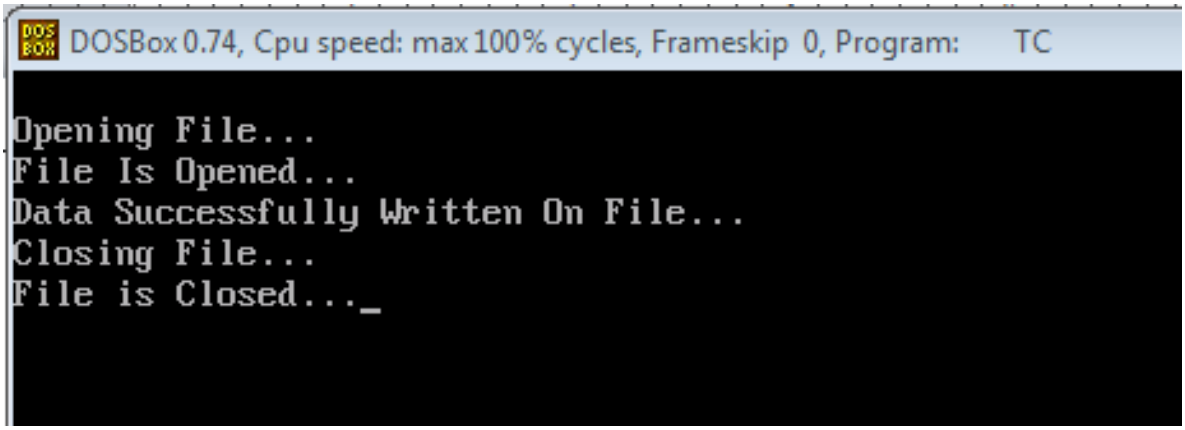
Pre-Assignment (Day 4): Advanced Data Structures

1. **Write a C++ program, which initializes a string variable to the content "The desire to learn should be stronger than the desire to live" and outputs the string to the disk file OUT.TXT. Include all the header files if required.**

Sol:

```
#include<iostream.h>
#include<conio.h>
#include<fstream.h>
void main()
{
        ofstream file;
        char str[100] = "The desire to learn should be stronger than the desire to
live";
        clrscr();
        cout<<"\nOpening File...";
        file.open("OUT.TXT");
        cout<<"\nFile Is Opened...";
        file<<str;
        cout<<"\nData Successfully Written On File...";
        cout<<"\nClosing File...";
        file.close();
        cout<<"\nFile is Closed...";
        getch();

}
```

O/p:


DOSBox 0.74, Cpu speed: max 100% cycles, Frameskip 0, Program: TC
Opening File...
File Is Opened...
Data Successfully Written On File...
Closing File...
File is Closed...

2. Declare a structure to represent a complex number (a number having a real part and imaginary part). Write C++ functions to add, subtract, multiply and divide two complex numbers.

