



FAZAIA BILQUIS POST GRADUATE COLLEGE FOR WOMEN

PAF NUR KHAN

OBJECT ORIENTED PROGRAMMING

PROGRAMMING LAB: 1

LAB MANUAL

SUBMITTED TO: MAAM MEHWISH KANWAL

SUBMITTED BY:

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ROLL NUMBER:

37

CLASS:

BSCS

SEMESTER:

2ND

SECTION:

B



LAB TASK: 1

PROGRAMM IMPLIMENTATION

QUESTION: 1

Write a program that print number from 1 to 20 with the gap of 2.

SOLUTION:

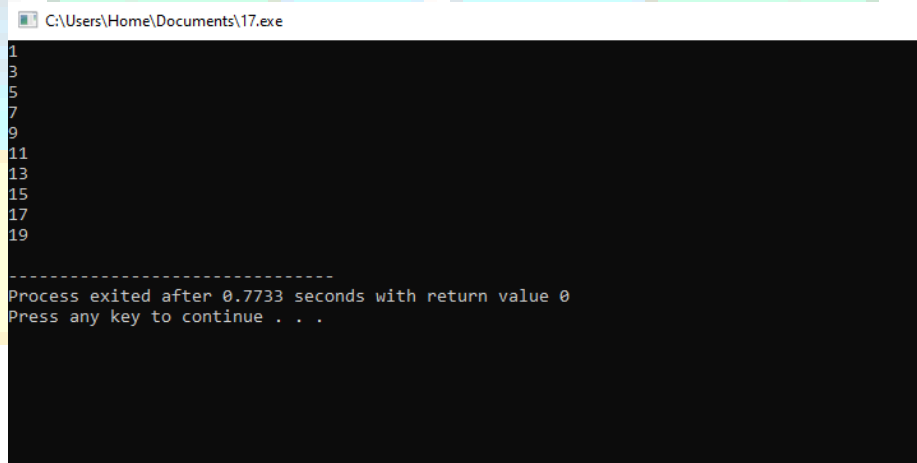
PROGRAM:

```
#include<iostream>

using namespace std;

int main()
{
    int a;
    for(a=1;a<=20;a+=2)
        cout<<a<<endl;
    return 0;
}
```

Output:



```
C:\Users\Home\Documents\17.exe
1
3
5
7
9
11
13
15
17
19
-----
Process exited after 0.7733 seconds with return value 0
Press any key to continue . . .
```

QUESTION: 2

Write a program that take following from the user like name, address, semester. Print on screen by concept of user defined function.

SOLUTION:

PROGRAM:

```
#include<iostream>

char name[14];
char address[20];
char semester[15];
void gets();
void print();
using namespace std;
int main()
{
    gets();
    print();
    return 0;
}

void gets()
{
    cout<<"Enter Name:";
    gets(name);
```

```
    cout<<"Enter Address:";

    gets(address);

    cout<<"Enter Semester:";

    cin>>semester;

}

void print()

{

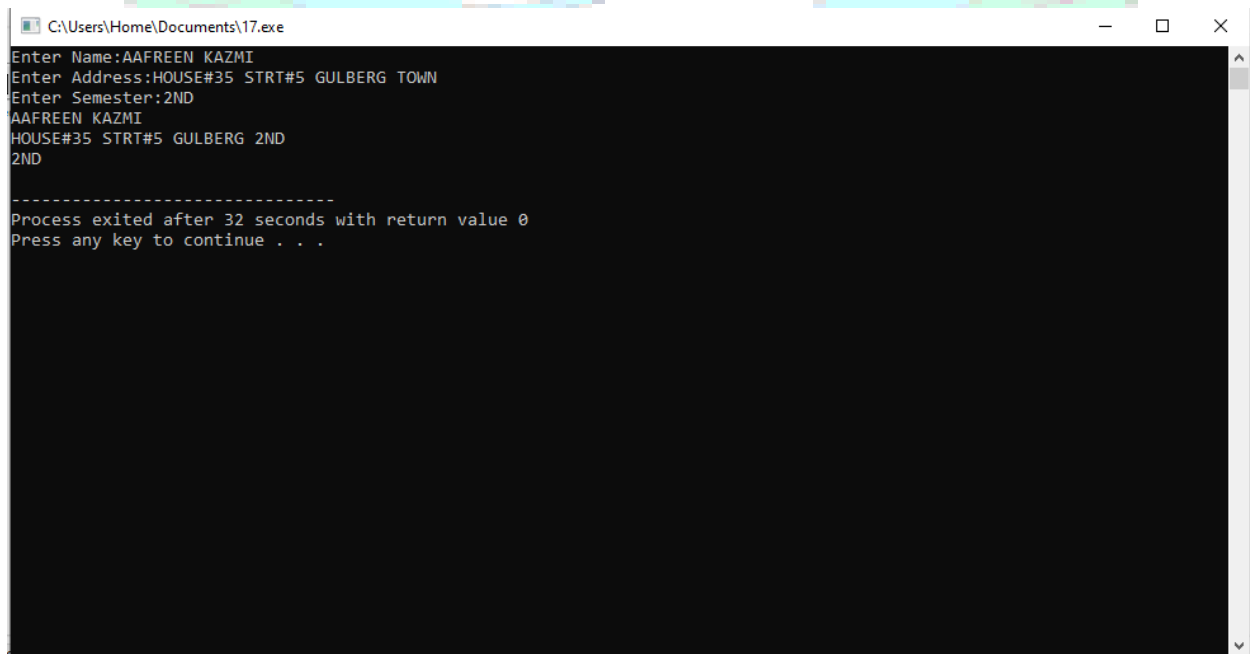
    cout<<name<<endl;

    cout<<address<<endl;

    cout<<semester<<endl;

}
```

Output:



```
C:\Users\Home\Documents\17.exe
Enter Name:AAFREEN KAZMI
Enter Address:HOUSE#35 STRT#5 GULBERG TOWN
Enter Semester:2ND
AAFREEN KAZMI
HOUSE#35 STRT#5 GULBERG 2ND
2ND

-----
Process exited after 32 seconds with return value 0
Press any key to continue . . .
```

QUESTION: 3

Write a program to create a simple arithmetic calculator by using user defined function.

SOLUTION:

• CALL BY VALUE:

PROGRAM:

```
#include<iostream>

using namespace std;

void addition(int,int);
void multiplication(int,int);
void division(int,int);
void subtraction(int,int);
void remainder(int,int);

int a,b;
char op;

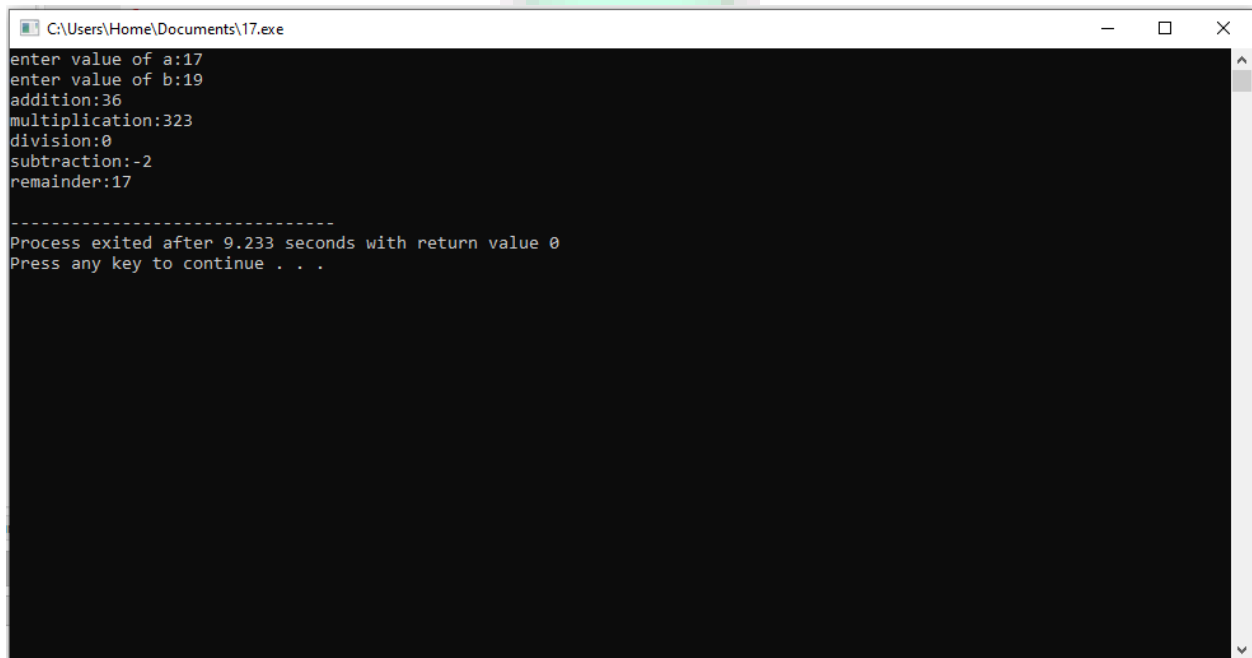
int main()
{
    cout<<"enter value of a:";
    cin>>a;
    cout<<"enter value of b:";
    cin>>b;

    addition(a,b);
```

```
multiplication(a,b);  
division(a,b);  
subtraction(a,b);  
remainder(a,b);  
return 0;  
}  
void addition(int a,int b)  
{  
    cout<<"addition:"<<a+b<<endl;  
}  
void multiplication(int a,int b)  
{  
    cout<<"multiplication:"<<a*b<<endl;  
}  
void division(int a, int b)  
{  
    cout<<"division:"<<a/b<<endl;  
}  
void subtraction(int a,int b)  
{  
    cout<<"subtraction:"<<a-b<<endl;  
}  
void remainder(int a,int b)
```

```
{  
    cout<<"remainder:"<<a%b<<endl;  
}
```

Output:



A screenshot of a Windows command prompt window titled "C:\Users\Home\Documents\17.exe". The window has a black background with white text. The output of the program is as follows:

```
enter value of a:17  
enter value of b:19  
addition:36  
multiplication:323  
division:0  
subtraction:-2  
remainder:17  
  
-----  
Process exited after 9.233 seconds with return value 0  
Press any key to continue . . .
```



• **CALL BY REFERENCE:**

PROGRAMM:

```
#include<iostream>

using namespace std;

void addition(int&a,int&b);

void multiplication(int&a,int&b);

void division(int&a,int&b);

void subtraction(int&a,int&b);

void remainder(int&a,int&b);

int a,b;

char op;

int main()

{

cout<<"enter value of a:";

cin>>a;

cout<<"enter value of b:";

cin>>b;

    addition(a,b);

    multiplication(a,b);

    division(a,b);

    subtraction(a,b);

    remainder(a,b);
```

```
    return 0;
}

void addition(int&a,int& b)
{
    cout<<"addition:"<<a+b<<endl;
}

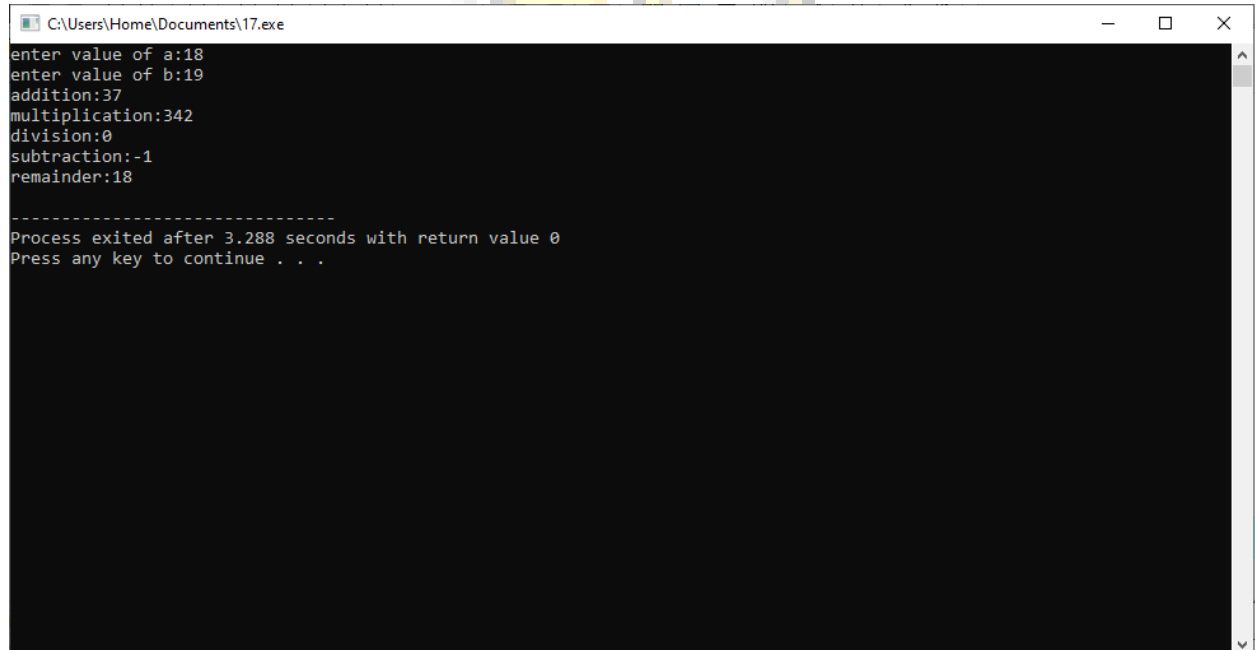
void multiplication(int&a,int& b)
{
    cout<<"multiplication:"<<a*b<<endl;
}

void division(int& a, int& b)
{
    cout<<"division:"<<a/b<<endl;
}

void subtraction(int&a,int& b)
{
    cout<<"subtraction:"<<a-b<<endl;
}

void remainder(int&a,int&b)
{
    cout<<"remainder:"<<a%b<<endl;
}
```

Output:



```
C:\Users\Home\Documents\17.exe
enter value of a:18
enter value of b:19
addition:37
multiplication:342
division:0
subtraction:-1
remainder:18

-----
Process exited after 3.288 seconds with return value 0
Press any key to continue . . .
```



QUESTION: 4

Write a program to do swapping between three variables.

SOLUTION:

PROGRAM:

```
#include<iostream>

using namespace std;

void swap(int,int,int);

int a,b,c;

int main()
{
    cout<<"enter value of a:";
    cin>>a;
    cout<<"enter value of b:";
    cin>>b;
    cout<<"enter value of c:";
    cin>>c;
    cout<<"BEFORE SWAPING"<<endl;
    cout<<"value of a="<<a<<endl;
    cout<<"value of b="<<b<<endl;
    cout<<"value of c="<<c<<endl;

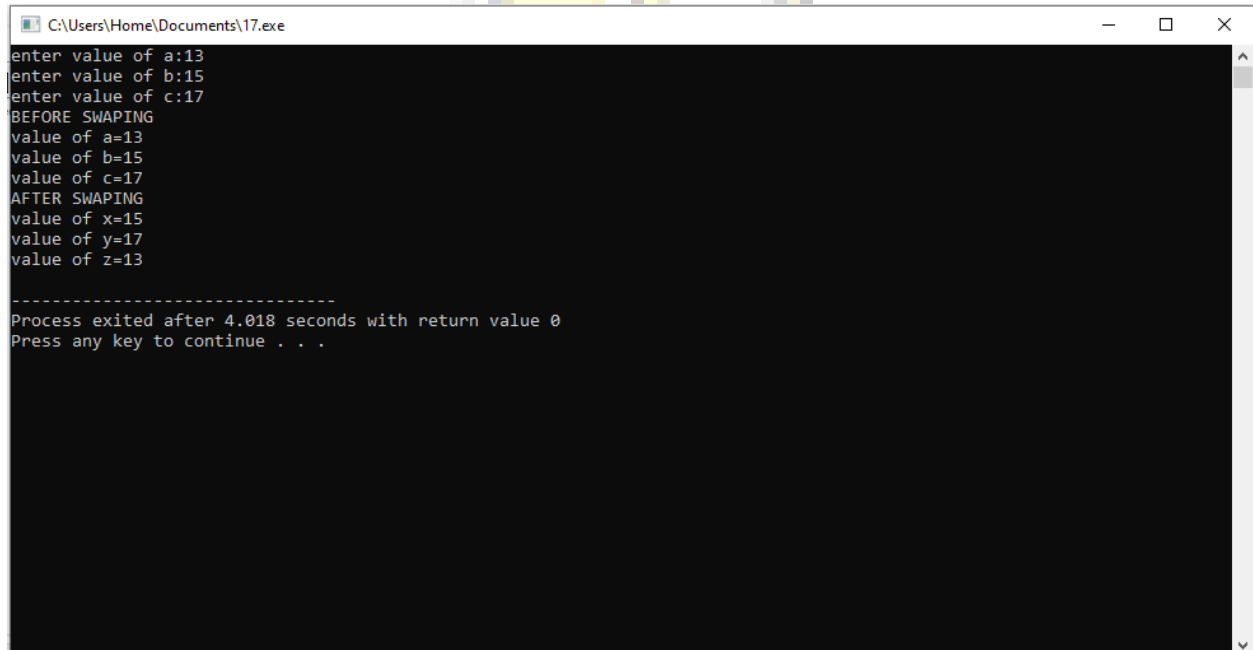
    swap(a,b,c);

    return 0;
```

```
}  
void swap(int x, int y, int z)  
{  
    int g;  
    g=x;  
    x=y;  
    y=z;  
    z=g;  
    cout<<"AFTER SWAPING"<<endl;  
    cout<<"value of x="<<x<<endl;  
    cout<<"value of y="<<y<<endl;  
    cout<<"value of z="<<z<<endl;  
}
```



Output:



```
C:\Users\Home\Documents\17.exe
enter value of a:13
enter value of b:15
enter value of c:17
BEFORE SWAPING
value of a=13
value of b=15
value of c=17
AFTER SWAPING
value of x=15
value of y=17
value of z=13
-----
Process exited after 4.018 seconds with return value 0
Press any key to continue . . .
```





LAB TASK: 2

QUESTION: 1

Write a program that will display the address of a variable.

