + 0.5 * \sigma \leq x < \mu + 1.5 * \sigma$

B, if  $\mu - 0.5 * \sigma \leq x < \mu + 0.5 * \sigma$

C, if  $\mu - \sigma \leq x < \mu - 0.5 * \sigma$

D, if  $\mu - 1.5 * \sigma \leq x < \mu - \sigma$

P, if  $\mu - 2 * \sigma \leq x < \mu - 1.5 * \sigma$

F, if  $x < \mu - 2 * \sigma$

In the output file, print the mean and standard deviation of the distribution. Print also the list of score and grade for each student in each separate line in the same sequence as they are read.

For example, if the input is given in the following form:

N=5

45, 23, 80, 20, 75

The outputs are printed as follows:

Mean=48.6

Standard Deviation=28.15

Marks and grades of students are:

45 B

23 C  
80 A  
20 D  
75 A

Provide output for the following input data set.

(i) N=10

Students' scores: 23, 35, 12, 56, 75, 84, 23, 90, 95, 65

(ii) N=20

Students' scores: 32, 53, 21, 65, 57, 48, 32, 9, 59, 56, 75, 43, 52, 64, 85, 12, 18, 25, 92

3. Read N (to be read) 2-D coordinate points in a 2-D array, where the  $i$ th row represents the  $i$ th point, and first and second columns represent x and y coordinates in real numbers, respectively. It also reads another value T ( a real number), which decides whether two points are close or not. If the Euclidean distance between two points are less than T, the points are declared as close. Compute the pairs of points (in any order) which are close. Print also the closest and furthest pair among them.

For example:

N=4

The list of points: (0,0), (1,0), (1,2), (2,1)

T=1.5

The output from the program would be as follows:

List of close pairs: ((0,0),(1,0)), ((1,0),(2,1)), ((1,2),(2,1))

Closest pair: ((0,0),(1,0))

Furthest pair: ((0,0),(2,1)) [or ((0,0),(1,2))]

Provide output for the following input data set.

(i) N=4

The list of points: (1,1), (5.87,5), (1,10.45),(10,1)

T=10.0

(ii) N=8

The list of points: (-1,45.4), (5.8,5), (8,9.45), (-5.12,-67), (3,45.89), (-4,-4.6), (12,-50.12),(50,-50)

T=12.0

N.B. Your program may be tested with other input data set.