Assignment VI

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
```

(a) Write a program, which has a recursive function f(n) as defined below:

f(n) = 0, for n<0

= 1, for n=0

= f(n-2) -2* f(n-1) + f(n-3), otherwise

Note that n is an integer argument and f(n)returns an integer value.

The program computes the following expression using f(n):

f(0)+f(1)+f(2)+ ….. for M terms (M to be read)

The program prints the value of the expression and also the number of times recursive calls invoked while computing the expression.

Hints: Use a global variable to keep count of the number of recursive calls within the function f(n).

Run your program for the following input data set and provide the results with input datasets in a separate output file.

(i) M=5, and (ii) M=10.

(b) Write a recursive function named *sum_digits(.)* for computing sum of digits of a positive integer (up to six digits long). Read a list of positive integers in an array and print the number(s) which has (have) the maximal sum of digits.

Run your program for the following input data set and provide the results with input datasets in a separate output file.

(i) 35, 467, 1234, 89, 145, 912, 0, 1000, 10000

(ii) 856, 1000, 94, 19, 205, 489, 75, 57

(c) Write a recursive C function *digit_reverse(.)* that takes a positive integer (up to six digits long) as argument, and returns another integer where the digits are reversed. For example, if the number passed as argument is 2371, the value returned will be 1732. Write a main function that uses "digit_reverse" to determine, if a given number is a palindrome. A palindrome is one which reads the same forward or backward (like 120021, 234, 5, etc.).

Read a list of positive numbers in an array and print them after reversing their digits. Further report the palindromes and the number of palindromes.

Run your program for the following input data set and provide the results with input datasets in a separate output file.

(i) 1456, 100, 1001, 23432, 156, 789, 4502

(ii) 8000, 80008, 23657, 78986, 23032, 10010