Programming Fundamentals – Spring 2013
(BS-SE-F12 Morning & Afternoon)
Lab # 4

Instructions:

- Indent your code properly.
- Use meaningful variable names. Follow the naming conventions.
- Use meaningful prompt lines/labels for all input/output that is done by your programs.

Task # 1

Write a C++ program which takes the name of a file from the user, opens that file, and determines various statistics about the contents of that file. For example, if the file **input.txt** contains the following lines of text:

```
abc	dEF
Gh J!^&@8
Mn
```

the output of your program will look like this (text shown in red is entered by the user):

```
Enter the name of file: input.txt

No. of Lines: 3

Total Characters: 20
No. of white-space characters: 4
No. of printable characters: 16

No. of capital alphabets: 4
No. of small alphabets: 7
No. of digits: 1
```

Note: *that in the file* ***input.txt*** *shown above, there is a Tab between abc and dEF on the first line.*

Task # 2

Write a C++ program which determines the median of all the numbers present in a text file (**numbers.txt**). The median is the number that has the same number of data elements greater

than the number as there are less than the number. For purposes of this problem, you can assume that the numbers stored in the input file and sorted in increasing order.

If there are an odd number of elements, then the median is the middle element of the input file. If the number of elements is even, then the median is the average of the two middle elements of the file.

Hint: *You will need to open the file, count the numbers, close the file and calculate the location of the middle of the file, open the file once again, count up to the file entries you need, and determine the median.*

For example, if the input file **numbers.txt** contains the following elements:

3 4 6 8 10 14 19 56 99

Then, the median is **10**.

On the other hand, if the file **numbers.txt** contains the following elements:

4 8 12 27 35 48

Then, the median is **19.5** (i.e. (27+12)/2).

Task # 3

Assume that you have a text file **words.txt** which contains several words (one on each line). Write a C++ program which takes a word from the user and then searches the given word in this file. The program should display the line numbers of all the lines on which the given word occurs, as well as the total number of times that word occurs in the input file. For example, if the file **words.txt** contains the following words:

Apple
Mango
Banana
Apple
Apple
Banana
Orange
Mango
Apple
Guava

the output of your program will look like this (text shown in red is entered by the user):

Enter the word that you want to search: Apple

The word "Apple" occurs on these lines:
Line 1
Line 4
Line 5
Line 9

Total occurrences: 4

Note: *The search should be case-sensitive.*

Task # 4

The factorial of a nonnegative integer *n* is written *n*! (Pronounced "*n* factorial") and is defined as follows:

$$n! = n \times (n-1) \times (n-2) \times \ldots \times 1 \qquad \text{for values of } n \text{ greater than 1}$$

and

$$n! = 1 \quad (\text{for } n = 0 \text{ or } n = 1)$$

Your program should take *n* (which should be an integer value) as input from the user. Then, it should calculate the value of *n*! (using the above formula) and display it on screen.

Enter the value of "n": 3

Factorial of 3: 6

Good Luck!!