SOLUTION:

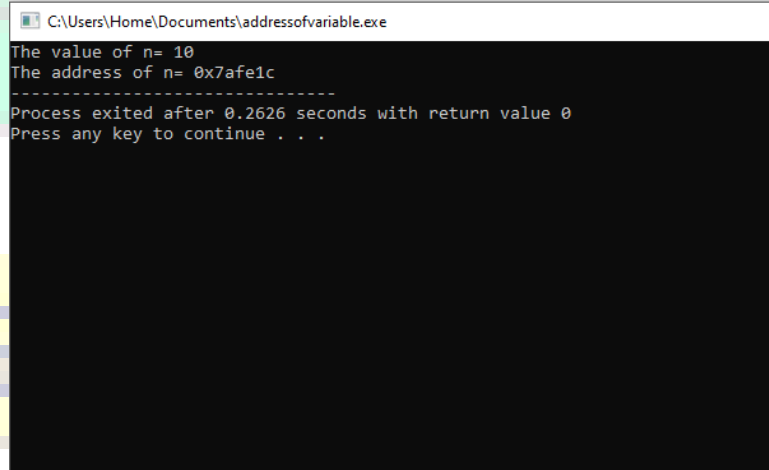
PROGRAM:

```
#include<iostream>

using namespace std;

int main()
{
    int n;
    n=10;
    cout<<"The value of n= "<<n<<endl;
    cout<<"The address of n= "<<&n;
}
```

OUTPUT:



```
C:\Users\Home\Documents\addressofvariable.exe
The value of n= 10
The address of n= 0x7afe1c
-----
Process exited after 0.2626 seconds with return value 0
Press any key to continue . . .
```


• FLOAT:

SOLUTION:

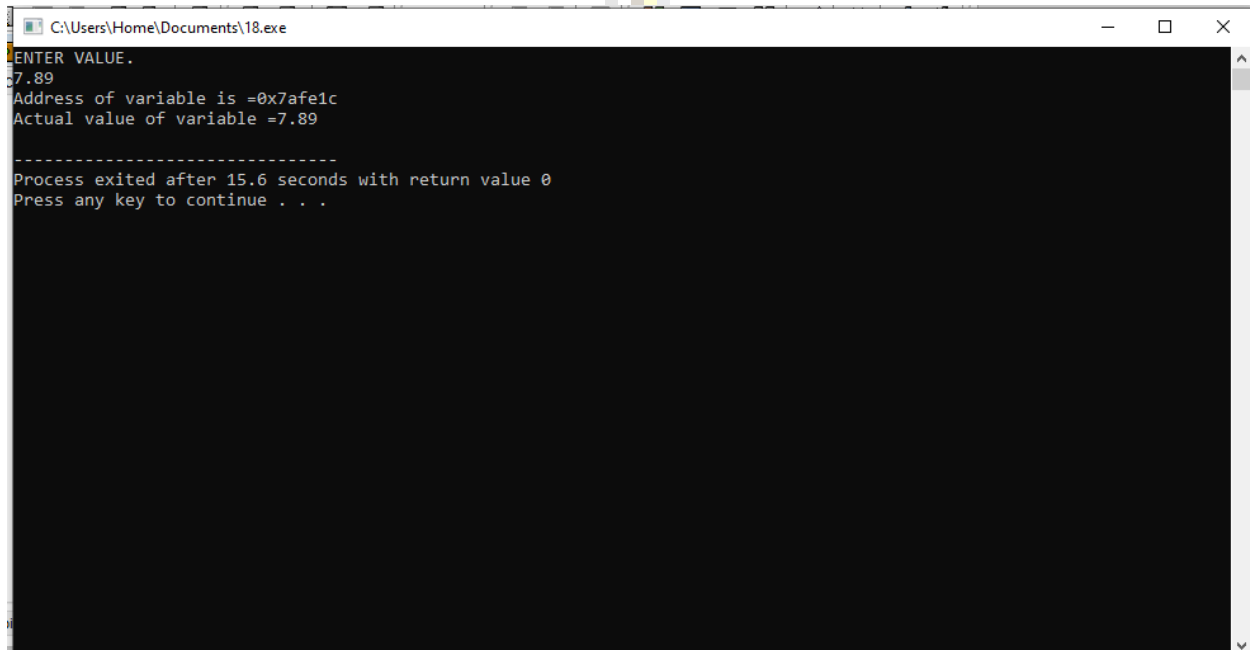
PROGRAM:

```
#include<iostream>

using namespace std;

int main()
{
    float a;
    cout<<"ENTER VALUE."<<endl;
    cin>>a;
    cout<<"Address of variable is "<<&a<<endl;
    cout<<"Actual value of variable ="<<a<<endl;
    return 0;
}
```

Output:



```
C:\Users\Home\Documents\18.exe
ENTER VALUE.
7.89
Address of variable is =0x7afe1c
Actual value of variable =7.89

-----
Process exited after 15.6 seconds with return value 0
Press any key to continue . . .
```

• CHARACTER:

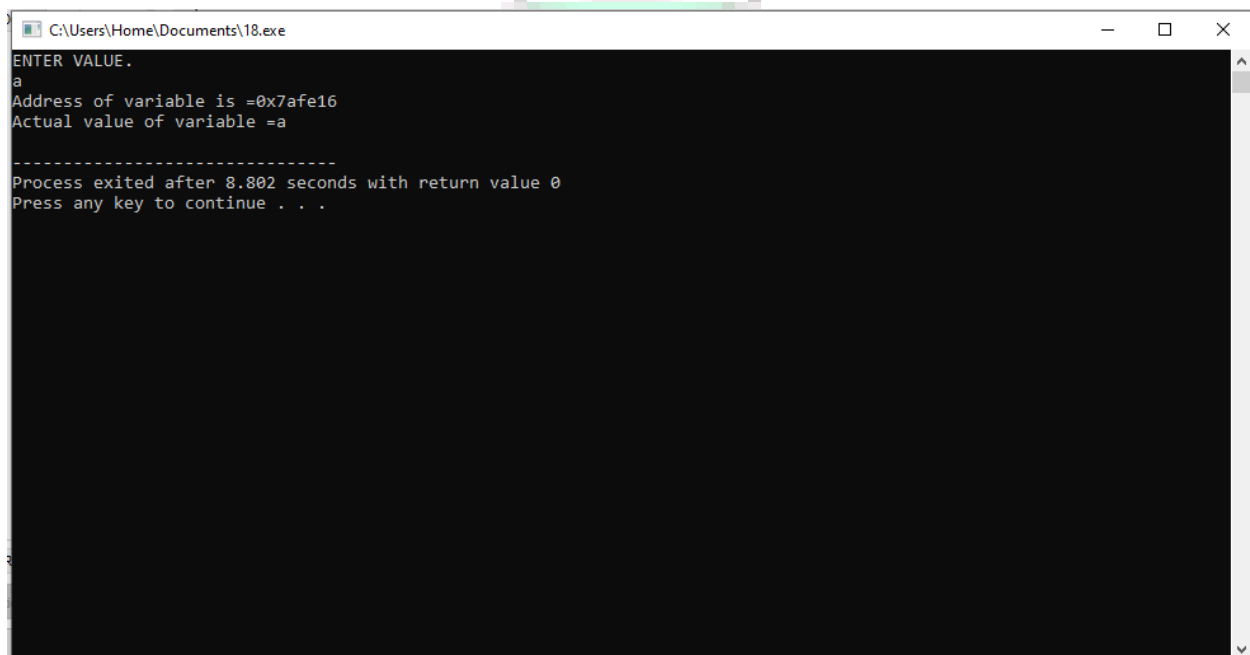
SOLUTION:

PROGRAM:

```
#include<iostream>
using namespace std;
int main()
{
    char a[10];
    cout<<"ENTER VALUE."<<endl;
    cin>>a;
    cout<<"Address of variable is ="<<&a<<endl;
```

```
cout<<"Actual value of variable ="<<a<<endl;  
return 0;  
}
```

Output:



A screenshot of a Windows command prompt window titled "C:\Users\Home\Documents\18.exe". The window has a black background with white text. The text shows the program's execution: it prompts "ENTER VALUE.", receives the input "a", and then displays "Address of variable is =0x7afe16" and "Actual value of variable =a". After a separator line of dashes, it shows "Process exited after 8.802 seconds with return value 0" and "Press any key to continue . . .".

```
C:\Users\Home\Documents\18.exe  
ENTER VALUE.  
a  
Address of variable is =0x7afe16  
Actual value of variable =a  
-----  
Process exited after 8.802 seconds with return value 0  
Press any key to continue . . .
```



QUESTION: 2

write a program that inputs a number in an integer variable. It stores the address of the variable in a pointer and then displays the value and address of the variable.

SOLUTION:

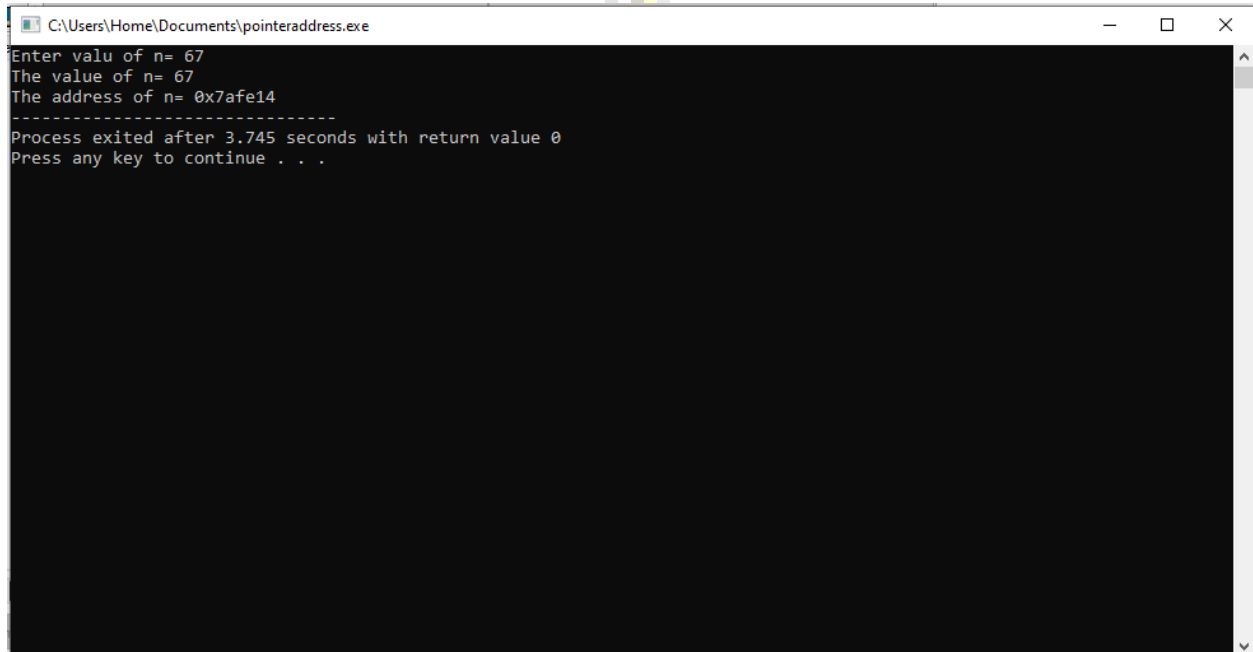
PROGRAM:

```
#include<iostream>

using namespace std;

int main()
{
    int n;
    int *ptr;
    cout<<"Enter valu of n= ";
    cin>>n;
    ptr=&n;
    cout<<"The value of n= "<<n<<endl;
    cout<<"The address of n= "<<ptr;
}
```

Output:



```
C:\Users\Home\Documents\pointeraddress.exe
Enter valu of n= 67
The value of n= 67
The address of n= 0x7afe14
-----
Process exited after 3.745 seconds with return value 0
Press any key to continue . . .
```

• **FLOAT:**

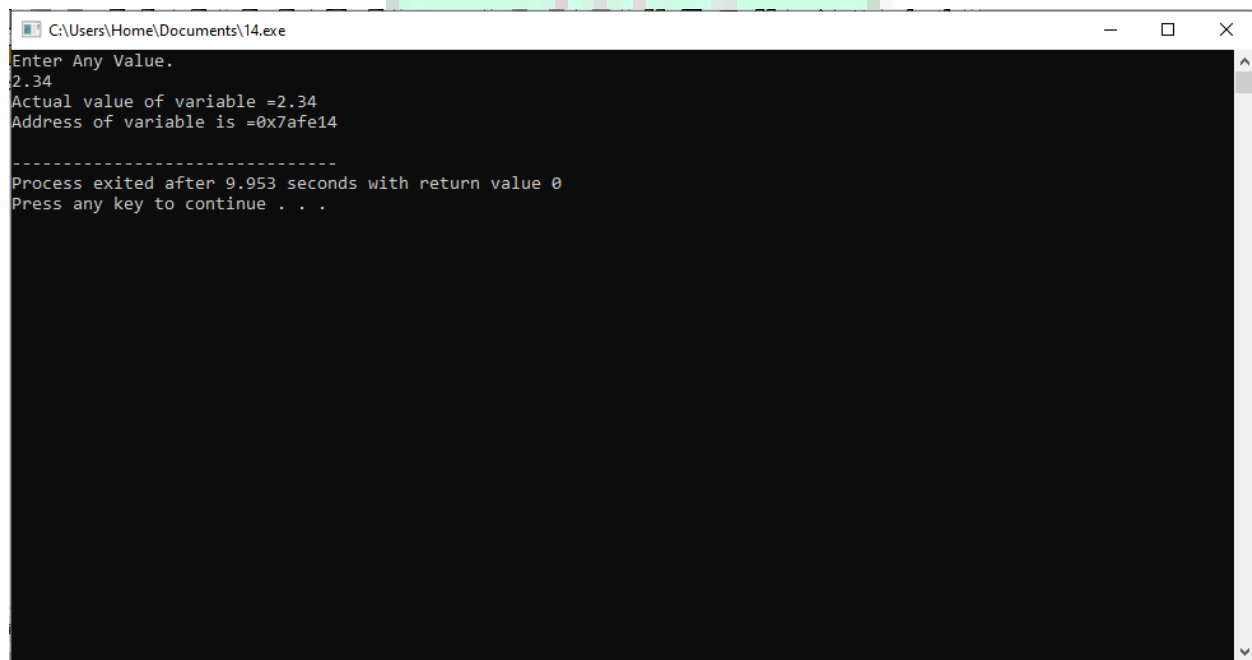
SOLUTION:

PROGRAM:

```
#include<iostream>
using namespace std;
int main()
{
    float z;
    float *q;
    cout<<"Enter Any Value."<<endl;
    cin>>z;
```

```
q=&z;  
  
cout<<"Actual value of variable ="<<z<<endl;  
  
cout<<"Address of variable is ="<<q<<endl;  
  
return 0;  
  
}
```

Output:



```
C:\Users\Home\Documents\14.exe  
Enter Any Value.  
2.34  
Actual value of variable =2.34  
Address of variable is =0x7afe14  
  
-----  
Process exited after 9.953 seconds with return value 0  
Press any key to continue . . .
```

• CHAR:

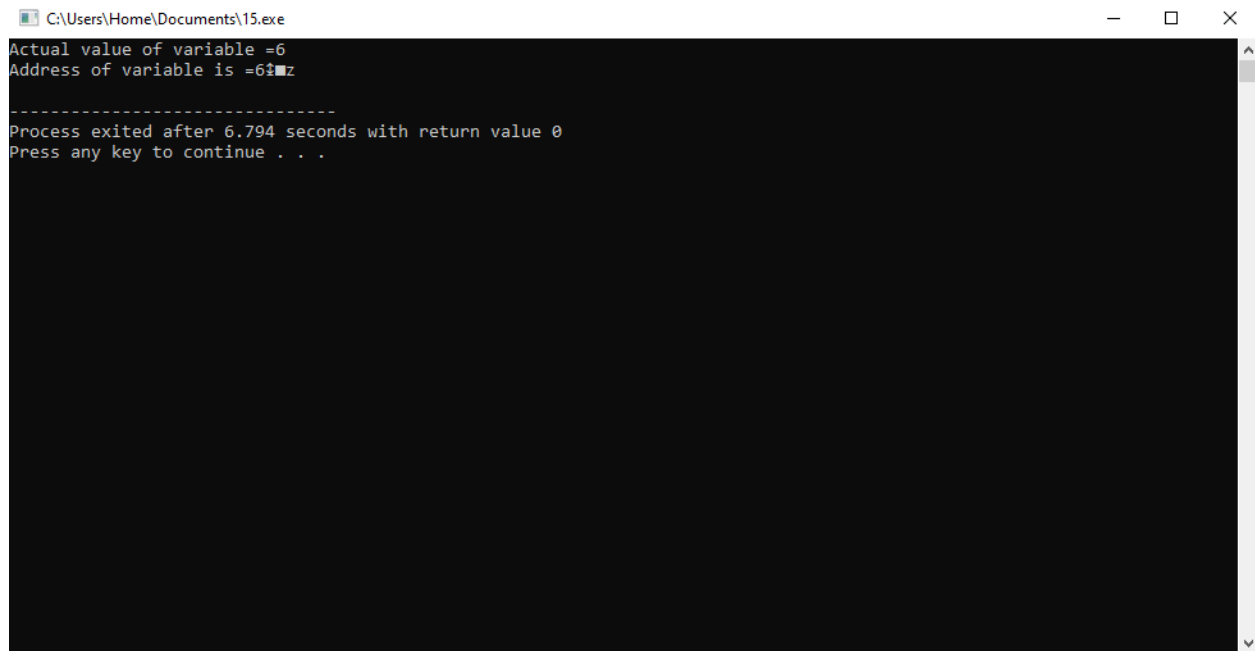
SOLUTION:

PROGRAM:

```
#include<iostream>  
  
using namespace std;  
  
int main()
```

```
{  
  
    char z='6';  
  
    char *q;  
  
    q=&z;  
  
    cout<<"Actual value of variable ="<<z<<endl;  
    cout<<"Address of variable is ="<<q<<endl;  
  
    return 0;  
}
```

Output:



The screenshot shows a Windows command prompt window titled "C:\Users\Home\Documents\15.exe". The output of the program is as follows:

```
Actual value of variable =6  
Address of variable is =61z  
-----  
Process exited after 6.794 seconds with return value 0  
Press any key to continue . . .
```

QUESTION: 3

Write a program that initializes three different type of variables. use void pointer to assign address of these variables and then print the original value and address of the variables one by one.

SOLUTION:

PROGRAM:

```
#include<iostream>

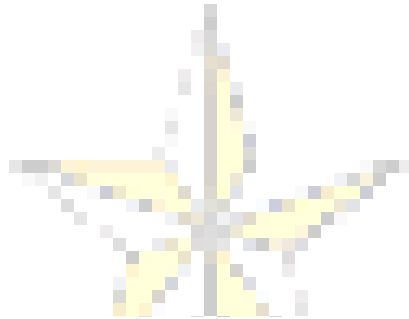
using namespace std;

int main()
{
    int n=10;
    float f=25.14;
    char c='$';
    void *ptr;
    ptr=&n;
    cout<<"The value of n: "<<n<<endl;
    cout<<"The address of n: "<<ptr<<endl;
    ptr=&f;
    cout<<"The value of f: "<<f<<endl;
    cout<<"The address of f: "<<ptr<<endl;
    ptr=&c;
    cout<<"The value of c: "<<c<<endl;
    cout<<"The address of c: "<<ptr<<endl;
```



```
return 0;
```

```
}
```



Output:

```
C:\Users\Home\Documents\3.exe
The value of n: 10
The address of n: 0x7afe14
The value of f: 25.14
The address of f: 0x7afe10
The value of c: $
The address of c: 0x7afe0f
-----
Process exited after 0.5256 seconds with return value 0
Press any key to continue . . .
```



QUESTION: 4

Write a program that will add the two integer values. Use deference operator.

SOLUTION:

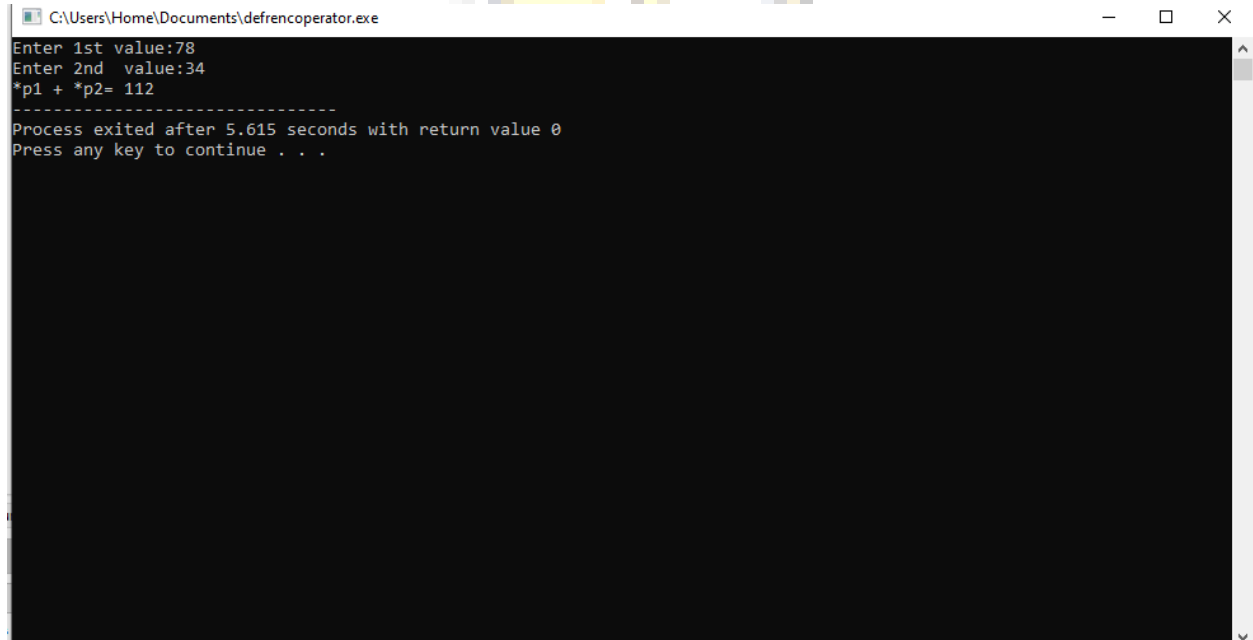
PROGRAM:

```
#include<iostream>

using namespace std;

int main()
{
    int a,b,s, *p1, *p2;
    p1=&a;
    p2=&b;
    cout<<"Enter 1st value:";
    cin>>*p1;
    cout<<"Enter 2nd value:";
    cin>>*p2;
    s=*p1+*p2;
    cout<<"*p1 + *p2= "<<s;
    return 0;
}
```

Output:



```
C:\Users\Home\Documents\defrencoperator.exe
Enter 1st value:78
Enter 2nd value:34
*p1 + *p2= 112
-----
Process exited after 5.615 seconds with return value 0
Press any key to continue . . .
```



QUESTION: 5

Write a program that will declare a variable a. Assign the address of the variable to pointer variable. Use the pointer variable to input the value and then display that value.

