

**Name: Swarnabh Paul**

**Section: Y**

**Roll no: 19CS8122**

**Assignment no: 1**

**Questions attempted:**

**a,b,c,d,e**

# Question (a)

## Code:

```
#include<iostream>
#include<fstream>
#include<string>
#include<algorithm>
using namespace std;
string largeAdd(string, string);
int main()
{
    string n1, n2, res;
    cout<<"Input first number: ";
    cin>>n1;
    cout<<"Input second number: ";
    cin>>n2;
    res=largeAdd(n1,n2);
    cout<<"Result is: "<<res;
    ofstream fout;
    fout.open("sum.txt",ios::out);
    fout<<res;
    fout.close();
    return 0;
}
string largeAdd(string n1, string n2)
{
    int l1=n1.length(), l2=n2.length(), c=0, i=0;
    string res="";
    reverse(n1.begin(), n1.end());
    reverse(n2.begin(), n2.end());
    while(i<l1&& i<l2)
    {
        res+=(char) (((c+(int) ((n1[i]-'0')+(n2[i]-'0')))%10)+'0');
        c=(c+(int) ((n1[i]-'0')+(n2[i]-'0')))/10;
        i++;
    }
    while(i<l1)
    {
        res+=(char) (((c+(int) (n1[i]-'0')))%10)+'0');
        c=(c+(int) (n1[i]-'0'))/10;
        i++;
    }
    while(i<l2)
    {
        res+=(char) (((c+(int) (n2[i]-'0')))%10)+'0');
        c=(c+(int) (n2[i]-'0'))/10;
        i++;
    }
    if(c)
    {
        res+=(char) (c+'0');
    }
    reverse(res.begin(), res.end());
    return res;
}
```

**Output:**

Input first number: 2345

Input second number: 9876

Result is: 12221

# Question (b)

## Code:

```
#include<iostream>
#include<stdio.h>
#include<string>
#include<string.h>
using namespace std;
string copyString(char*);
void display(string[],int);
void indent(string name)
{
    FILE *f=fopen(name.c_str(),"r");
    if(f==NULL)
    {
        cout<<"File does not exist.";
        return;
    }
    string s[1000];
    char temp[1000];
    int n=0, i, tab=0;
    while(fgets(temp,1000,f)!=NULL)
    {
        s[n]=copyString(temp);
        if(s[n][0]=='}')
        {
            tab--;
        }
        for(i=0;i<tab;i++)
            s[n]='\t'+s[n];
        if(s[n][tab]=='{')
        {
            tab++;
        }
        n++;
    }
    fclose(f);
    display(s,n);
    f=fopen("indent.c","w");
    for(i=0;i<n;i++)
        fprintf(f,"%s",s[i].c_str());
    fclose(f);
}

int main()
{
    string s;
    cout<<"Enter filename to be scanned (with extension): ";
    cin>>s;
    indent(s);
    return 0;
}

string copyString(char *temp)
{
    int i, n=strlen(temp);
    string s;
```

```

        for (i=0; i<n; i++)
            s+=temp[i];
        return s;
    }
    void display(string s[], int n)
    {
        int i;
        cout<<"Displaying indented code:\n\n";
        for (i=0; i<n; i++)
            cout<<s[i];
    }

```

### **Output:**

Enter filename to be scanned (with extension):

FirstC++Code(FahrenheitToCelsius).cpp

Displaying indented code:

```

#include<iostream>
#include<conio.h>
using namespace std;
int main()
{
    int far;
    float cel;
    char ch;
    do
    {
        cout<<"Enter temperature in fahrenheit: ";
        cin>>far;
        cel=(float) (far-32)*(5.0/9);
        cout<<far<<" far = "<<cel<<" cel"<<endl;
        cout<<"Want to continue: <y/n> ";
        cin>>ch;
    }while(ch=='y'||ch=='Y');
    return 0;
}

```

# Question (c)

## Code:

```
#include<iostream>
#include<stdlib.h>
#include<time.h>
#include<iomanip>
unsigned long int myrand(unsigned long int);
using namespace std;
int main()
{
    unsigned long int myRandNum, sysRandNum, myseed;
    int o1[5], o2[5];
    double chi1, chi2;
    time_t seconds;
    int n, i;
    seconds=time(NULL);
    cout<<"The time as seed: "<<seconds<<endl;
    myseed=seconds;
    srand(seconds);
    cout<<"How many numbers?: ";
    cin>>n;
    cout<<setw(40)<<"Nos. generated by myrand() "<<setw(40)<<"Nos. generated
by rand() "<<endl;
    for(int i=0;i<5;i++)
        o1[i]=o2[i]=0;
    for(int i=1;i<=n;i++)
    {
        myseed=myrand(myseed);
        myRandNum=(myseed%50)+1;
        sysRandNum=(rand()%50)+1;
        cout<<setw(40)<<myRandNum<<setw(40)<<sysRandNum<<endl;
        if(myRandNum<=10)
            o1[0]++;
        else if(myRandNum<=20)
            o1[1]++;
        else if(myRandNum<=30)
            o1[2]++;
        else if(myRandNum<=40)
            o1[3]++;
        else
            o1[4]++;
        if(sysRandNum<=10)
            o2[0]++;
        else if(sysRandNum<=20)
            o2[1]++;
        else if(sysRandNum<=30)
            o2[2]++;
        else if(sysRandNum<=40)
            o2[3]++;
        else
            o2[4]++;
    }
    chi1=chi2=0.0;
    for(i=0;i<5;i++)
```

```

    {
        chi1+=(((o1[i]-(n/5.0))*(o1[i]-(n/5.0)))/(n/5.0));
        chi2+=(((o2[i]-(n/5.0))*(o2[i]-(n/5.0)))/(n/5.0));
    }
    cout<<"Chi square test value of random nos. generated by myrand():
"<<chi1<<endl;
    cout<<"Chi square test value of random nos. generated by rand():
"<<chi2<<endl;
    if(chi1<23.6)
        cout<<"Chi square test value of myrand() is acceptable."<<endl;
    else
        cout<<"Chi square test value of myrand() is not acceptable."<<endl;
    if(chi2<23.6)
        cout<<"Chi square test value of rand() is acceptable."<<endl;
    else
        cout<<"Chi square test value of rand() is not acceptable."<<endl;
    return 0;
}
unsigned long int myrand(unsigned long int x)
{
    unsigned long long int m=2147483647, a=65539;
    unsigned long int r=(x*a)%m;
    return r;
}