Sol:

```
#include<iostream.h>
#include<conio.h>
void add()
{
        int r1,r2,r3,i1,i2,i3;
        cout<<"\nEnter 1st Complex Number: ";
        cout<<"\nEnter Real Part: ";
        cin>>r1;
        cout<<"Enter Imaginary Part: ";
        cin>>i1;
        cout<<"\nEnter 2nd Complex Number: ";
        cout<<"\nEnter Real Part: ";
        cin>>r2;
        cout<<"Enter Imaginary Part: ";
        cin>>i2;
        r3 = r1 + r2;
        i3 = i1 + i2;
        cout<<"\nAddition of Given Complex Numbers: ";
        cout<<endl<<"("<<r3<<") + ("<<i3<<")i";
}
void sub()
{
        int r1,r2,r3,i1,i2,i3;
        cout<<"\nEnter 1st Complex Number: ";
        cout<<"\nEnter Real Part: ";
        cin>>r1;
        cout<<"Enter Imaginary Part: ";
        cin>>i1;
        cout<<"\nEnter 2nd Complex Number: ";
        cout<<"\nEnter Real Part: ";
        cin>>r2;
        cout<<"Enter Imaginary Part: ";
        cin>>i2;
```

```
        r3 = r1 - r2;
        i3 = i1 - i2;
        cout<<"\nSubtraction of Given Complex Numbers: ";
        cout<<endl<<"("<<r3<<") + ("<<i3<<")i";
}
void mul()
{
        int r1,r2,r3,i1,i2,i3;
        cout<<"\nEnter 1st Complex Number: ";
        cout<<"\nEnter Real Part: ";
        cin>>r1;
        cout<<"Enter Imaginary Part: ";
        cin>>i1;
        cout<<"\nEnter 2nd Complex Number: ";
        cout<<"\nEnter Real Part: ";
        cin>>r2;
        cout<<"Enter Imaginary Part: ";
        cin>>i2;
        r3 = r1 * r2;
        i3 = i1 * i2;
        cout<<"\nMultiplication of Given Complex Numbers: ";
        cout<<endl<<"("<<r3<<") + ("<<i3<<")i";
}
void div()
{
        int r1,r2,r3,i1,i2,i3;
        cout<<"\nEnter 1st Complex Number: ";
        cout<<"\nEnter Real Part: ";
        cin>>r1;
        cout<<"Enter Imaginary Part: ";
        cin>>i1;
        cout<<"\nEnter 2nd Complex Number: ";
        cout<<"Enter Real Part: ";
        cin>>r2;
        cout<<"\nEnter Imaginary Part: ";
        cin>>i2;
        r3 = r1 / r2;
        i3 = i1 / i2;
        cout<<"\nDivision of Given Complex Numbers: ";
        cout<<endl<<"("<<r3<<") + ("<<i3<<")i";
```

```
}
void main()
{
	int ch;
	char ch2;
	clrscr();
	do
	{
		cout<<"\n1. Add Two Complex Numbers";
		cout<<"\n2. Subtract Two Complex Numbers";
		cout<<"\n3. Multiply Two Complex Numbers";
		cout<<"\n4. Divide Two Complex Numbers";
		cout<<"\nEnter Choice: ";
		cin>>ch;
		switch(ch)
		{
			case 1:	add();
				getch();
				break;
			case 2: sub();
				getch();
				break;
			case 3: mul();
				getch();
				break;
			case 4: div();
				getch();
				break;
			default:
				cout<<"\nInvalid Choice...";
				break;
		}
		cout<<"\nTry Again??? (Press y/Y - YES | n/N - NO): ";
		cin>>ch2;
	}while(ch2 == 'y' || ch2 == 'Y');
}
```

O/p:

```
DOSBox 0.74, Cpu speed: max 100% cycles, Frameskip  0, Program:    TC

1. Add Two Complex Numbers
2. Subtract Two Complex Numbers
3. Multiply Two Complex Numbers
4. Divide Two Complex Numbers
Enter Choice: 1

Enter 1st Complex Number:
Enter Real Part: 22
Enter Imaginary Part: 35

Enter 2nd Complex Number:
Enter Real Part: 53
Enter Imaginary Part: 12

Addition of Given Complex Numbers:
(75) + (47)i
Try Again??? (Press y/Y - YES | n/N - NO): y_
```

```
1. Add Two Complex Numbers
2. Subtract Two Complex Numbers
3. Multiply Two Complex Numbers
4. Divide Two Complex Numbers
Enter Choice: 2

Enter 1st Complex Number:
Enter Real Part: 12
Enter Imaginary Part: 44

Enter 2nd Complex Number:
Enter Real Part: 56
Enter Imaginary Part: 66

Subtraction of Given Complex Numbers:
(-44) + (-22)i_
```

```
1. Add Two Complex Numbers
2. Subtract Two Complex Numbers
3. Multiply Two Complex Numbers
4. Divide Two Complex Numbers
Enter Choice: 3

Enter 1st Complex Number:
Enter Real Part: 12
Enter Imaginary Part: 2

Enter 2nd Complex Number:
Enter Real Part: 54
Enter Imaginary Part: 21

Multiplication of Given Complex Numbers:
(648) + (42)i
```