SOLUTION:

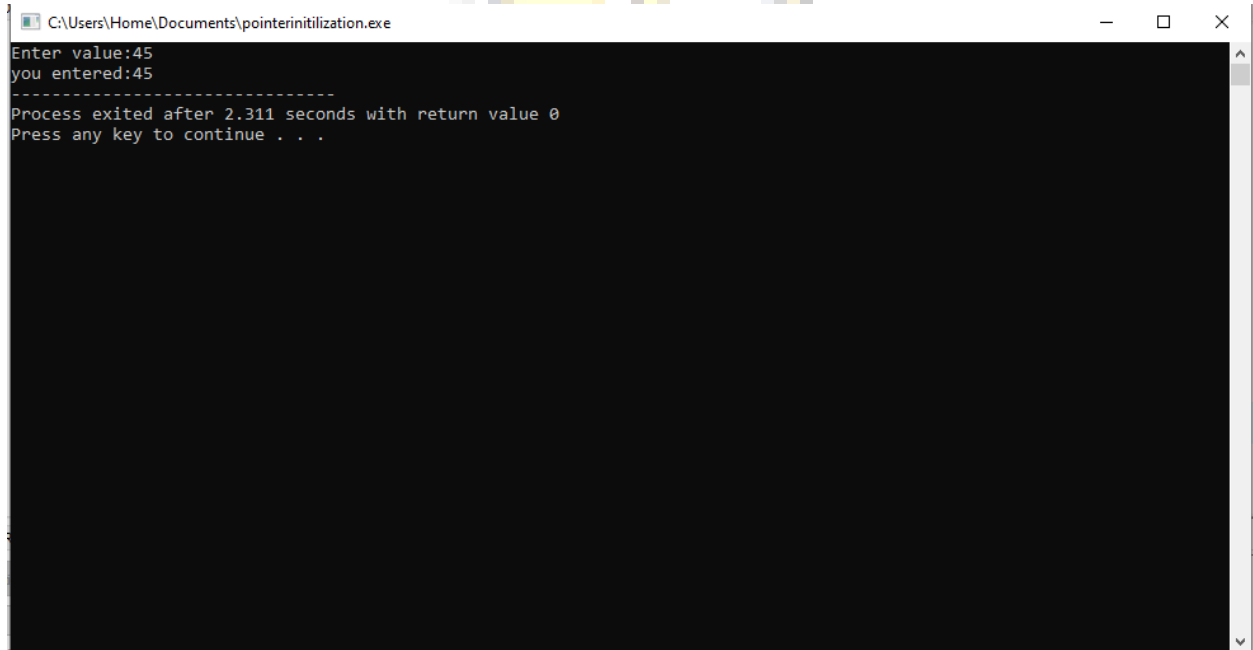
PROGRAM:

```
#include<iostream>

using namespace std;

int main()
{
    int a;
    int *ptr=&a;
    cout<<"Enter value:";
    cin>>*ptr;
    cout<<"you entered:"<<*ptr;
    return 0;
}
```

Output:



```
C:\Users\Home\Documents\pointerinitialization.exe
Enter value:45
you entered:45
-----
Process exited after 2.311 seconds with return value 0
Press any key to continue . . .
```



QUESTION: 6

Write a program to input five integers in an array and then display them using a pointer.

SOLUTION:

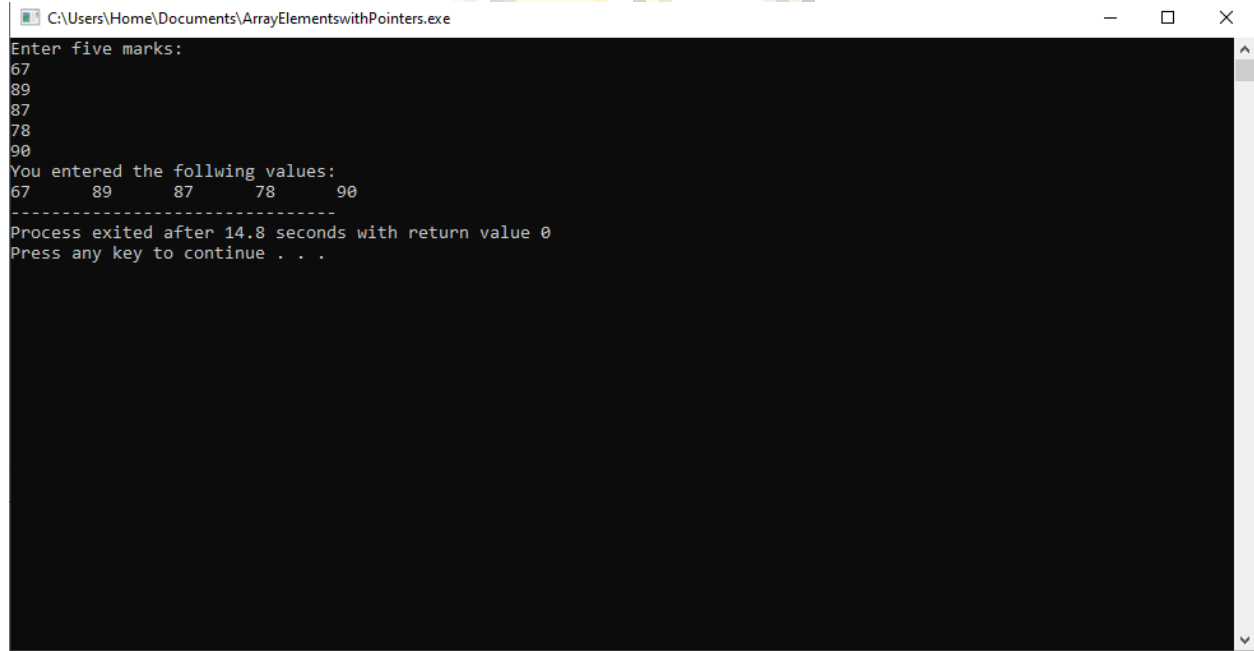
PROGRAM:

```
#include<iostream>

using namespace std;

int main()
{
    int marks[5],i;
    int *ptr;
    cout<<"Enter five marks: \n";
    for(i=0;i<5;i++)
        cin>>marks[i];
    ptr=marks;
    cout<<"You entered the following values:\n";
    for(i=0;i<5;i++)
        cout<<*ptr++<<"\t";
    return 0;
}
```

Output:



```
C:\Users\Home\Documents\ArrayElementswithPointers.exe
Enter five marks:
67
89
87
78
90
You entered the follwing values:
67      89      87      78      90
-----
Process exited after 14.8 seconds with return value 0
Press any key to continue . . .
```



QUESTION: 7

Write a program to input five floating point values in an array and then display in reverse order. Use pointers

SOLUTION:


PROGRAM:

```
#include<iostream>

using namespace std;

int main()
{
float arr[5],*ptr;
int i;
cout<<"Enter five values: \n";
for(i=0;i<5;i++)
cin>>arr[i];
ptr=&arr[4];
cout<<"The Values in Reverse Order:\n";
for(i=0;i<5;i++)
cout<<*ptr--<<"\t";
return 0;
}
```


Output:



```
C:\Users\Home\Documents\4.exe
Enter five values:
6
89
09
56
76
The Values in Reverse Order:
76    56    9    89    6
-----
Process exited after 8.703 seconds with return value 0
Press any key to continue . . .
```





QUESTION: 1

write a program that display the value stored in a string variable name.

SOLUTION:

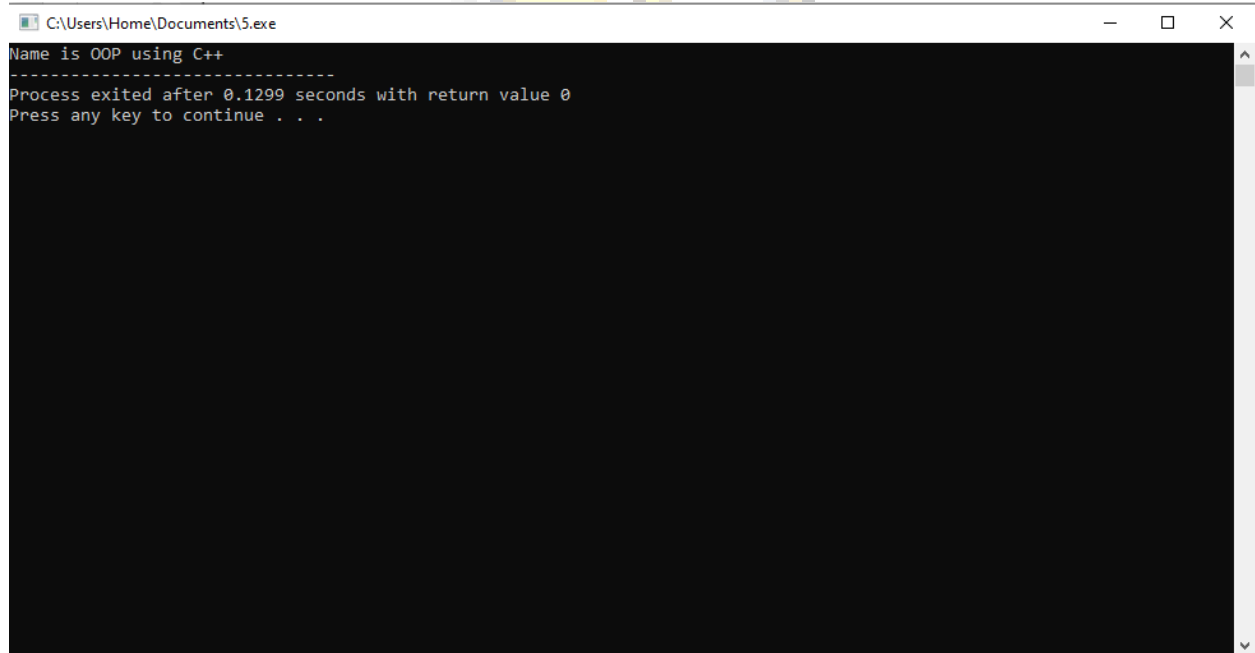
PROGRAM:

```
#include<iostream>

using namespace std;

int main()
{
    char name[40]="OOP using C++";
    cout<<"Name is "<<name;
    return 0;
}
```

OUTPUT:



```
C:\Users\Home\Documents\5.exe
Name is OOP using C++
-----
Process exited after 0.1299 seconds with return value 0
Press any key to continue . . .
```



QUESTION: 2

write a program that inputs the name of the user using cin object and display it.

SOLUTION:

PROGRAM:

```
#include<iostream>

using namespace std;

int main()
{
    char name[50];
    cout<<"Enter name: ";
    cin>>name;
    cout<<"Your name is "<<name;
    return 0;
}
```

Output:



```
C:\Users\Home\Documents\6.exe
Enter name: aafreen zahra kazmi
Your name is aafreen
-----
Process exited after 30.34 seconds with return value 0
Press any key to continue . . .
```



QUESTION: 3

write a program that inputs the name of the user using cin.getline() function and display it on screen.

SOLUTION:

PROGRAM:

```
#include<iostream>
```

```
using namespace std;
```

```
int main()
```

```
{
```

```
char c;
```

```
cout<<"Enter any character: ";
```

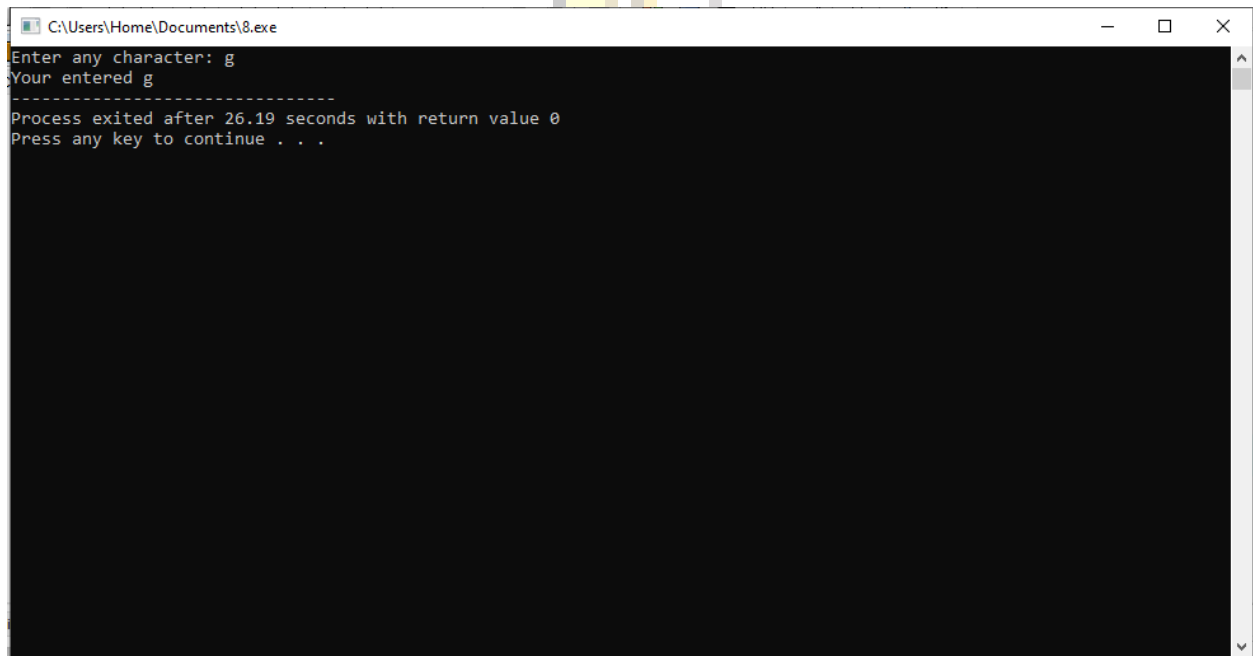
```
cin.get(c);
```

```
cout<<"Your entered "<<c;
```

```
return 0;
```

```
}
```

Output:



```
C:\Users\Home\Documents\8.exe
Enter any character: g
Your entered g
-----
Process exited after 26.19 seconds with return value 0
Press any key to continue . . .
```



QUESTION: 4

write a program that inputs a string from the user and displays its length.

SOLUTION:

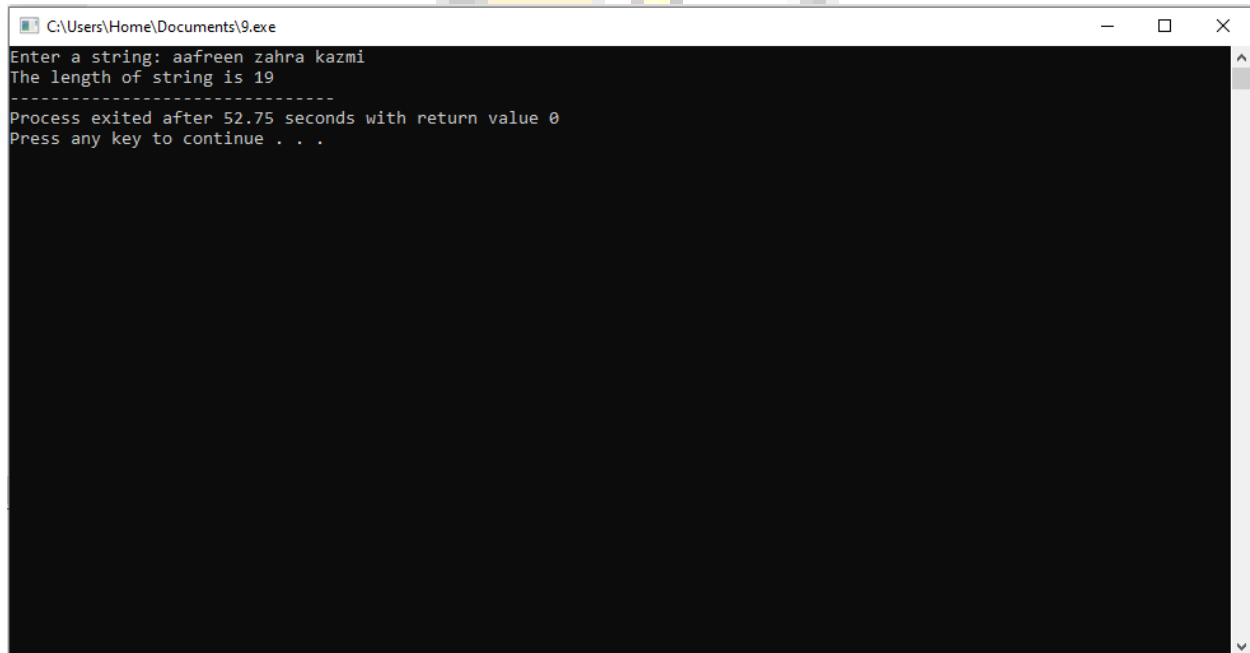
PROGRAM:

```
#include<iostream>

using namespace std;

int main()
{
    char str[50];
    int i=0;
    cout<<"Enter a string: ";
    cin.getline(str,50);
    while(str[i]!='\0')
        i++;
    cout<<"The length of string is "<<i;
    return 0;
}
```

Output:



```
C:\Users\Home\Documents\9.exe
Enter a string: aafreen zahra kazmi
The length of string is 19
-----
Process exited after 52.75 seconds with return value 0
Press any key to continue . . .
```



QUESTION: 5

write a program that inputs a string from the user and then copies it to another string

SOLUTION:

PROGRAM:

```
#include<iostream>

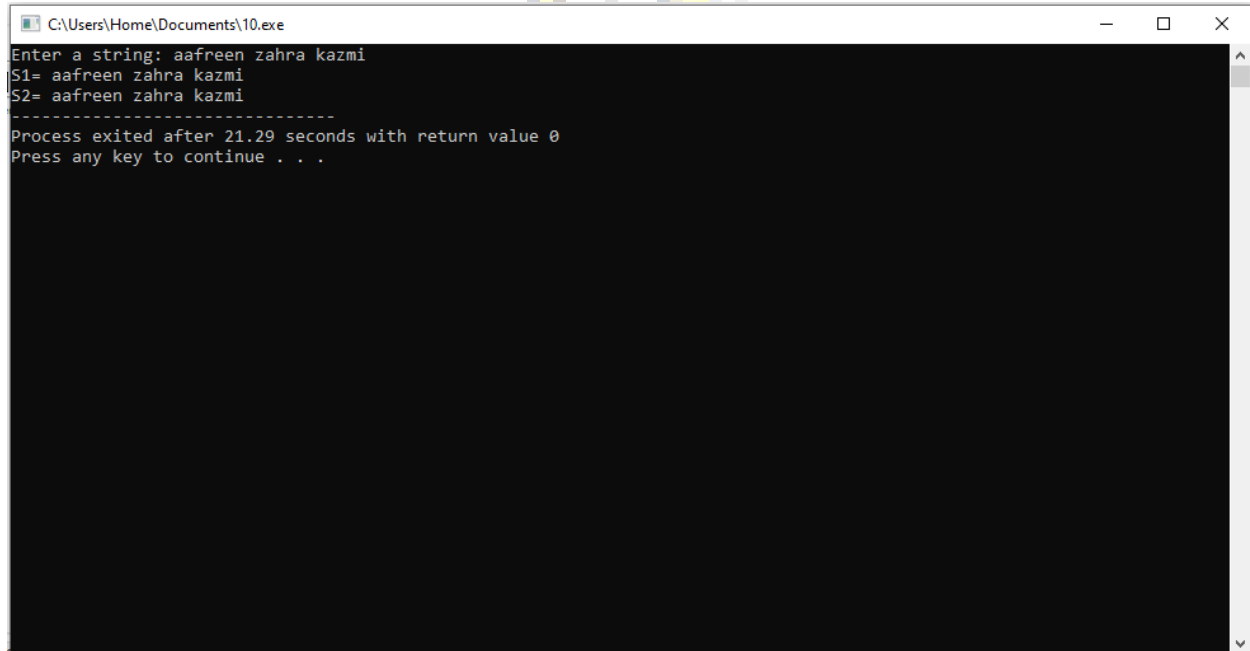
using namespace std;

int main()
{
    char s1[50], s2[50];
    int i=0;
    cout<<"Enter a string: ";
    cin.getline(s1,50);
    while(s1[i]!='\0')
    {
        s2[i]=s1[i];
        i++;
    }
    s2[i]='\0';
    cout<<"S1= "<<s1<<endl;
    cout<<"S2= "<<s2;

    return 0;
```

}

Output:



```
C:\Users\Home\Documents\10.exe
Enter a string: aafreen zahra kazmi
S1= aafreen zahra kazmi
S2= aafreen zahra kazmi
-----
Process exited after 21.29 seconds with return value 0
Press any key to continue . . .
```



QUESTION: 6

write a program that inputs a string from the user and then counts the number of vowels in the string

SOLUTION:

PROGRAM:

```
#include<iostream>

using namespace std;

int main()
{
    char str[50];
    int i,v;
    i=v=0;
    cout<<"Enter a string: ";
    cin.getline(str,50);
    while(str[i]!='\0')
    {
        switch(str[i])
        {
            case 'a':
            case 'e':
            case 'i':
            case 'o':
```

```
case 'u':
```

```
v++;
```

```
}
```

```
i++;
```

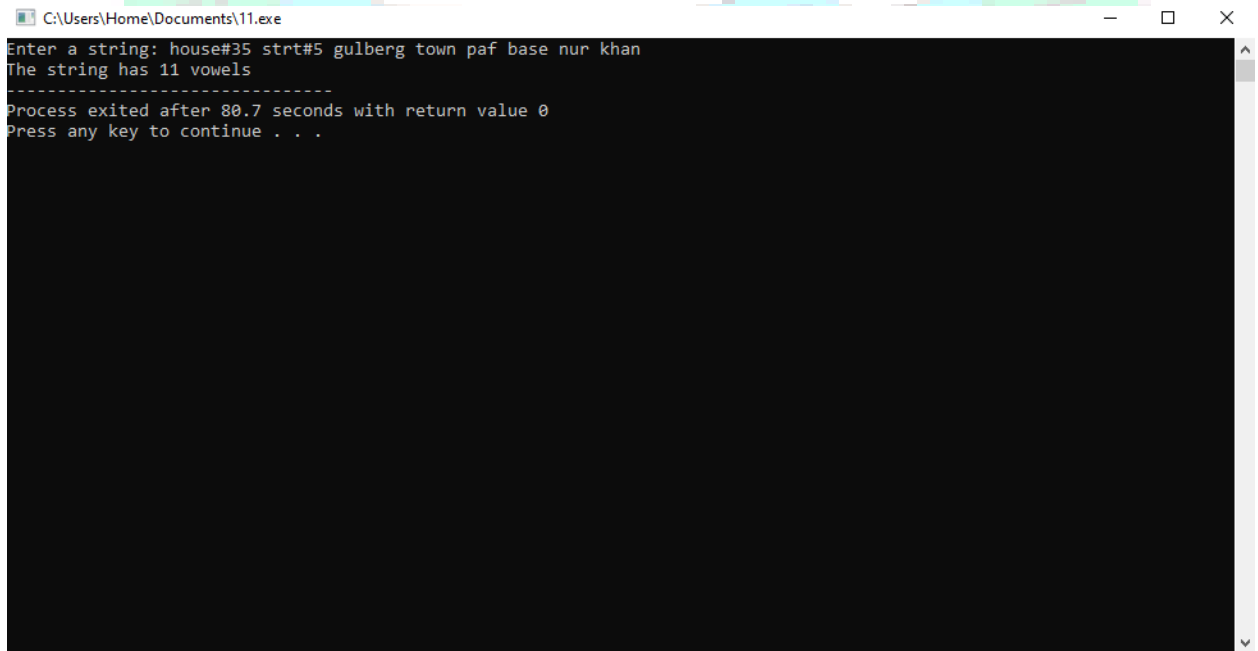
```
}
```

```
cout<<"The string has "<<v<<" vowels";
```

```
return 0;
```

```
}
```

Output:



The screenshot shows a Windows command prompt window titled "C:\Users\Home\Documents\11.exe". The user has entered the string "house#35 strt#5 gulberg town paf base nur khan". The program outputs "The string has 11 vowels". Below this, it says "Process exited after 80.7 seconds with return value 0" and "Press any key to continue . . .".

```
C:\Users\Home\Documents\11.exe
Enter a string: house#35 strt#5 gulberg town paf base nur khan
The string has 11 vowels
-----
Process exited after 80.7 seconds with return value 0
Press any key to continue . . .
```

QUESTION: 7

write a program that inputs a string from the user and then counts the number of uppercase and lowercase constants, uppercase and lowercase vowels in sentence.

SOLUTION:

PROGRAM:

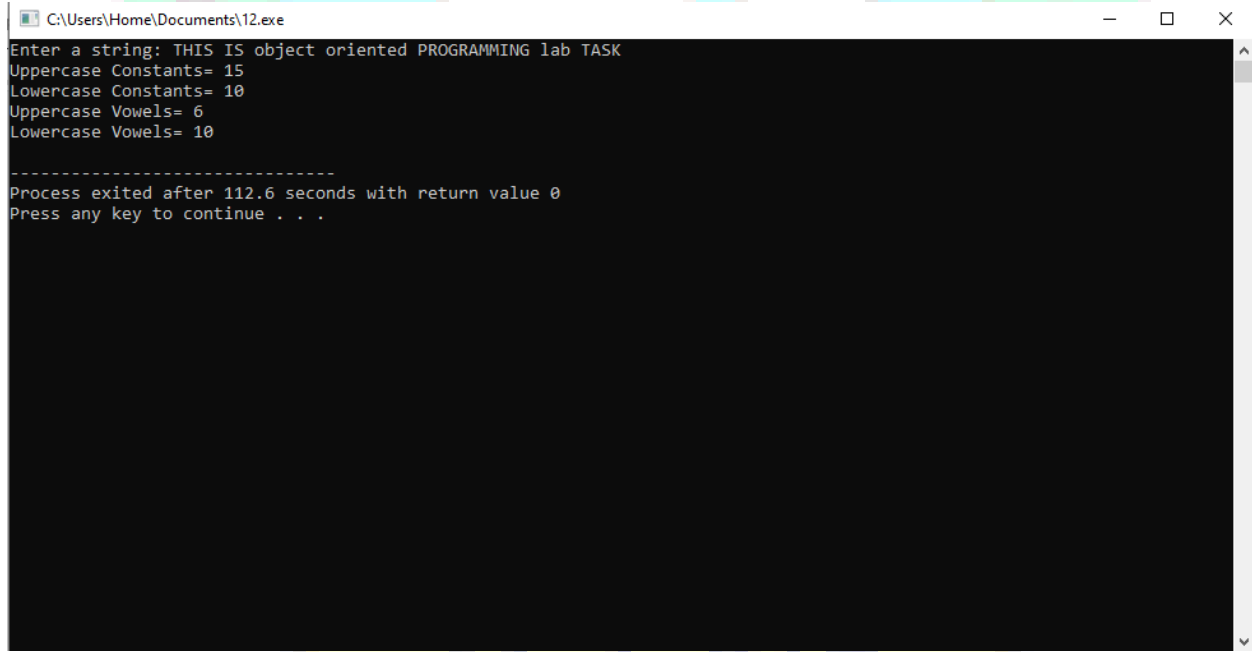
```
#include<iostream>

using namespace std;

int main()
{
    char str[50];
    int uc, lc, uv,lv;
    uc=lc=uv=lv=0;
    cout<<"Enter a string: ";
    cin.getline(str,50);
    for(int i=0;str[i]!='\0';i++)
    {
        if(str[i]=='A' || str[i]=='E' || str[i]=='I' || str[i]=='O' || str[i]=='U')
            uv++;
        else if(str[i]=='a' || str[i]=='e' || str[i]=='i' || str[i]=='o' || str[i]=='u')
            lv++;
        else if(str[i]>=65 && str[i]<=90)
            uc++;
    }
```

```
else if(str[i]>=97 && str[i]<=122)
lc++;
}
cout<<"Uppercase Constants= "<<uc<<endl;
cout<<"Lowercase Constants= "<<lc<<endl;
cout<<"Uppercase Vowels= "<<uv<<endl;
cout<<"Lowercase Vowels= "<<lv<<endl;
return 0;
}
```

Output:



```
C:\Users\Home\Documents\12.exe
Enter a string: THIS IS object oriented PROGRAMMING lab TASK
Uppercase Constants= 15
Lowercase Constants= 10
Uppercase Vowels= 6
Lowercase Vowels= 10
-----
Process exited after 112.6 seconds with return value 0
Press any key to continue . . .
```


QUESTION: 8

write a program that inputs the names of five cities and then display them

SOLUTION:

PROGRAM:

```
#include<iostream>

using namespace std;

int main()
{
    char city[5][30];
    int i;
    for(i=0;i<5;i++)
    {
        cout<<"Enter "<<i<<" city name: ";
        cin>>city[i];
    }
    for(i=0;i<5;i++)
        cout<<city[i]<<endl;
    return 0;
}
```

Output:

```
C:\Users\Home\Documents\15.exe
Enter 0 city name: rawalpindi
Enter 1 city name: karachi
Enter 2 city name: lahore
Enter 3 city name: multan
Enter 4 city name: islamabad
rawalpindi
karachi
lahore
multan
islamabad

-----
Process exited after 20.44 seconds with return value 0
Press any key to continue . . .
```



QUESTION: 9

write a program that inputs the names of ten students and then display them

SOLUTION:

PROGRAM:

```
#include<iostream>

using namespace std;

int main()
{
    char city[10][100];
    int i;
    for(i=0;i<10;i++)
    {
        cout<<"Enter "<<i<<" student name ";
        cin>>city[i];
    }
    for(i=0;i<10;i++)
        cout<<city[i]<<endl;
    return 0;
}
```

OUTPUT:

```
C:\Users\Home\Documents\156.exe
Enter 0 student name ABDULLAH
Enter 1 student name ALI
Enter 2 student name SHAHAAB
Enter 3 student name SAHUKAT
Enter 4 student name AAFREEN
Enter 5 student name FARWA
Enter 6 student name FATIMA
Enter 7 student name MARIA
Enter 8 student name KASHAF
Enter 9 student name MOEEZ
ABDULLAH
ALI
SHAHAAB
SAHUKAT
AAFREEN
FARWA
FATIMA
MARIA
KASHAF
MOEEZ

-----
Process exited after 43.89 seconds with return value 0
Press any key to continue . . .
```





LAB TASK: 4

QUESTION: 1

Write a program that declares a class with one integer data member and two member functions in () and out () to input and output data in data member.

SOLUTION:

PROGRAM:

```
#include <iostream>

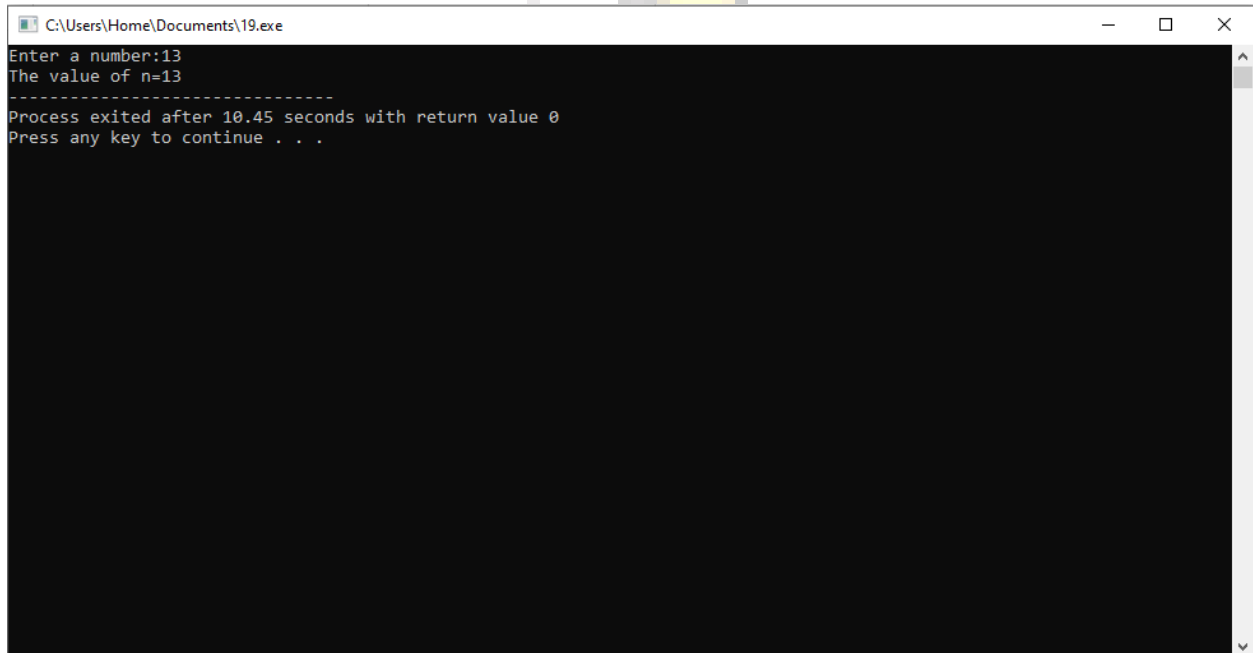
using namespace std;

class Test {
    int n;
public:
    void in ()
    {   cout<<"Enter a number:";
        cin>>n; }
    void out ()
    {   cout<<"The value of n="<<n; }
};

int main ()
{
    Test obj;
    obj.in();
    obj.out();
    return 0;
```

}

OUTPUT:



```
C:\Users\Home\Documents\19.exe
Enter a number:13
The value of n=13
-----
Process exited after 10.45 seconds with return value 0
Press any key to continue . . .
```



QUESTION: 2

Write a class circle with one data members radius. Write three member functions

- 1) get_radius() to set radius value with parameter value,**
- 2) area() to display radius and**
- 3) circum() to calculate and display circumference of circle.**

SOLUTION:

PROGRAM:

```
#include<iostream>
using namespace std;
class circle
{
    float radius;
    public:
    void get_radius(float r)
    {
        radius=r;
    }
    void area()
    {
        cout<<"AREA OF THE CIRCLE ="<<3.14*radius*radius<<endl;
    }
}
```



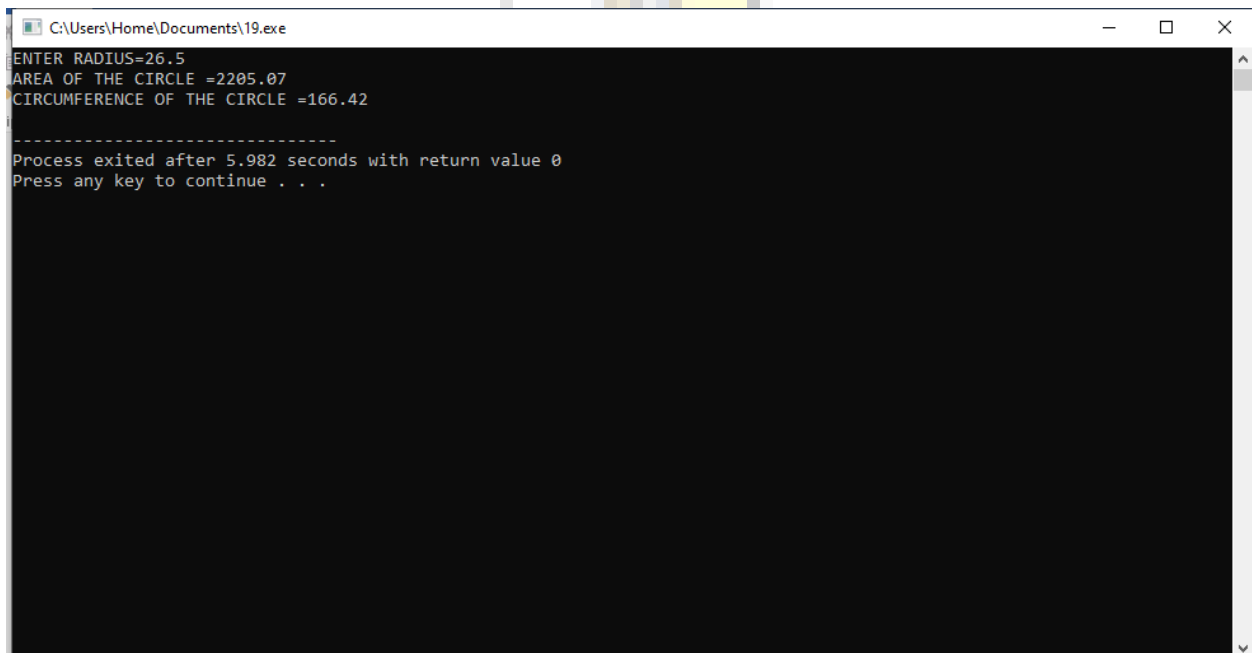
```
void circum()
{
    cout<<"CIRCUMFERENCE OF THE CIRCLE
=<<2*3.14*radius<<endl;
}

};

int main()
{
    float r;
    cout<<"ENTER RADIUS=";
    cin>>r;
    circle c1;
    c1.get_radius(r);
    c1.area();
    c1.circum();
    return 0;
}
```



OUTPUT:



```
C:\Users\Home\Documents\19.exe
ENTER RADIUS=26.5
AREA OF THE CIRCLE =2205.07
CIRCUMFERENCE OF THE CIRCLE =166.42
-----
Process exited after 5.982 seconds with return value 0
Press any key to continue . . .
```



QUESTION: 3

Write a program that make a student class and write data members and get these data members in the member function of in () and display them in the member function of display ().

