Programming Language 1[EEE] Assignments Final-term

Due date: 09.12.2021

Instruction: put all C and .txt files in a folder (folder name: ID) and I will discuss about submission process in the class.

1. 40 students in a class appeared in their examination. Their mark sheets have been given to you. The grade column of the mark sheet contains the Grade (A, B, C or F) obtained by the student. Write a function to calculate the total number of students who got F grade. Use Array to store grade [char grade [40]].

```
Grade.txt
B
A
```

2. There are 100 employees in an organization. The organization wants to distribute annual bonus to the employees based on their performance. The performance of the employees is recorded in their annual appraisal forms. Every employee's appraisal form contains his basic salary and the grade for his/her performance during the year. The grade is of three categories – 'A' for outstanding, 'B' for good and 'C' for average performance. It has been decided that the bonus of an employee will be 100% of the basic salary for outstanding performance, 70% of the basic salary for good performance, and 40% of the basic salary for average performance and zero for all other cases. Write a function to calculate and print the total bonus amount to be distributed by the organization. Use Arrays [double salary[100], char performance[100]].

```
salary.txt
5000  A
4000  B
```

3. The dot product of two vectors a = $[a_0, a_1 \dots, a_n]$ and b = $[b_0, b_1 \dots, b_n]$ is defined as: $a.b = \sum_{i=1}^{n} a_i b_i$, magnitude of a vector $|a| = \sqrt{{a_0}^2 + {a_1}^2 + \cdots + {a_n}^2}$ and angle(in radian*180/pi=degree) between two vectors, $\theta = \cos^{-1} \frac{a.b}{|a||b|}$.
   Write function to calculate the dot product of two vectors and angle between them. [Use two arrays].
4. Generate 100 random integer and 100 random floating point numbers and save them in separate file. Write two separate functions to generate numbers and save integer in integer.txt, float in float.txt.
5. The greatest common divisor (GCD) of two or more integers, which are not all zero, is the largest positive integer that divides each of the integers. For example, the GCD of 8 and 12 is 4, that is, gcd(8,12)=4. Euclid's algorithm is given in the pseudocode. Write the following algorithm in recursively.

```
1. input n,m
2. if n = m then STOP
3. if n is greater then m: do n = n-m
4. else do m = m-n
5. GOTO 2
6. print n or m
```

6. Create dynamic Matrix A[5x3]using malloc and assign random value in the Matrix. Take size(nxm) input from user. Find the transpose of the Matrix.

7. Write a program that takes input your name, id and department from keyboard and write those to a file (your_name.txt). Hints: your name, id and department instead of following.

```
Richard.txt
Richard Philip
1909-1997-2
Computer science
```

8. A dice was rolled 100 times and save each outcome in a text file (dice.txt) and calculates the frequency and probability of each outcomes using C program. (Rolling one dice by choosing one of the integers 1, 2, 3, 4, 5, or 6 at random).
9. Monthly rainfall data of 1970 of different station is given. Data column as follows:
   Use the structure and following code to read the dada.

```
struct Rain{
    int year;
    char station[40];
    int month;
    int rainfall;
    int stationindex;
};
struct Rain r[264];
freopen("customized_daily_rainfall_data.txt","r",stdin);
for(int i=0;i<264;i++){
  scanf("%d%s%d%d%d",&r[i].year,r[i].station,&r[i].month,&r[i].rainfall,&r[i].stationindex);
}
```

   a. Write a function to find average rainfall of Chittagong in 1970.
   b. Write a function to find average rainfall of Dhaka in 1970.

10. List of input and a function is given bellow. Find the list of corresponding output.

```
double input[9]={-4,-3,-2,-1,0,1,2,3,4}
double output[9];
```

    The function is f1(x)=1/1+ex(-x).