```

### **Output:**

The time as seed: 1612588779

How many numbers?: 20

Nos. generated by myrand()	Nos. generated by rand()
24	44
30	35
2	41
13	40
4	9
35	40
34	19
20	13
16	43
14	16
15	13
6	18
15	46
9	6
48	34
27	33
16	35
3	10

2

10

2

34

Chi square test value of random nos. generated by myrand(): 8

Chi square test value of random nos. generated by rand(): 6.5

Chi square test value of myrand() is acceptable.

Chi square test value of rand() is acceptable.



# Question (d)

## Code:

```
#include<iostream>
#include<math.h>
#include<iomanip>
using namespace std;
void plotCosine();
void plotExponential();
int main()
{
    int choice;
    cout<<"Enter choice:\n1. Plot cosine\n2. Plot exponential\n";
    cin>>choice;
    for(int i=0;i<=110;i++)
        cout<<'=';
    cout<<endl;
    if(choice==1)
        plotCosine();
    else if(choice==2)
        plotExponential();
    else
        cout<<"Wrong choice.";
    return 0;
}
void plotCosine()
{
    int a, b, s, x, i;
    char c;
    cout<<"Enter the starting angle (in degrees): "; cin>>a;
    cout<<"Enter the ending angle (in degrees): "; cin>>b;
    cout<<"Enter the step length: "; cin>>s;
    cout<<"Enter the fill character: "; cin>>c;
    for(i=a;i<=b;i+=s)
    {
        x=floor(cos(i*3.14/180)*50);
        if(x>=0)
        {
            cout<<setw(55)<<setfill('
')<<'| '<<setw(x)<<setfill(c)<<'+'<<endl;
        }
        else
        {
            x=abs(x);
            cout<<setw(55-x)<<setfill('
')<<'+'<<setw(x)<<setfill(c)<<'| '<<endl;
        }
    }
}
void plotExponential()
{
    int a, b, s, x, i;
    char c;
    cout<<"Enter the starting coordinate: "; cin>>a;
    cout<<"Enter the ending coordinate: "; cin>>b;
```

```
cout<<"Enter the step length: ";      cin>>s;
cout<<"Enter the fill character: ";    cin>>c;
for(i=a;i<=b;i+=s)
{
    x=floor(exp(i));
    if(x>100)
        x=100;
    cout<<setw(5)<<setfill(' ')<<'| '<<setw(x)<<setfill(c)<<'+ '<<endl;
}
```

**Output(1):**

[illegible]

**Output(2):**

Enter choice:

1. Plot cosine
2. Plot exponential

2

```
Enter the starting coordinate: 0
```

```
Enter the ending coordinate: 10
```

Enter the step length: 1

```
Enter the fill character: *
```

```
+
*_+
*****_+
*****+_+
*****+_+
*****+_+
*****+_+
*****+_+
*****+_+
*****+_+
*****+_+
*****+_+
```

# Question (e)

## Code:

```
#include<iostream>
#include<iomanip>
using namespace std;
void printPattern(int);
int main()
{
    int n, i, j;
    cout<<"Enter n: ";
    cin>>n;
    printPattern(n);
    return 0;
}
void printPattern(int n)
{
    int i, j;
    for(i=1;i<=n;i++)
    {
        cout<<setw(i)<<i;
        for(j=i+1;j<=n;j++)
            cout<<j;
        j--;
        while(j>i)
        {
            j--;
            cout<<j;
        }
        cout<<endl;
    }
    for(i=1;i<n;i++)
    {
        cout<<setw(n-i)<<n-i;
        for(j=n-i+1;j<=n;j++)
            cout<<j;
        j--;
        while(j>n-i)
        {
            j--;
            cout<<j;
        }
        cout<<endl;
    }
}
```

**Output:**

Enter n: 5

123454321

2345432

34543

454

5

454

34543

2345432

123454321

# Extra Question (To find the factorial of a very large number n)

## Code:

```
#include<iostream>
#include<string>
#include<algorithm>
using namespace std;
string factorial(int);
string multiply(string,int,int*);
int main()
{
    int n;
    cout<<"Input n: ";
    cin>>n;
    string result=factorial(n);
    cout<<"Result is: "<<result<<endl;
    return 0;
}
string factorial(int n)
{
    string result="1";
    int len=1, i;
    for(i=1;i<=n;i++)
        result=multiply(result,i,&len);
    reverse(result.begin(),result.end());
    return result;
}
string multiply(string s,int x,int *len)
{
    int i, d, c=0;
    for(i=0;i<(*len);i++)
    {
        d=(int(s[i]-'0'))*x+c;
        c=d/10;
        d%=10;
        s[i]=char(d+'0');
    }
    while(c)
    {
        s+=char((c%10)+'0');
        c/=10;
        (*len)++;
    }
    return s;
}
```

**Output:**

Input n: 100

Result is:

9332621544394415268169923885626670049071596826438162146859296389521  
7599993229915608941463976156518286253697920827223758251185210916864  
000000000000000000000000