SOLUTION:

PROGRAM:

```
#include<iostream>

using namespace std;

class student
{
int age;
char name[100];
char fathurname[100];
char program[100];
char address[100];
int rollno;
char section[30];
public:
void in()
{
    cout<<"ENTER YOUR NAME =";
    cin.getline(name,100) ;
    cout<<"ENETR YOUR ADDRESS =";
```

```
cin.getline(address,100) ;

cout<<"ENTER YOUR FATHER NAME =";

cin.getline(fathername,100);

cout<<"ENTER YOUR PRAGRAMM NAME =";

cin>>program;

cout<<"ENTER YOUR SECTION =";

cin>>section;

cout<<"ENTER YOU AGE =";

cin>>age;

}

void display()
{

cout<<name<<endl;
cout<<age<<endl;
cout<<fathername<<endl;
cout<<address<<endl;
cout<<section<<endl;
cout<<program<<endl;

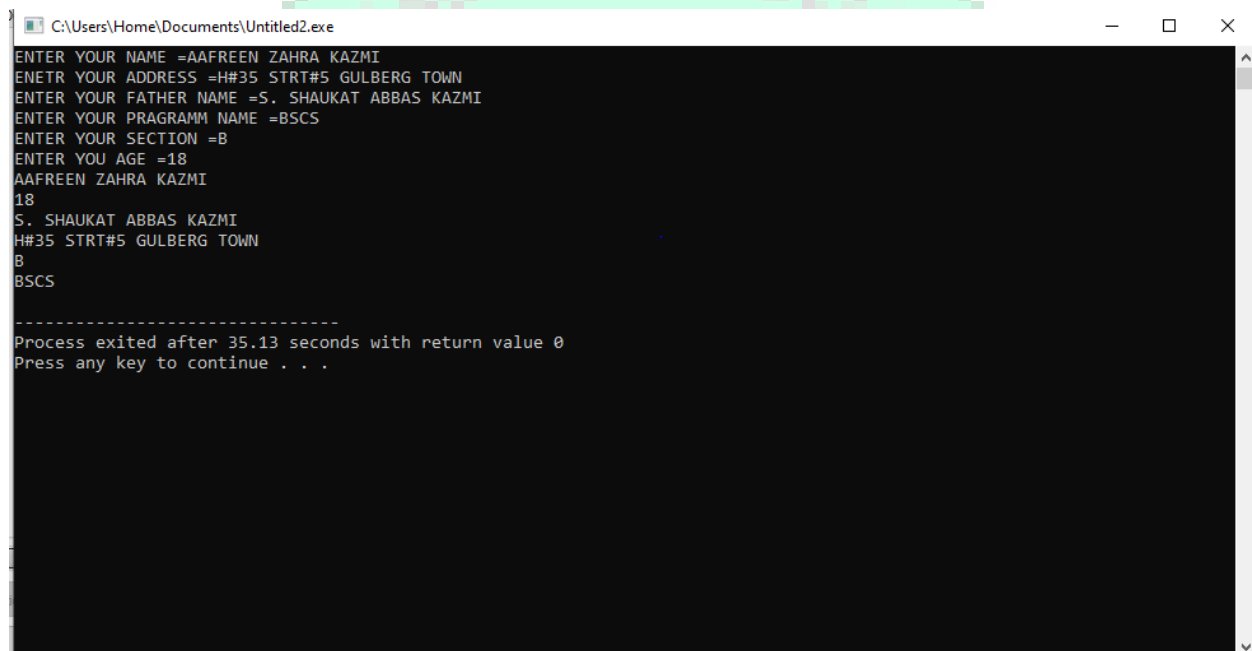
}

};

int main()
{
```

```
student s1;  
  
s1.in();  
  
s1.display();  
  
return 0;  
  
}
```

Output:



```
C:\Users\Home\Documents\Untitled2.exe  
ENTER YOUR NAME =AAFREEN ZAHRA KAZMI  
ENETR YOUR ADDRESS =H#35 STRT#5 GULBERG TOWN  
ENTER YOUR FATHER NAME =S. SHAUKAT ABBAS KAZMI  
ENTER YOUR PRAGRAMM NAME =BSCS  
ENTER YOUR SECTION =B  
ENTER YOU AGE =18  
AAFREEN ZAHRA KAZMI  
18  
S. SHAUKAT ABBAS KAZMI  
H#35 STRT#5 GULBERG TOWN  
B  
BSCS  
  
-----  
Process exited after 35.13 seconds with return value 0  
Press any key to continue . . .
```

QUESTION: 4

Create a class calculator that performs the following function;

- a) Addition
- b) Subtraction
- c) Multiplication
- d) Division

Use concept of passing parameters.

SOLUTION:

PROGRAM:

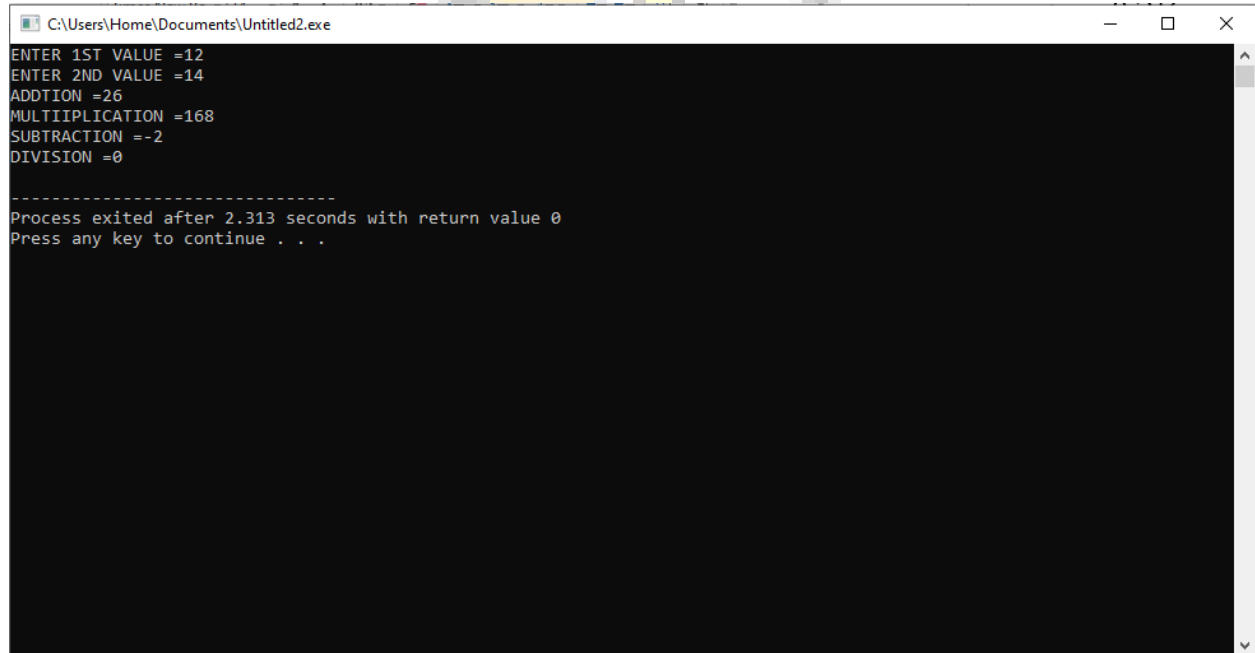
```
#include<iostream>

using namespace std;

class calculator
{
    public:
    void addition(int a,int b)
    {
        cout<<"ADDTION ="<<a+b<<endl;
    }
    void subtraction(int a,int b)
    {
        cout<<"SUBTRACTION ="<<a-b<<endl;
    }
    void multiplication(int a,int b)
```

```
{  
cout<<"MULTIPLICATION ="<<a*b<<endl;  
}  
void division(int a,int b)  
{  
    cout<<"DIVISION ="<<a/b<<endl;  
}  
};  
int main()  
{  
    int a,b;  
    cout<<"ENTER 1ST VALUE =";  
    cin>>a;  
    cout<<"ENTER 2ND VALUE =";  
    cin>>b;  
    calculator c1;  
    c1.addition(a,b);  
    c1.multiplication(a,b);  
    c1.subtraction(a,b);  
    c1.division(a,b);  
    return 0;  
}
```

OUTPUT:



```
C:\Users\Home\Documents\Untitled2.exe
ENTER 1ST VALUE =12
ENTER 2ND VALUE =14
ADDITION =26
MULTIPLICATION =168
SUBTRACTION =-2
DIVISION =0

-----
Process exited after 2.313 seconds with return value 0
Press any key to continue . . .
```



QUESTION: 5

Write a program that has the class `swipe_test` that has two integer data members in one function and swap these data members in another function. Use the concept of classes and object in the main function .

SOLUTION:

PROGRAM:

```
#include<iostream>

using namespace std;

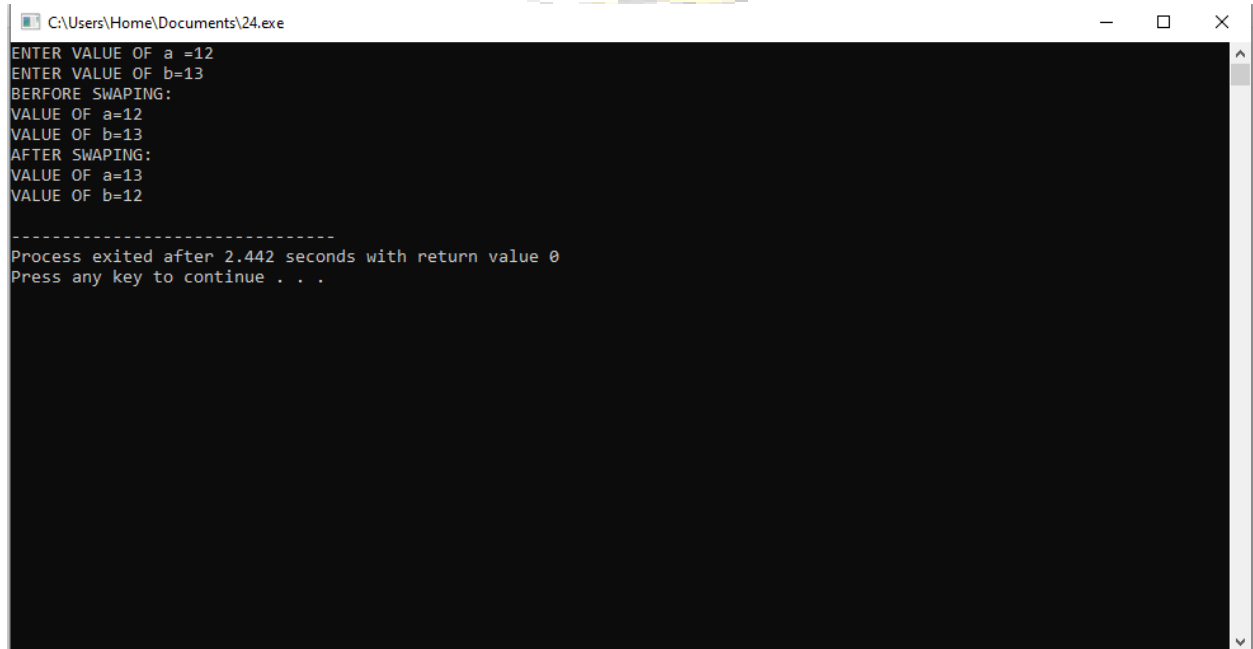
class swipe_test
{
    int a,b;
public:
    void in()
    {
        cout<<"ENTER VALUE OF a=";
        cin>>a;
        cout<<"ENTER VALUE OF b=";
        cin>>b;
        cout<<"BERFORE SWAPING:"<<endl;
        cout<<"VALUE OF a="<<a<<endl;
        cout<<"VALUE OF b="<<b<<endl;
    }

    void swipe()
```

```
{  
    int c;  
  
    c=a;  
    a=b;  
    b=c;  
  
    cout<<"AFTER SWAPING:"<<endl;  
    cout<<"VALUE OF a="<<a<<endl;  
    cout<<"VALUE OF b="<<b<<endl;  
}  
};  
int main()  
{  
    swipe_test st1;  
    st1.in();  
    st1.swipe();  
    return 0;  
}
```



Output:



```
C:\Users\Home\Documents\24.exe
ENTER VALUE OF a =12
ENTER VALUE OF b=13
BERFORE SWAPING:
VALUE OF a=12
VALUE OF b=13
AFTER SWAPING:
VALUE OF a=13
VALUE OF b=12

-----
Process exited after 2.442 seconds with return value 0
Press any key to continue . . .
```



QUESTION: 6

Write a class Book with three data members BookID, Pages and Price. It also contains the following funtions:

- 1) The get() function is used to input values**
- 2) The show() function is used to display values**
- 3) The set() function is used to set the values of data members using parameters.**
- 4) The getPrice() function is used to return the value of Book.**

NOTE: The program should create two objects of the class and input values of object 1 and set values of object 2. The program will display the details of the most costly book.

```
#include <iostream>
using namespace std;
class Book {
    private:
        int BookID,Pages;
        float Price;
    public:
        void get ()
        {
            cout<<"Enter BookID:";
            cin>>BookID;
            cout<<"Enter Pages:";
```

```
    cin>>Pages;

    cout<<"Enter Price:";

    cin>>Price;

    }

void show ()
{

    cout<<"BookID= "<<BookID<<endl;

    cout<<"Pages= "<<Pages<<endl;

    cout<<"Price= "<<Price;

}

void set (int id, int pg, float pr)
{

    BookID=id;

    Pages=pg;

    Price=pr;

}

float getPrice ()
{

    return Price;

}

};

int main ()
{
```

```
Book b1, b2;  
b1.get();  
b2.set(20, 320, 40.5);  
cout<<"most costly book ="<<endl;  
if(b1.getPrice()>b2.getPrice())  
    b1.show();  
else  
    b2.show();  
return 0;  
}
```



QUESTION: 7

Write a class Marks with three data members to store three marks. Write three member functions

1)in() to input marks,

2)sum() to calculate and return the sum and

3) avg() to calculate and return the average marks.

SOLUTION:

PROGRAM:

```
#include <iostream>
using namespace std;
class Marks
{
    private:
        int a,b,c;
    public:
        void in ()
        {
            cout<<"Enter three marks:";
            cin>>a>>b>>c;
        }
}
```

```
int sum ()
{
return(a+b+c);
}

int avg ()
{
return(a+b+c)/3.0;
}

};

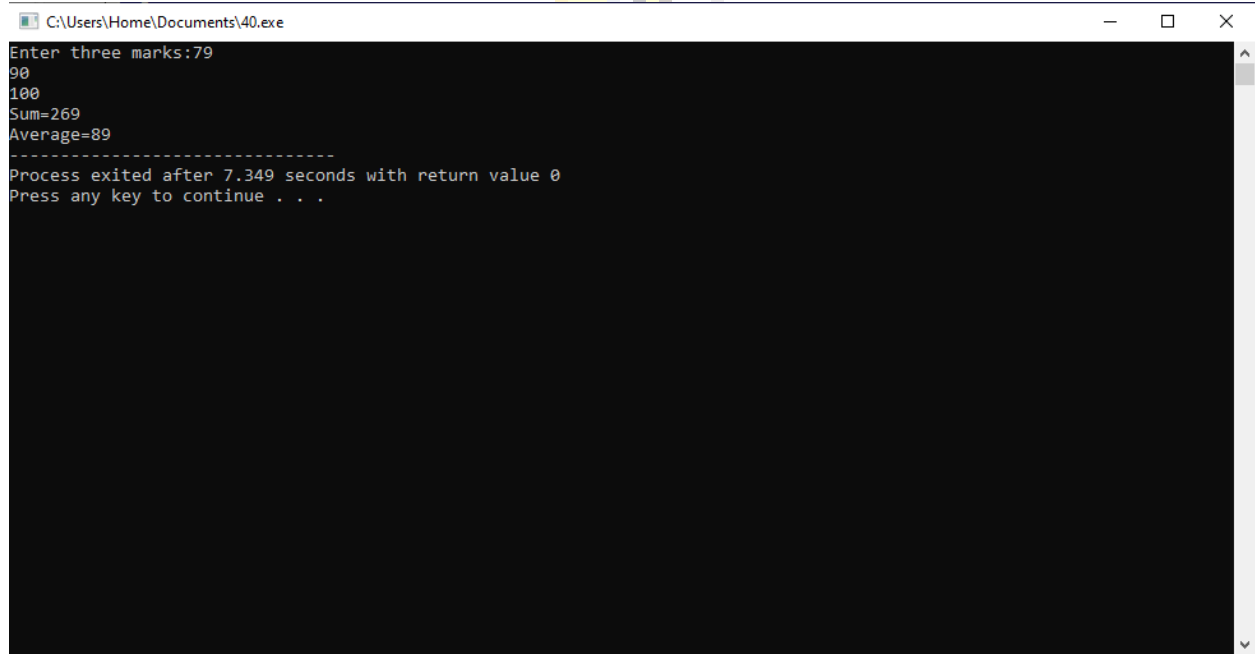
int main ()
{
Marks m;
int s;
float a;
m.in();
s=m.sum();
a=m.avg();
cout<<"Sum="<<s<<endl;
cout<<"Average="<<a;
```



```
return 0;
```

```
}
```

Output:



```
C:\Users\Home\Documents\40.exe
Enter three marks:79
90
100
Sum=269
Average=89
-----
Process exited after 7.349 seconds with return value 0
Press any key to continue . . .
```



QUESTION: 8

Write a class Result that contains rollno, name and marks of three subjects. The marks are stored in an array of integers. The class also contains the following member functions:

- 1.The input() function is used to input values in data members**
- 2.The show() function is used to display values of data members**
- 3.The total() function returns the total marks of a student.**
- 4.The avg() function returns the average marks of a student.**

NOTE: The program should create an object of the class and call the member functions.

SOLUTION:

PROGRAM:

```
#include <iostream>
#include<string>
using namespace std;
class Result
{
private:
    int rno, marks[3];
    char name[50];
```

public:

void input ()

```
{    cout<<"Enter name:";
    gets(name);
    cout<<"Enter Roll No:";
    cin>>rno;
    for(int i=0; i<3; i++)
    {
        cout<<"Enter marks ["<<i<<"]: ";
        cin>>marks[i];
    }
}
```

void show ()

```
{
    cout<<"Name= "<<name<<endl;
    cout<<"Roll No= "<<rno<<endl;
    for(int i=0; i<3; i++)
        cout<<"Marks["<<i<<"]: "<<marks[i]<<endl;
}
```

```
int total ()
{
    int t=0;
    for(int i=0; i<3; i++)
        t=t+maks[i];
    return t;
}

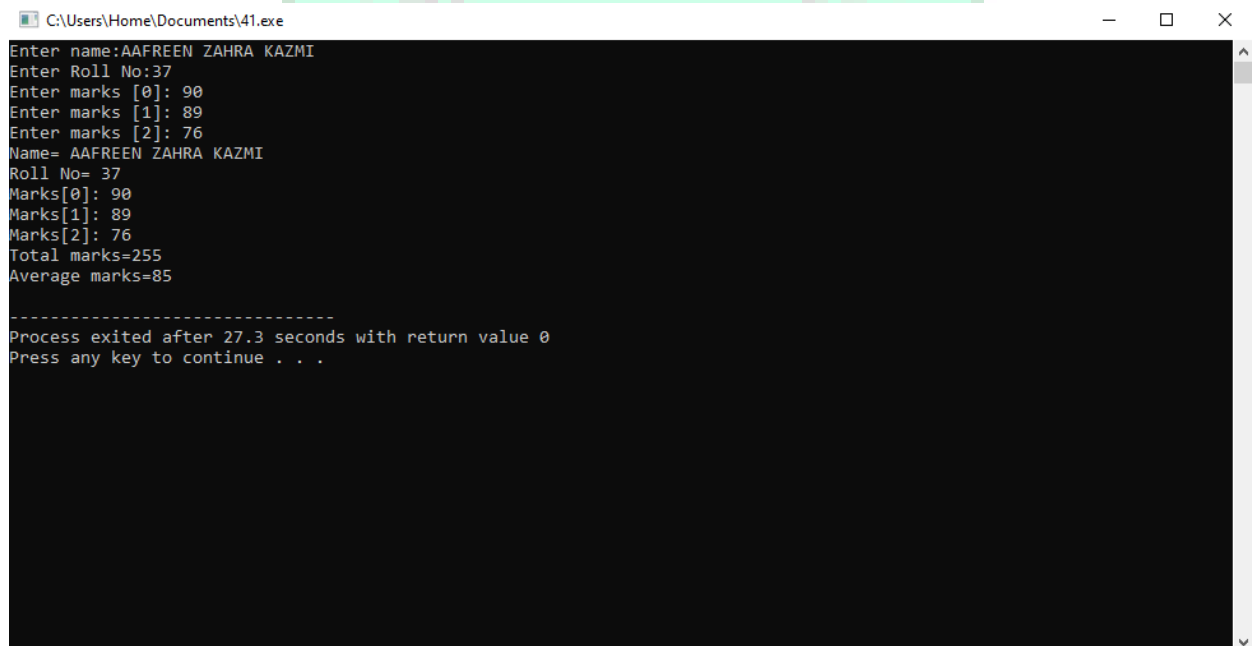
float avg ()
{
    int t=0;
    for(int i=0; i<3; i++)
        t=t+maks[i];
    return t/3.0;
}

};

int main ()
{
    Result r;
    r.input();
```

```
r.show();  
  
cout<<"Total marks="<<r.total()<<endl;  
cout<<"Average marks="<<r.avg()<<endl;  
  
return 0;  
  
}
```

Output:



The screenshot shows a Windows command prompt window titled "C:\Users\Home\Documents\41.exe". The program prompts the user to enter a name, roll number, and three marks. The user enters "AAFREEN ZAHRA KAZMI", "37", and marks "90", "89", and "76". The program then displays the total marks (255) and average marks (85). The window also shows the process exit message and a prompt to press any key to continue.

```
C:\Users\Home\Documents\41.exe  
Enter name:AAFREEN ZAHRA KAZMI  
Enter Roll No:37  
Enter marks [0]: 90  
Enter marks [1]: 89  
Enter marks [2]: 76  
Name= AAFREEN ZAHRA KAZMI  
Roll No= 37  
Marks[0]: 90  
Marks[1]: 89  
Marks[2]: 76  
Total marks=255  
Average marks=85  
-----  
Process exited after 27.3 seconds with return value 0  
Press any key to continue . . .
```



LAB TASK:5

QUESTION: 1

Write a program that declares a class with one integer data member and two member functions in () and out () to input and output data in data member by using scope resolution.