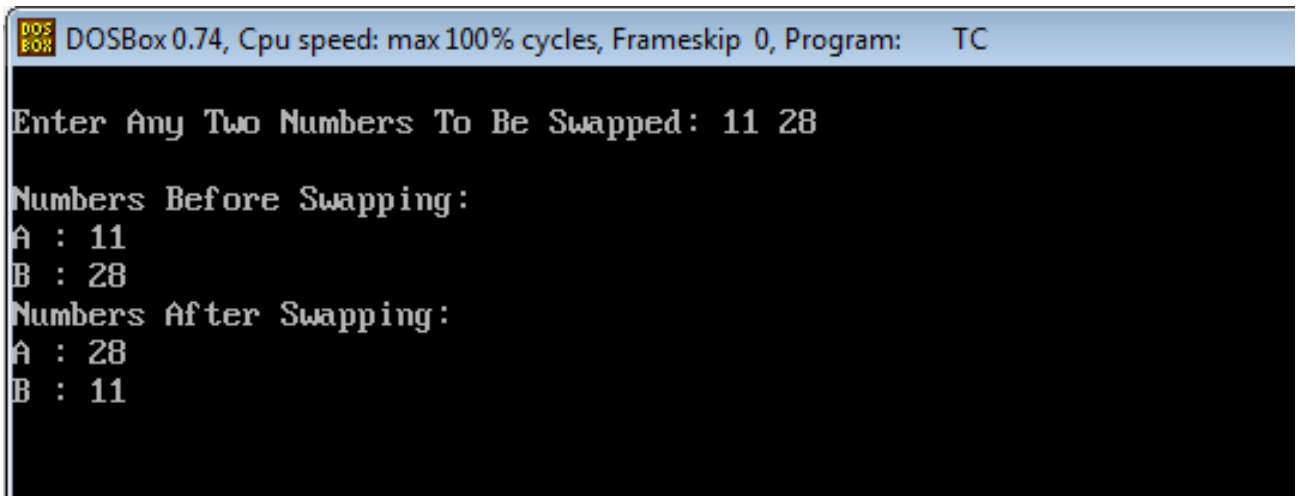
```
1. Add Two Complex Numbers
2. Subtract Two Complex Numbers
3. Multiply Two Complex Numbers
4. Divide Two Complex Numbers
Enter Choice: 4

Enter 1st Complex Number:
Enter Real Part: 88
Enter Imaginary Part: 56

Enter 2nd Complex Number: Enter Real Part: 2

Enter Imaginary Part: 8

Division of Given Complex Numbers:
(44) + (7)i
Try Again??? (Press y/Y - YES ¦ n/N - NO): n_
```

3. Write a program in C++ to swap values of two variables using pointers.

Sol:

```
#include<iostream.h>
#include<conio.h>
void main()
{
        clrscr();
        int *a, *b, *temp;
        cout<<"\nEnter Any Two Numbers To Be Swapped: ";
        cin>>*a>>*b;
        cout<<"\nNumbers Before Swapping: ";
        cout<<"\nA : "<<*a;
        cout<<"\nB : "<<*b;
        temp = a;
        a = b;
        b = temp;
        cout<<"\nNumbers After Swapping: ";
        cout<<"\nA : "<<*a<<"\nB : "<<*b;
        getch();
}
```

O/p:



