CENG113 Computer Programming **I**

PROBLEM SET 8

One Dimensional Arrays and Methods

1. Consider the following method and the following arrays:

```
static int met1 (int[] X, int[] Y, int z)
      {
           int v, k;
           v = 0;
           for (k = 0; k < z; k++)
              v = v + X[k] * Y[k];
           return(v);
      }
```

M	N	L
3	2	4
1	4	-1
-3	-1	-2
8	2	0
0	4	5
-4	3	-2
2	0	10

Find the result of each of the following method calls, and determine what the method does.

i) met1 (M, N, 7) **ii)** met1 (L, M, 5) **iii)** met1 (N, L, 6) **iv)** met1 (N, N, 4)

2. Define a method for each of the following problems:

a) Find the maximum value in a one-dimensional array.

b) Find the minimum value in a one-dimensional array.

c) Find the index of the maximum value in a one-dimensional array.

d) Find the index of the minimum value in a one-dimensional array.

e) Find the maximum value in a one-dimensional array, using the method you defined in question **3.c**.

f) Find the minimum value in a one-dimensional array, using the method you defined in question **3.d**.

g) Find the sum of a one-dimensional array's elements.

h) Find the average of a one-dimensional array's elements, using the method you defined in question **3.g**.

i) Find the standard deviation of a one-dimensional array's elements, using the method you defined in question **3.h**.

j) Find the position of a given integer in an array if it exists, return –1 otherwise.

k) Count the number of occurences of a given number in a one-dimensional array.

l) Find the dot product of two vectors. If A and B are two vectors:

Dot Product of A and B = $\sum A_i B_i$

m) Read the elements of a one-dimensional character array until a sentinel value is entered.

n) Given a one-dimensional character array, output its elements.

o) Given a one-dimensional character array, output its elements in the reverse order.

p) Check whether a given character exists in a one-dimensional character array.

q) Find the number of uppercase letters in a one-dimensional character array, and their positions within the array.

r) Find the number of lowercase letters in a one-dimensional character array, and their positions within the array.

s) Read a list of integers until a certain sentinel value is entered.

t) Display a list of integers.

u) Join two integer lists and create a new list.

v) Separate evens and odds in a list of integers.

3. Analyze the following problems and develop a program for each of them, using the methods you defined in Question 2, where necessary.

a) Given the exam grades of 100 students within a file, find how many students got the average grade.

b) Given the exam grades of 40 students within a file, output only the grades below the average if the average of the exam is less than 50, otherwise output only the grades above the average.

c) A student takes 0 from an exam only if he did not take the exam. Given the exam grades of 70 students taking a course, within a file, display the number of students who did not take the exam.

d) A student passes a course if his overall grade is 50 or more. Given the IDs and midterm1, midterm2 and final exam grades of 75 students taking a course, within a file, calculate the overall grade of each student using 0.3, 0.3 and 0.4 as the weight of each exam, respectively. Display the standard deviation of each exam and the standard deviation of overall grades, and write the IDs of the students who passed that course in a file and the IDs of the students who failed in another file.

e) Given the ID's and exam grades of 150 students taking a course, within a file, display the average and the standard deviation of the exam, and the IDs of the students who got the largest and lowest grade of the exam.

f) Given the exam grades of 80 students taking a course, within a file, find the average of the exam, excluding the largest and lowest grades of the exam.

g) Resolve all of the questions above, assuming that you don't know the number of students, but you are sure that there are at most 200 students.

h) Within a file, you are given the ID's and salaries of 100 employees working in a company, followed by a list of employee ID's who are promoted and so are given a 10% salary increase. Display a table showing the ID's, old salaries and new salaries of the promoted employees.

i) Given a list of characters, ending with & sign, display that list in the order that it is entered if the list includes the % sign, display the list in the reverse order otherwise.

j) Given two sentences, first ending with a question mark (?), second ending with a full-stop (.), if the number of uppercase letters in the first sentence is more than the number of lowercase letters in the second sentence, display the first sentence; if the number of lowercase letters in the first sentence is more than the number of uppercase letters in the second sentence, display the reverse of the first sentence; otherwise display the positions of the uppercase and lowercase letters in the first sentence (if any).

k) Given two sentences, both ending with a full-stop (.), if the number of uppercase letters in the first sentence is less than the number of lowercase letters in the second sentence, display the second sentence; if the number of lowercase letters in the first sentence is less than the number of uppercase letters in the second sentence, display the reverse of the second sentence; otherwise display the positions of the uppercase and lowercase letters in the second sentence (if any).

l) Given two lists of positive integers, each list ending with -1, and creates two lists, first one containing all even numbers, the second one containing all odd numbers in both lists.

m) Given 100 numbers within a file, display the negative numbers and positive numbers as separate lists, and find the sum of the negative numbers, average of the positive numbers, number of zeros, maximum negative number, and minimum positive number.