SOLUTION:

PROGRAM:

```
#include <iostream>
using namespace std;
class Test {
    int n;
public:
    void in ();
    void out ();
};
void Test::in()
{
    cout<<"Enter a number:";
    cin>>n;
}
void Test::out()
```

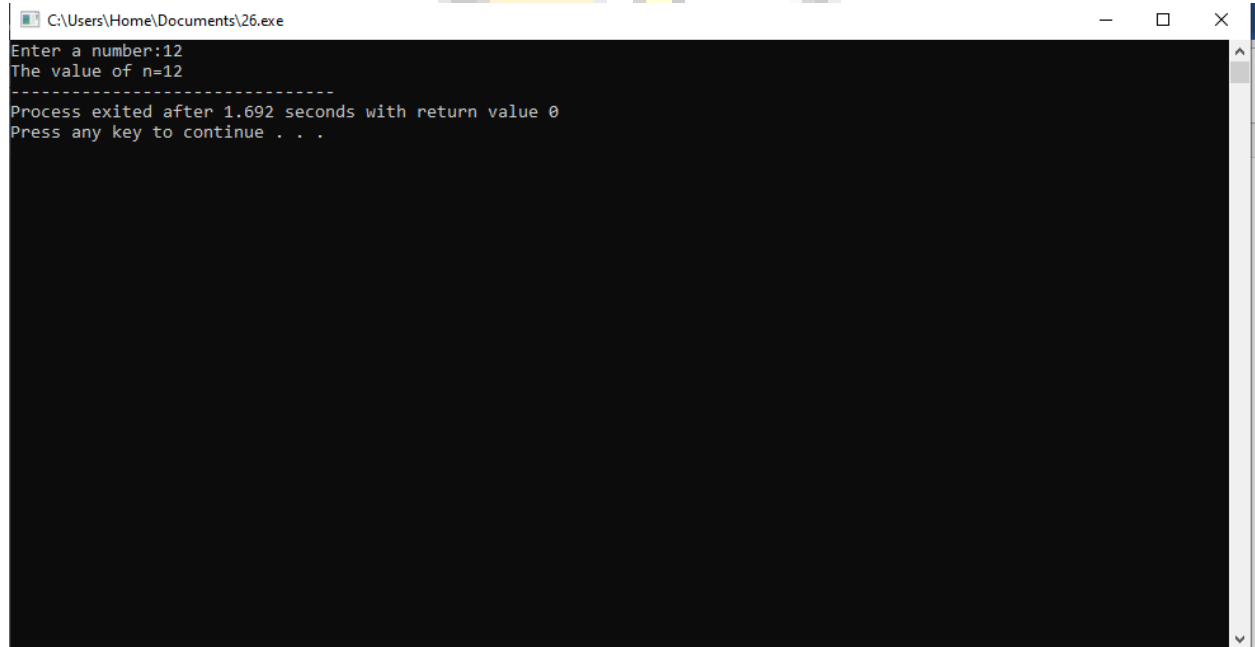
```
{  
    cout<<"The value of n="<<n;  
}
```

```
int main ()
```

```
{  
Test obj;  
obj.in();  
obj.out();  
return 0;  
}
```



Output:



```
C:\Users\Home\Documents\26.exe
Enter a number:12
The value of n=12
-----
Process exited after 1.692 seconds with return value 0
Press any key to continue . . .
```



QUESTION: 2

Write a class circle with one data members radius. Write three member functions

- 1) get_radius() to set radius value with parameter value,
- 2) area() to display radius and
- 3) circum() to calculate and display circumference of circle.

SOLUTION:

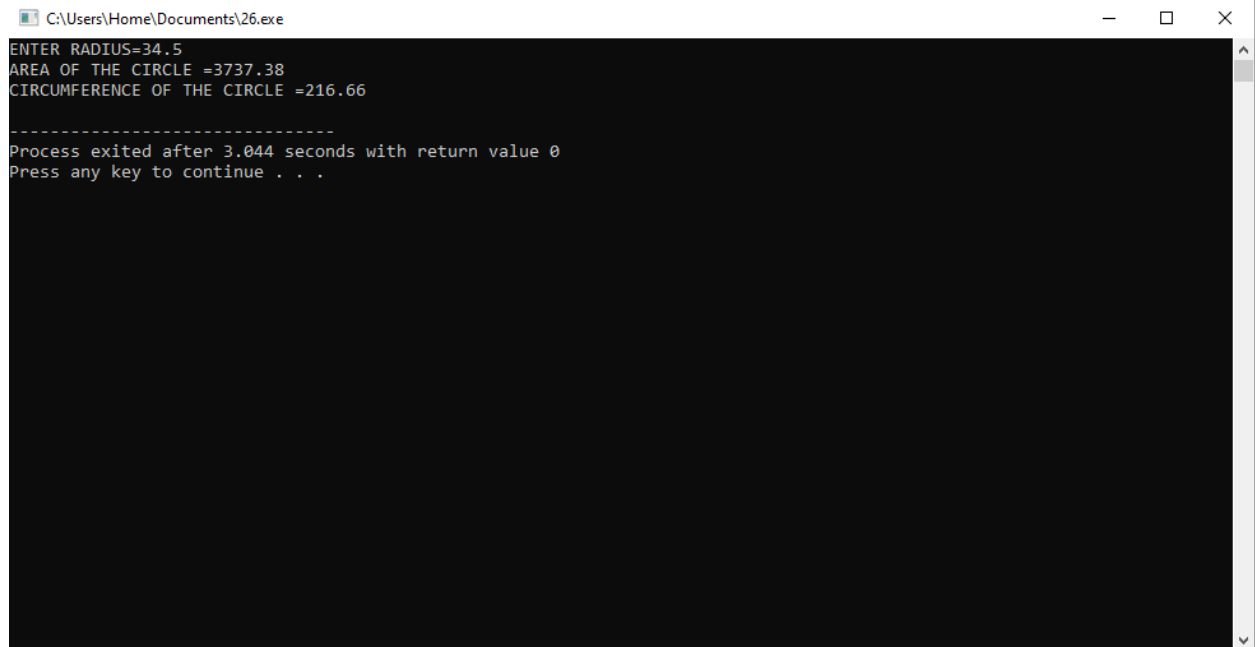
PROGRAM:

```
#include<iostream>
using namespace std;
class circle
{
    float radius;
public:
    void get_radius(float r);
    void area();
    void circum();
};
void circle ::get_radius(float r)
{
```

```
        radius=r;
    }
    void circle ::area()
    {
        cout<<"AREA OF THE CIRCLE
    = "<<3.14*radius*radius<<endl;
    }
    void circle ::circum()
    {
        cout<<"CIRCUMFERENCE OF THE CIRCLE
    = "<<2*3.14*radius<<endl;
    }
    int main()
    {
        float r;
        cout<<"ENTER RADIUS=";
        cin>>r;
        circle c1;
        c1.get_radius(r);
        c1.area();
```

```
c1.circum();  
  
return 0;  
  
}
```

Output:



```
C:\Users\Home\Documents\26.exe  
ENTER RADIUS=34.5  
AREA OF THE CIRCLE =3737.38  
CIRCUMFERENCE OF THE CIRCLE =216.66  
-----  
Process exited after 3.044 seconds with return value 0  
Press any key to continue . . .
```



QUESTION: 3

Write a program that make a student class and write data members and get these data members in the member function of in () and display them in the member function of display ().

SOLUTION:

PROGRAM:

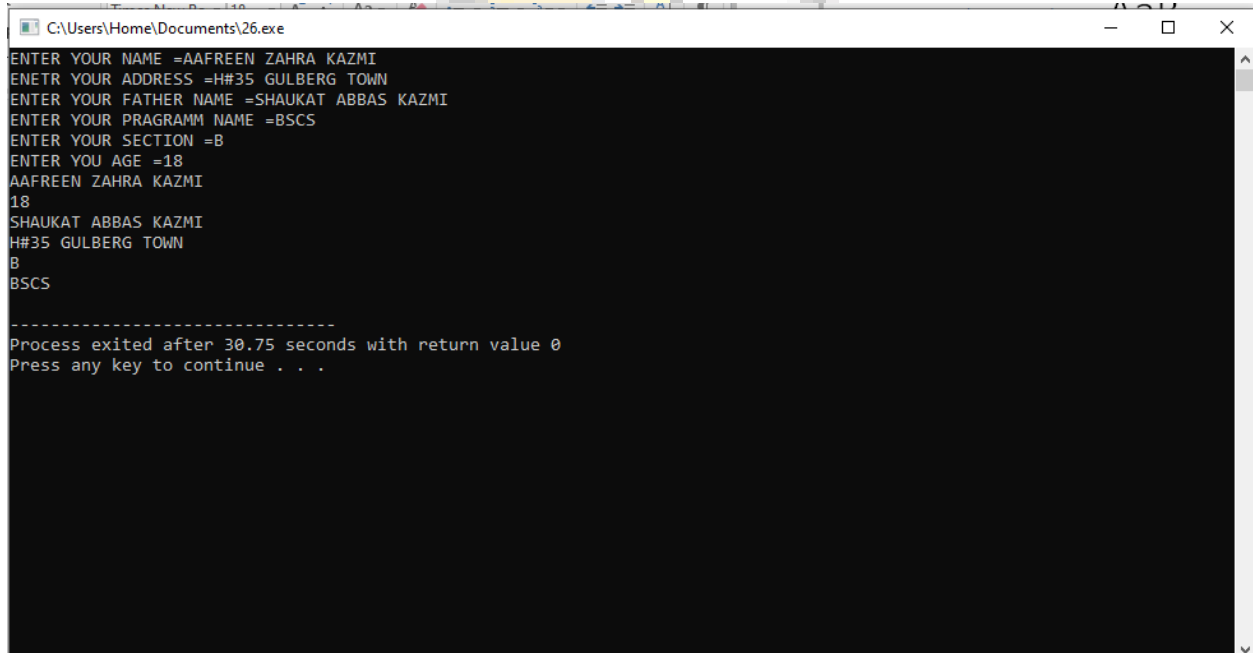
```
#include<iostream>
using namespace std;
class student
{
int age;
char name[100];
char fathename[100];
char program[100];
char address[100];
int rollno;
char section[30];
public:
void in();
void display();
```

```
};  
void student :: in()  
{  
    cout<<"ENTER YOUR NAME =";  
    cin.getline(name,100);  
    cout<<"ENETR YOUR ADDRESS =";  
    cin.getline(address,100);  
    cout<<"ENTER YOUR FATHER NAME =";  
    cin.getline(fathername,100);  
    cout<<"ENTER YOUR PRAGRAMM NAME =";  
    cin>>program;  
    cout<<"ENTER YOUR SECTION =";  
    cin>>section;  
    cout<<"ENTER YOU AGE =";  
    cin>>age;  
}  
void student :: display()  
{
```

```
cout<<name<<endl;
cout<<age<<endl;
cout<<fathername<<endl;
cout<<address<<endl;
cout<<section<<endl;
cout<<program<<endl;
}
int main()
{
    student s1;
    s1.in();
    s1.display();
    return 0;
}
```



OUTPUT:



```
C:\Users\Home\Documents\26.exe
ENTER YOUR NAME =AAFREEN ZAHRA KAZMI
ENETR YOUR ADDRESS =H#35 GULBERG TOWN
ENTER YOUR FATHER NAME =SHAUKAT ABBAS KAZMI
ENTER YOUR PROGRAMM NAME =BSCS
ENTER YOUR SECTION =B
ENTER YOU AGE =18
AAFREEN ZAHRA KAZMI
18
SHAUKAT ABBAS KAZMI
H#35 GULBERG TOWN
B
BSCS

-----
Process exited after 30.75 seconds with return value 0
Press any key to continue . . .
```



QUESTION: 4

Create a class calculator that performs the following function;

- a) Addition
- b) Subtraction
- c) Multiplication
- d) Division

Use concept of passing parameters.

SOLUTION:

PROGRAM:

```
#include<iostream>

using namespace std;

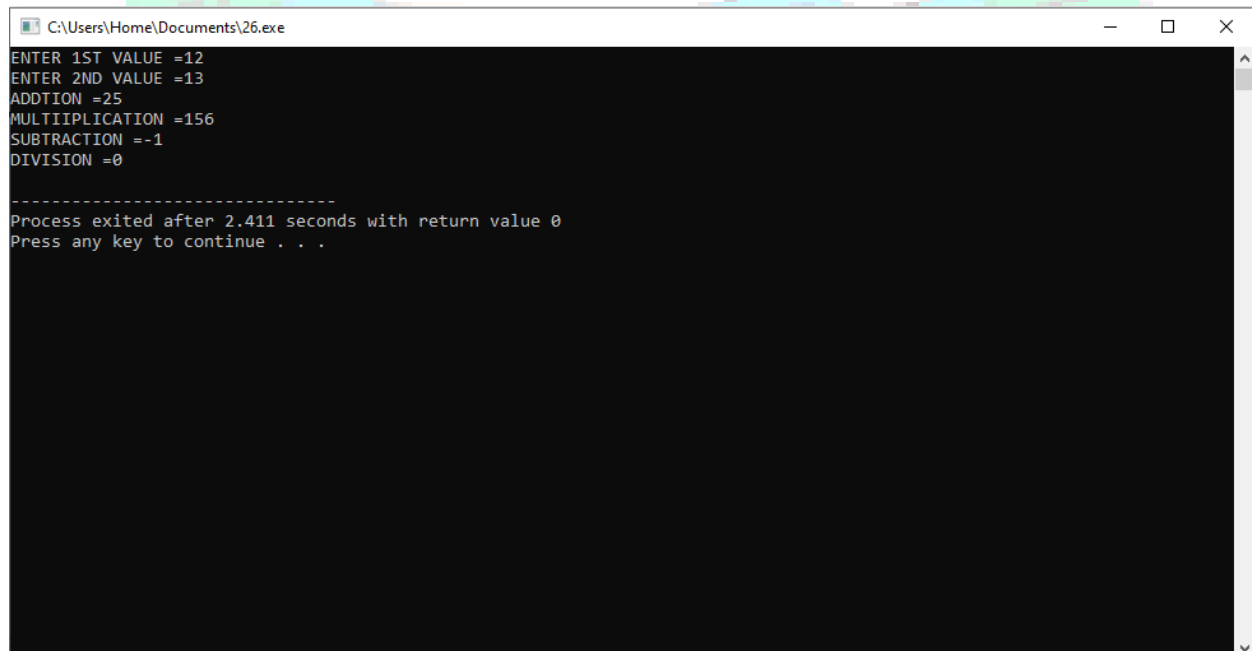
class calculator
{
public:
void addition(int a,int b);
void subtraction(int a,int b);
void multiplication(int a,int b);
void division(int a,int b);
};

void calculator ::addition(int a,int b)
{
```

```
        cout<<"ADDITION ="<<a+b<<endl;
    }
    void calculator ::subtraction(int a,int b)
    {
        cout<<"SUBTRACTION ="<<a-b<<endl;
    }
    void calculator ::multiplication(int a,int b)
    {
        cout<<"MULTIPLICATION ="<<a*b<<endl;
    }
    void calculator ::division(int a,int b)
    {
        cout<<"DIVISION ="<<a/b<<endl;
    }
    int main()
    {
        int a,b;
        cout<<"ENTER 1ST VALUE =";
        cin>>a;
```

```
cout<<"ENTER 2ND VALUE =";  
cin>>b;  
calculator c1;  
c1.addition(a,b);  
c1.multiplication(a,b);  
c1.subtraction(a,b);  
c1.division(a,b);  
return 0;  
}
```

Output:



```
C:\Users\Home\Documents\26.exe  
ENTER 1ST VALUE =12  
ENTER 2ND VALUE =13  
ADDITION =25  
MULTIPLICATION =156  
SUBTRACTION =-1  
DIVISION =0  
-----  
Process exited after 2.411 seconds with return value 0  
Press any key to continue . . .
```

QUESTION: 5

Write a program that has the class `swipe_test` that has two integer data members in one function and swap these data members in another function. Use the concept of classes and object in the main function .

SOLUTION:

PROGRAM:

```
#include<iostream>

using namespace std;

class swipe_test
{
    int a,b;
    public:
    void in();
    void swipe();
};

void swipe_test ::in()
{
    cout<<"ENTER VALUE OF a=";
    cin>>a;
    cout<<"ENTER VALUE OF b=";
```

```
cin>>b;

cout<<"BEFORE SWAPING:"<<endl;

cout<<"VALUE OF a="<<a<<endl;

cout<<"VALUE OF b="<<b<<endl;

}

void swipe_test ::swipe()

{

    int c;

    c=a;

    a=b;

    b=c;

    cout<<"AFTER SWAPING:"<<endl;

    cout<<"VALUE OF a="<<a<<endl;

    cout<<"VALUE OF b="<<b<<endl;

}

int main()

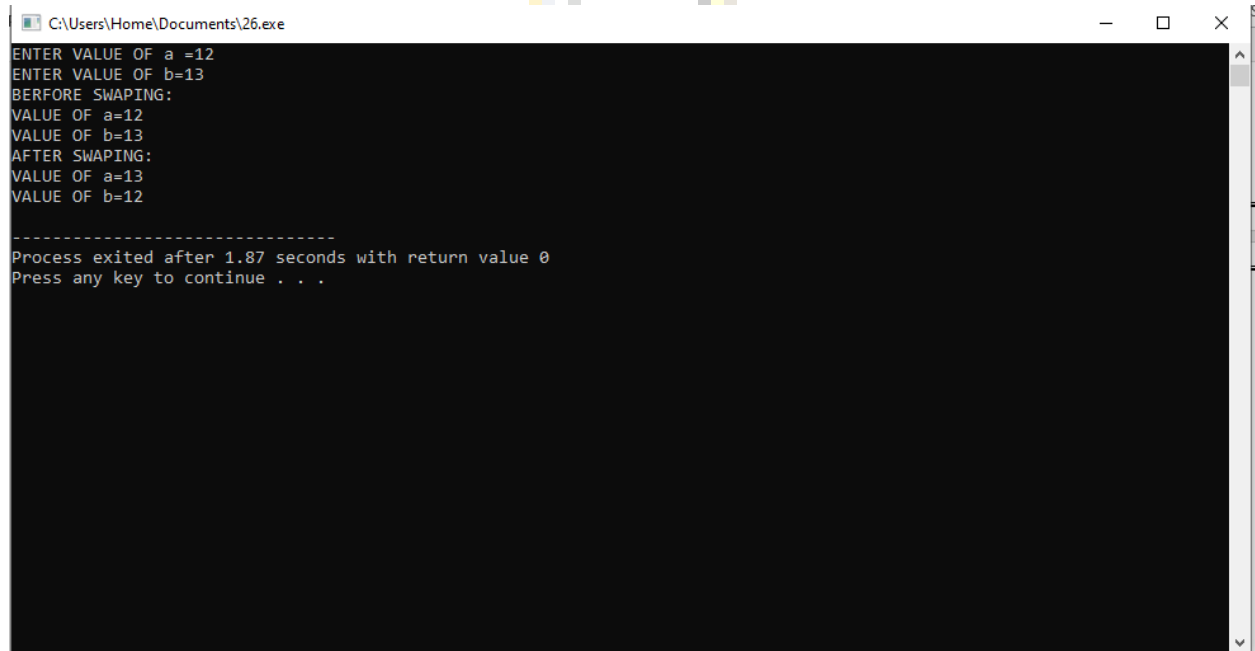
{

    swipe_test st1;

    st1.in();
```

```
    st1.swipe();  
  
    return 0;  
  
}
```

Output:



```
C:\Users\Home\Documents\26.exe  
ENTER VALUE OF a =12  
ENTER VALUE OF b=13  
BEFORE SWAPING:  
VALUE OF a=12  
VALUE OF b=13  
AFTER SWAPING:  
VALUE OF a=13  
VALUE OF b=12  
  
-----  
Process exited after 1.87 seconds with return value 0  
Press any key to continue . . .
```



QUESTION: 6

Write a class Book with three data members BookID, Pages and Price. It also contains the following funtions:

- 1) The get() function is used to input values
- 2) The show() function is used to display values
- 3) The set() function is used to set the values of data members using parameters.
- 4) The getPrice() function is used to return the value of Book.