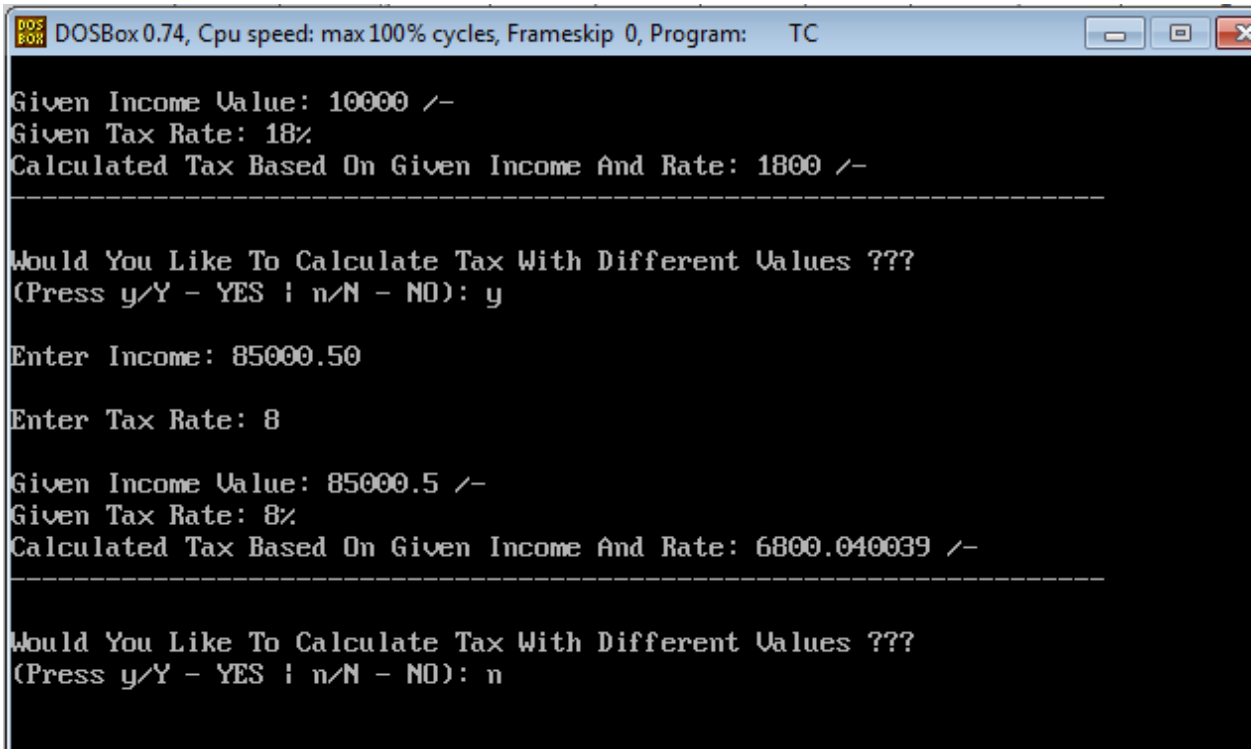
4. **Write the definition for a class called budget that has floating point data members income and tax. The class has the following member functions:**
   void show(float, float) to set the specified value in object
   void display() to display income and tax
   void calculate () to calculate tax on the basis of income (Rs 10000.0) and tax rate (18.0)

Sol:

```
#include<iostream.h>
#include<conio.h>
class Budget
{
        float income, tax;
        public:
                void show(float, float);
                void display();
                void calculate();
};
void Budget :: show(float incm, float tx)
{
        income = incm;
        tax = tx;
}
void Budget :: display()
{
        cout<<"\nGiven Income Value: "<<income<<" /-";
        cout<<"\nGiven Tax Rate: "<<tax<<"%";
}
void Budget :: calculate()
{
        float calc_tax;
        calc_tax = (income * tax) / 100;
        cout<<"\nCalculated Tax Based On Given Income And Rate:
"<<calc_tax<<" /-";
}
void main()
{
```

```
        Budget b;
        float incm,tx;
        char ch;
        clrscr();
        b.show(10000.0,18.0);
        b.display();
        b.calculate();
        do
        {
                cout<<"\n--------------------------------------------------------------------------";
                cout<<"\n\nWould You Like To Calculate Tax With Different Values
???";
                cout<<"\n(Press y/Y - YES | n/N - NO): ";
                cin>>ch;
                if(ch == 'y' || ch == 'Y')
                {
                        cout<<"\nEnter Income: ";
                        cin>>incm;
                        cout<<"\nEnter Tax Rate: ";
                        cin>>tx;
                        b.show(incm,tx);
                        b.display();
                        b.calculate();
                }
                else
                        break;
        }while(ch == 'y' || ch == 'Y');
}
```

O/p:


DOSBox 0.74, Cpu speed: max 100% cycles, Frameskip 0, Program: TC
Given Income Value: 10000 /-
Given Tax Rate: 18%
Calculated Tax Based On Given Income And Rate: 1800 /-
Would You Like To Calculate Tax With Different Values ???
(Press y/Y - YES ¦ n/N - NO): y
Enter Income: 85000.50
Enter Tax Rate: 8
Given Income Value: 85000.5 /-
Given Tax Rate: 8%
Calculated Tax Based On Given Income And Rate: 6800.040039 /-
Would You Like To Calculate Tax With Different Values ???
(Press y/Y - YES ¦ n/N - NO): n