NOTE: The program should create two objects of the class and input values of object 1 and set values of object 2. The program will display the details of the most costly book.

SOLUTION:

PROGRAM:

```
#include <iostream>
using namespace std;
class Book
{
private:
    int BookID,Pages;
    float Price;
public:
    void get ();
```

```
void show ();  
void set (int id, int pg, float pr);  
float getPrice ();  
};  
void Book ::get()  
{  
    cout<<"Enter BookID:";  
    cin>>BookID;  
    cout<<"Enter Pages:";  
    cin>>Pages;  
    cout<<"Enter Price:";  
    cin>>Price;  
}  
void Book ::show()  
{  
    cout<<"BookID= "<<BookID<<endl;  
    cout<<"Pages= "<<Pages<<endl;  
    cout<<"Price= "<<Price;  
}
```



```
void Book :: set (int id, int pg, float pr)
```

```
{
```

```
    BookID=id;
```

```
    Pages=pg;
```

```
    Price=pr;
```

```
}
```

```
float Book ::getPrice()
```

```
{
```

```
    return Price;
```

```
}
```

```
int main ()
```

```
{
```

```
    Book b1, b2;
```

```
    b1.get();
```

```
    b2.set(20, 320, 40.5);
```

```
    cout<<"most costly book ="<<endl;
```

```
    if(b1.getPrice()>b2.getPrice())
```

```
        b1.show();
```

```
    else
```

```
b2.show();  
  
return 0;  
  
}
```

Output:



```
C:\Users\Home\Documents\26.exe  
Enter BookID:1214  
Enter Pages:786  
Enter Price:890.9  
most costly book =  
BookID= 1214  
Pages= 786  
Price= 890.9  
-----  
Process exited after 30.82 seconds with return value 0  
Press any key to continue . . .
```



QUESTION: 7

Write a class that has the displays a simple message on the screen whenever an object of that class is created.

SOLUTION:

PROGRAM:

```
#include <iostream>

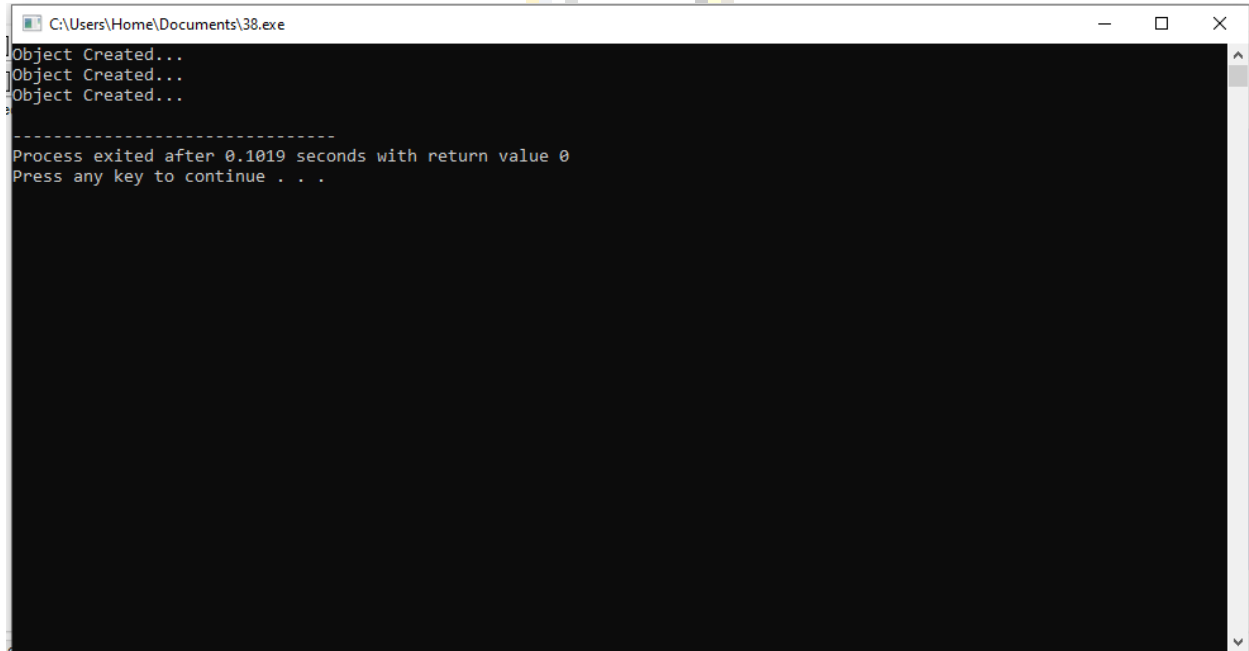
using namespace std;

class Hello
{
    private:
    int n;
    public:
    Hello()
    {
        cout<<"Object Created..."<<endl;
    }
};

int main ()
{
```

```
Hello x, y,z;  
  
return 0;  
  
}
```

Output:



A screenshot of a Windows command prompt window titled "C:\Users\Home\Documents\38.exe". The window has a black background with white text. The output shows three lines of "Object Created..." followed by a separator line of dashes. Below the dashes, it says "Process exited after 0.1019 seconds with return value 0" and "Press any key to continue . . .".

```
C:\Users\Home\Documents\38.exe  
Object Created...  
Object Created...  
Object Created...  
-----  
Process exited after 0.1019 seconds with return value 0  
Press any key to continue . . .
```



QUESTION: 8

Write a Number class that contains two integer data members which are initialized to 100 when an object is created. It has a member function avg() that displays the average of data members.

SOLUTION:

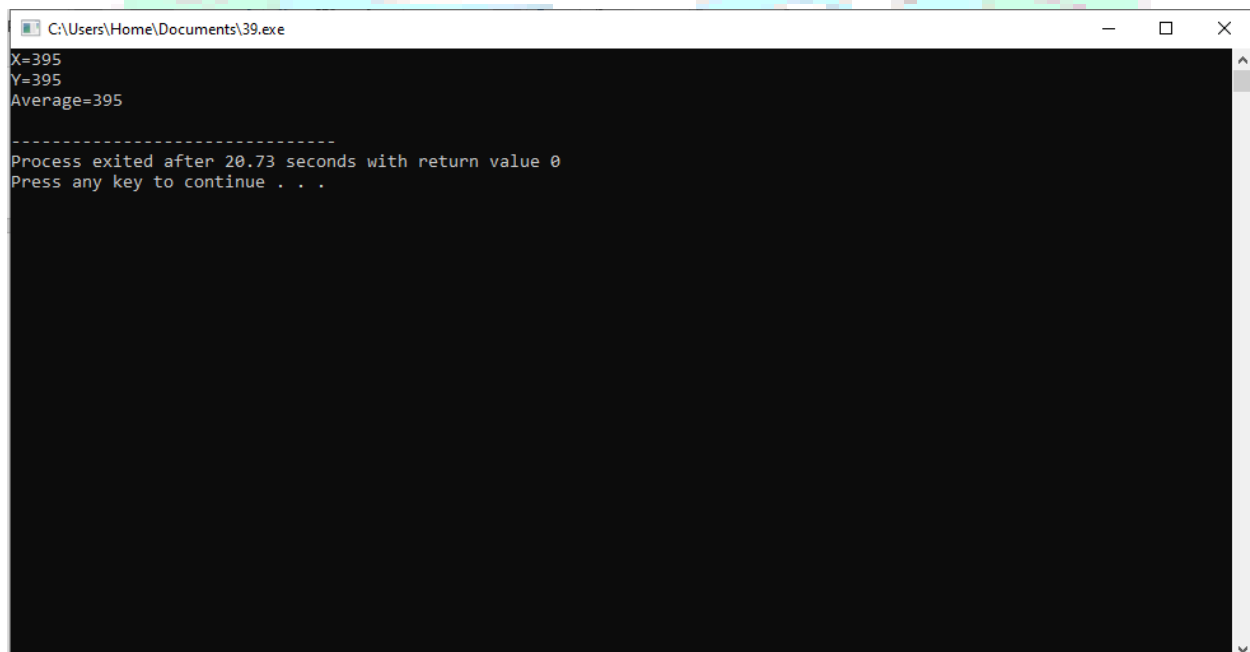
PROGRAM:

```
#include <iostream>
using namespace std;
class Number
{
    private:
        int x,y;
    public:
        Number()
        {
            x=y=395;
        }
        void avg()
        {   cout<<"X="<<x<<endl;
            cout<<"Y="<<y<<endl;
```

```
        cout<<"Average="<<(x+y)/2<<endl;
    }
};

int main ()
{
    Number n;
    n.avg();
    return 0;
}
```

Output:



```
C:\Users\Home\Documents\39.exe
X=395
Y=395
Average=395

-----
Process exited after 20.73 seconds with return value 0
Press any key to continue . . .
```

QUESTION: 9

Write a class Student that has marks and grade as data members. A constructor with two parameters initializes data members with the given values and member function show() displays the values of data members. Create two objects and display the values.

SOLUTION:

PROGRAM:

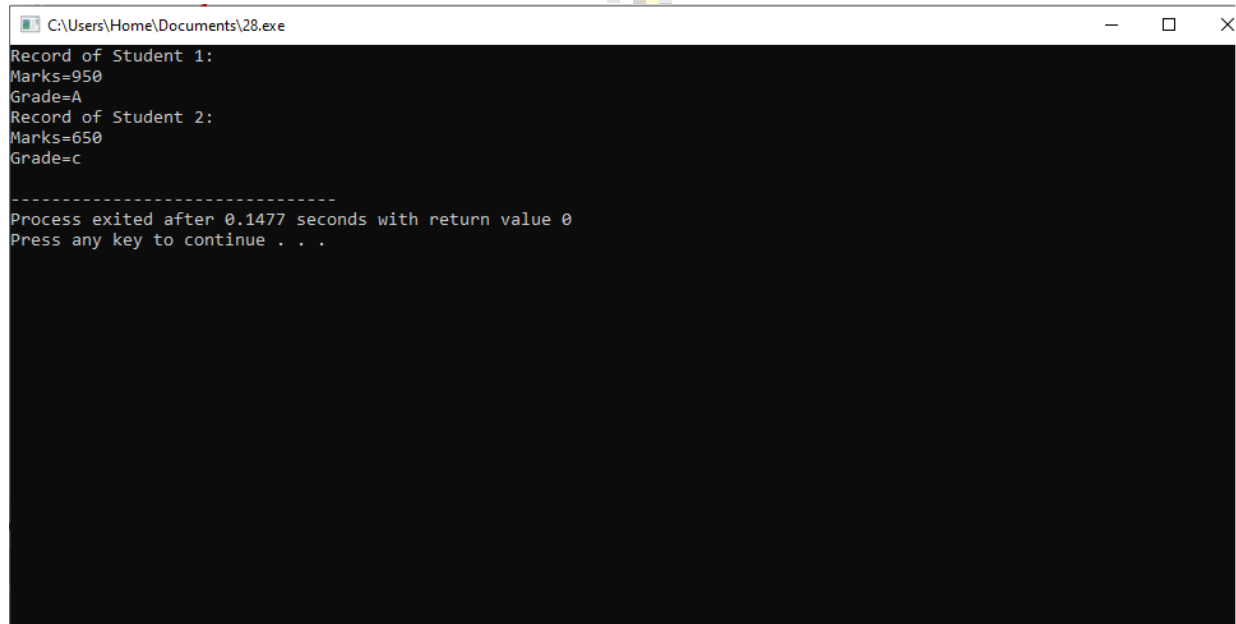
```
#include <iostream>
using namespace std;
class Student
{
    private:
        int marks;
        char grade;
    public:
        Student(int m, char g)
        {
            marks=m;
            grade=g;
        }
}
```

```
void show()
{
    cout<<"Marks="<<marks<<endl;
    cout<<"Grade="<<grade<<endl;
}

};

int main ()
{
    Student s1(950, 'A'), s2(650, 'c');
    cout<<"Record of Student 1:"<<endl;
    s1.show();
    cout<<"Record of Student 2:"<<endl;
    s2.show();
    return 0;
}
```


Output:



```
C:\Users\Home\Documents\28.exe
Record of Student 1:
Marks=950
Grade=A
Record of Student 2:
Marks=650
Grade=c
-----
Process exited after 0.1477 seconds with return value 0
Press any key to continue . . .
```



QUESTION: 10

Write a class Array that contains an array of integers to store five values. It also contains the following member functions:

- 1.The fill() function is used to fill the array with the values from the user.
- 2.The display() function is used to display values of array.
- 3.The max() function shows the maximum value in the array.
- 4.The min() function shows the minimum value in the array.

NOTE: All member function should be defined outside the class.

SOLUTION:

PROGRAM:

```
#include <iostream>
using namespace std;
class Array
{
private:
    int a[5];
public:
    void fill();
    void display();
    int max();
```

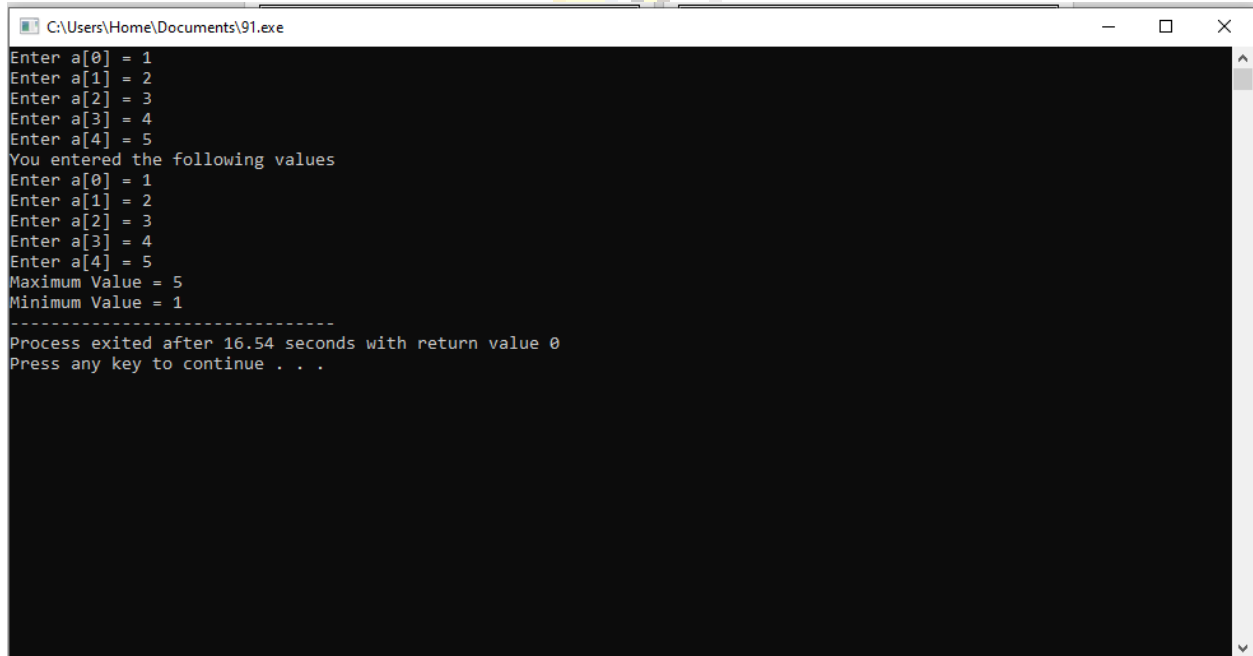
```
int min();  
};  
void Array::fill()  
{  
    for(int i=0; i<5;i++)  
    {  
        cout<<"Enter a["<<i<<" = ";  
        cin>>a[i];  
    }  
}  
void Array::display()  
{  
    for(int i=0; i<5;i++)  
        cout<<"Enter a["<<i<<" = "<<a[i]<<endl;  
}  
int Array::max()  
{  
    int m=a[0];  
    for(int i=0; i<5;i++)
```

```
        if(m<a[i])
            m=a[i];
        return m;
    }
    int Array::min()
    {
        int m=a[0];
        for(int i=0; i<5;i++)
            if(m>a[i])
                m=a[i];
        return m;
    }
    int main () {
        Array arr;
        arr.fill();
        cout<<"You entered the following values"<<endl;
        arr.display();
        cout<<"Maximum Value = "<<arr.max()<<endl;
        cout<<"Minimum Value = "<<arr.min();
```

```
return 0;
```

```
}
```

Output:



```
C:\Users\Home\Documents\91.exe
Enter a[0] = 1
Enter a[1] = 2
Enter a[2] = 3
Enter a[3] = 4
Enter a[4] = 5
You entered the following values
Enter a[0] = 1
Enter a[1] = 2
Enter a[2] = 3
Enter a[3] = 4
Enter a[4] = 5
Maximum Value = 5
Minimum Value = 1
-----
Process exited after 16.54 seconds with return value 0
Press any key to continue . . .
```



QUESTION: 11

Write a class Marks with three data members to store three marks. Write three member functions

1)in() to input marks,

2)sum() to calculate and return the sum and

3) avg() to calculate and return the average marks.

Using scope resolution.

SOLUTION:

PROGRAM:

```
#include <iostream>
```

```
using namespace std;
```

```
class Marks
```

```
{
```

```
    private:
```

```
    int a,b,c;
```

```
    public:
```

```
    void in();
```

```
    int sum();
```

```
    int avg();
```

```
};
```

```
void Marks::in ()
{ cout<<"Enter three marks:";
  cin>>a>>b>>c;
}

int Marks::sum ()
{ return(a+b+c); }

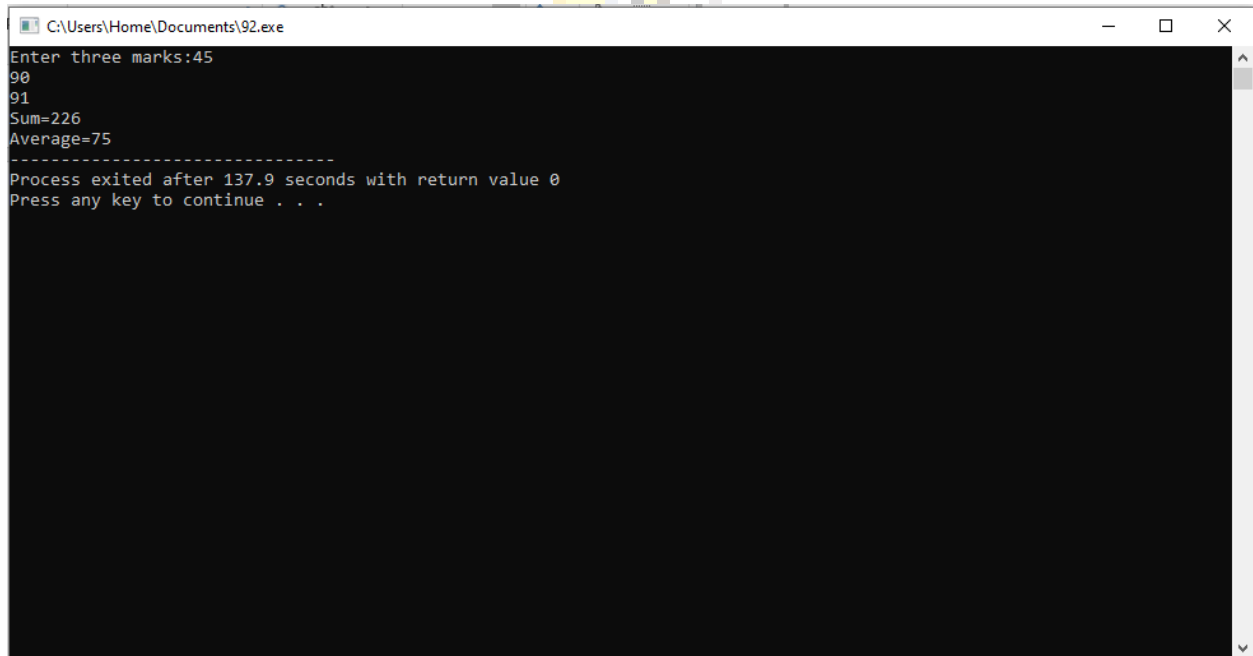
int Marks::avg ()
{ return(a+b+c)/3.0;
}

int main ()
{
  Marks m;
  int s;
  float a;
  m.in();
  s=m.sum();
  a=m.avg();
  cout<<"Sum="<<s<<endl;
  cout<<"Average="<<a;
```

```
return 0;
```

```
}
```

Output:



A screenshot of a Windows command prompt window titled "C:\Users\Home\Documents\92.exe". The window has a black background with white text. The text shows the program's execution: it prompts for three marks (45, 90, 91), calculates a sum (226) and an average (75), and then displays a message indicating the process exited after 137.9 seconds with a return value of 0, followed by a prompt to press any key to continue.

```
C:\Users\Home\Documents\92.exe
Enter three marks:45
90
91
Sum=226
Average=75
-----
Process exited after 137.9 seconds with return value 0
Press any key to continue . . .
```



QUESTION #12

Write a class Result that contains rollno, name and marks of three subjects. The marks are stored in an array of integers. The class also contains the following member functions:

- 1.The input() function is used to input values in data members**
- 2.The show() function is used to display values of data members**
- 3.The total() function returns the total marks of a student.**
- 4.The avg() function returns the average marks of a student.**

NOTE: The program should create an object of the class and call the member functions.[using scope resolution]

SOLUTION:

PROGRAM:

```
#include <iostream>
#include<string>
using namespace std;
class Result
{
private:
    int rno, marks[3];
    char name[50];
```

public:

void input();

void show();

int total();

float avg();

};

void Result::input ()

{ cout<<"Enter name:";

 gets(name);

 cout<<"Enter Roll No:";

 cin>>rno;

 for(int i=0; i<3; i++)

 {

 cout<<"Enter marks ["<<i<<"]: ";

 cin>>marks[i];

 }

}

void Result::show ()

{

```
cout<<"Name= "<<name<<endl;
cout<<"Roll No= "<<rno<<endl;
for(int i=0; i<3; i++)
cout<<"Marks["<<i<<"]: "<<marks[i]<<endl;
}

int Result::total ()
{
    int t=0;
    for(int i=0; i<3; i++)
        t=t+marks[i];
    return t;
}

float Result::avg ()
{
    int t=0;
    for(int i=0; i<3; i++)
        t=t+marks[i];
    return t/3.0;
}
```

```
int main ()
{
    Result r;
    r.input();
    r.show();
    cout<<"Total marks="<<r.total()<<endl;
    cout<<"Average marks="<<r.avg()<<endl;
    return 0;
}
```

Output:



```
C:\Users\Home\Documents\93.exe
Enter name:aafreen
Enter Roll No:37
Enter marks [0]: 80
Enter marks [1]: 90
Enter marks [2]: 98
Name= aafreen
Roll No= 37
Marks[0]: 80
Marks[1]: 90
Marks[2]: 98
Total marks=268
Average marks=89.3333
-----
Process exited after 25.26 seconds with return value 0
Press any key to continue . . .
```



QUESTION #13

LAB TASKS

- I. Create a class **Rectangle** keeping in mind that rectangle have **length** and **width**. One should be able to calculate the **perimeter ()** and the **area()** of the rectangle, can **set** a value to length and width and **retrieve** the value of Length & width. Where

$0 < \text{length} < 21$

$0 < \text{width} < 21$

Area of Rectangle=length*width;

Perimeter of Rectangle=(length+width)*2;

TEST PLANS

Commands	Output
Rectangle r;	
r.set(2);	
r.getLength();	
r.set(50);	
r.getLength();	
Rectangle f=r;	
f.set(-20);	
f.getLength();	

SOLUTION:

PROGRAM:

```
#include<iostream>
```

```
using namespace std;
```

```
class Rectangle
```

```
{
```

```
    float length,width;
```

```
public:
    void set(float,float);
    void perimeter();
    void area();
    void retrive();
};

void Rectangle::set(float a,float b)
{
    width=a;
    length=b;
}

void Rectangle::perimeter()
{
    float p;
    p=length+width*2;
    cout<<"Perimeter="<<p;
}

void Rectangle::area()
{
```

```
float A;

A=length*width;

cout<<"Area ="<<A;

}

void Rectangle::retrive()

{

    cout<<"WIDTH ="<<width;

    cout<<"LENGTH ="<<length;

}

main()

{

    Rectangle R1;

    R1.set(27.5,50.6);

    R1.perimeter();

    R1.area();

    R1.retrive();

}
```

Output:


```
C:\Users\Home\Documents\94.exe
Perimeter=105.6Area =1391.5WIDTH =27.5LENGTH =50.6
-----
Process exited after 8.502 seconds with return value 0
Press any key to continue . . .
```





LAB TASK:6

QUESTION: 1

Create a class with name Employee and take 4 data member of name, address, department, salary. A constructor with no parameters initializes string to '\0' and int to 0. A constructor with four parameters initializes data members with the given values and member function show () displays the values of data members.

SOLUTION:

PROGRAM:

```
#include<iostream>
#include<string>
using namespace std;
class Employee
{
    private:
        int age;
        int salary;
        char phone_number[15];
        char name[50];
    public:
        Employee()
        {
```

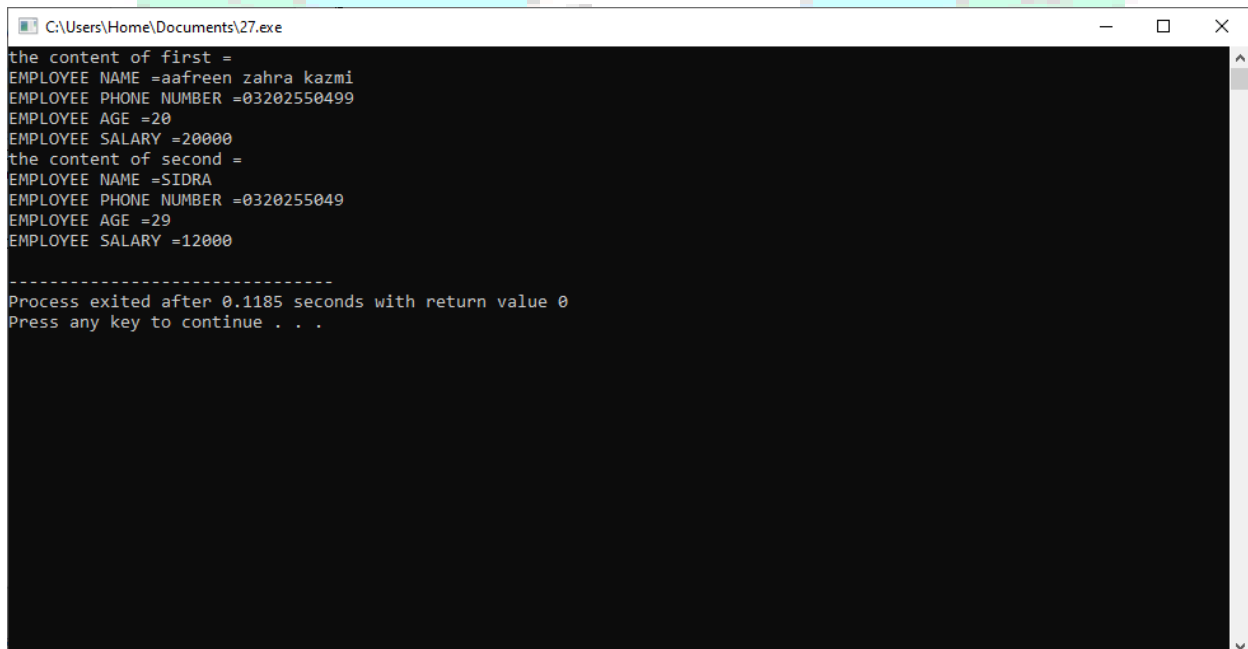
```
    age=20;
    salary=20000;
    strcpy(phone_number,"03202550499");
    strcpy(name,"aafreen zahra kazmi");
}

Employee(char N[50],char Ph[15],int slry,int AGE)
{
    age=AGE;
    strcpy(name,N);
    strcpy(phone_number,Ph);
    salary=slry;
}

void display()
{
    cout<<"EMPLOYEE NAME ="<<name<<endl;
    cout<<"EMPLOYEE PHONE NUMBER
="<<phone_number<<endl;
    cout<<"EMPLOYEE AGE ="<<age<<endl;
    cout<<"EMPLOYEE SALARY ="<<salary<<endl;
```

```
    }  
};  
  
int main()  
{  
    Employee first,second("SIDRA","0320255049",12000,29);  
    cout<<"the content of first ="<<endl;  
    first.display();  
    cout<<"the content of second ="<<endl;  
    second.display();  
    return 0;  
}
```

Output:



```
C:\Users\Home\Documents\27.exe  
the content of first =  
EMPLOYEE NAME =aafreen zahra kazmi  
EMPLOYEE PHONE NUMBER =03202550499  
EMPLOYEE AGE =20  
EMPLOYEE SALARY =20000  
the content of second =  
EMPLOYEE NAME =SIDRA  
EMPLOYEE PHONE NUMBER =0320255049  
EMPLOYEE AGE =29  
EMPLOYEE SALARY =12000  
  
-----  
Process exited after 0.1185 seconds with return value 0  
Press any key to continue . . .
```

QUESTION: 2

Write a class TV that contains attributes of Brand, Name, Model and Retail Price. Write a method to display all attributes and a method to change the attributes. Also write a constructor to initialize all attributes.

SOLUTION:

PROGRAM:

```
#include <iostream>
#include<string.h>
using namespace std;
class TV
{
    private:
        char BrandName[20];
        char Model[10];
        float RetailPrice;
    public:
        TV(char Brand[], char Mod[], float Price);
        void Change (char Brand[], char Mod[], float Price);
        void Display();
};
```

```
TV::TV(char Brand[], char Mod[], float Price)
```

```
{  
    strcpy(BrandName,Brand);  
    strcpy(Model,Mod);  
    RetailPrice=Price;  
}
```

```
void TV:: Change (char Brand[], char Mod[], float Price)
```

```
{  
    strcpy(BrandName,Brand);  
    strcpy(Model, Mod);  
    RetailPrice=Price;  
}
```

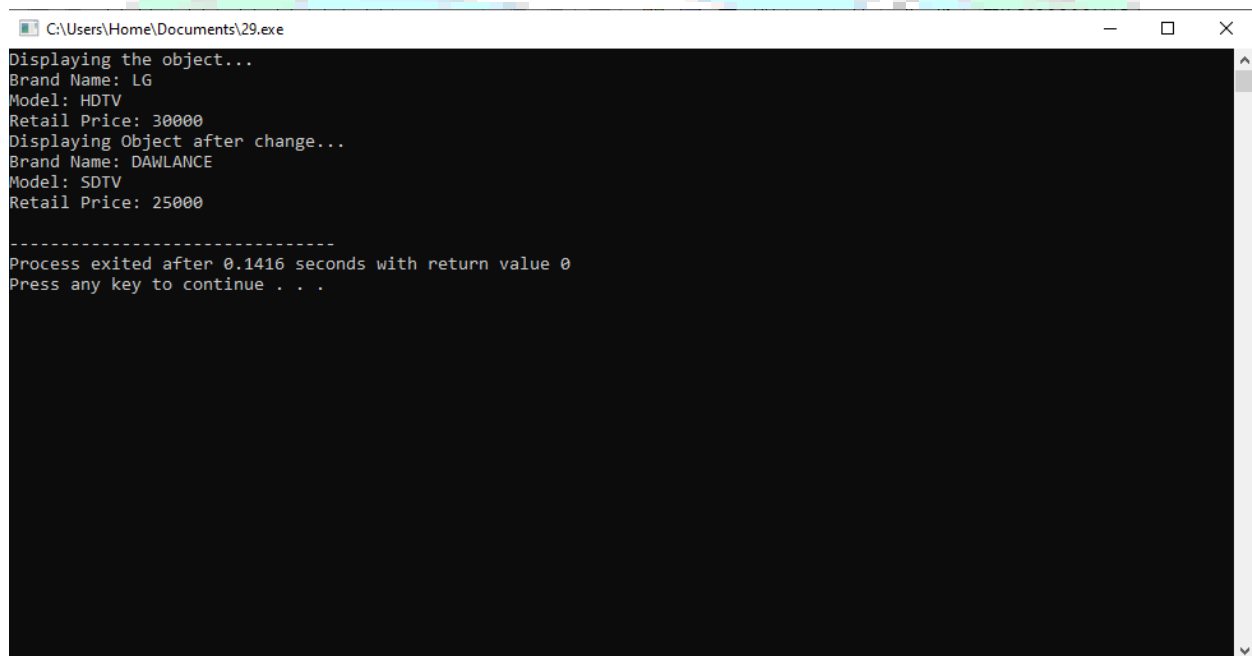
```
void TV:: Display()
```

```
{  
    cout<<"Brand Name: "<<BrandName<<endl;  
    cout<<"Model: "<<Model<<endl;  
    cout<<"Retail Price: "<<RetailPrice<<endl;  
}
```

```
int main ()
```

```
{    TV Test("LG", "HDTV", 30000);  
    cout<<"Displaying the object..."<<endl;  
    Test.Display();  
    Test.Change("DAWLANCE", "SDTV", 25000);  
    cout<<"Displaying Object after change..."<<endl;  
    Test.Display();  
    return 0;  
}
```

Output:



```
C:\Users\Home\Documents\29.exe  
Displaying the object...  
Brand Name: LG  
Model: HDTV  
Retail Price: 30000  
Displaying Object after change...  
Brand Name: DAWLANCE  
Model: SDTV  
Retail Price: 25000  
-----  
Process exited after 0.1416 seconds with return value 0  
Press any key to continue . . .
```


QUESTION: 3

Write a class OVER that has num and ch as data members. A constructor with no parameters initializes num to 0 and ch to 'x'. A constructor with two parameters initializes data members with the given values and member function show() displays the values of data members.

SOLUTION:

PROGRAM:

```
#include <iostream>
```

```
using namespace std;
```

```
class Over
```

```
{
```

```
private:
```

```
int num;
```

```
char ch;
```

```
public:
```

```
Over()
```

```
{
```

```
num=0;
```

```
ch='J';
```

```
}
```

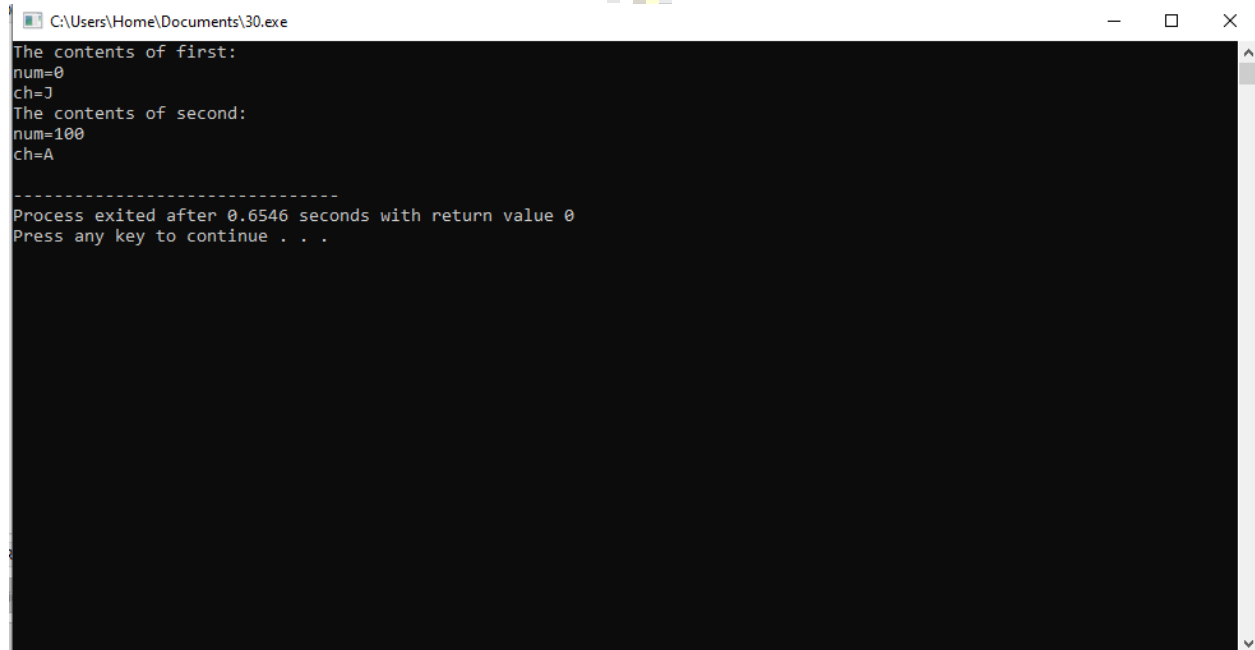
```
Over(int n, char c)
{
    num=n;
    ch=c;
}

void show()
{
    cout<<"num="<<num<<endl;
    cout<<"ch="<<ch<<endl;
}

};

int main ()
{
    Over first, second(100,'A');
    cout<<"The contents of first:"<<endl;
    first.show();
    cout<<"The contents of second:"<<endl;
    second.show();
    return 0;
}
```

Output:



A screenshot of a Windows command prompt window titled "C:\Users\Home\Documents\30.exe". The window has a black background with white text. The output shows the contents of two variables, 'first' and 'second', and then a message indicating the process has exited after 0.6546 seconds with a return value of 0. The prompt asks the user to press any key to continue.

```
C:\Users\Home\Documents\30.exe
The contents of first:
num=0
ch=J
The contents of second:
num=100
ch=A

-----
Process exited after 0.6546 seconds with return value 0
Press any key to continue . . .
```



QUESTION: 4

Write a class Book that has attributes for pages, price and title. It has two functions to input the values and display the values. Create three objects (b1,b2 and b3) of the class and input values.

SOLUTION:

PROGRAM:

```
#include <iostream>
using namespace std;
class Book
{
    private:
    int pg, pr;
    char title[50];
    public:
    void get()
    {
        cout<<"Enter title: ";
        gets(title);
        cout<<"Enter pages: ";
        cin>>pg;
```

```
    cout<<"Enter Price: ";
    cin>>pr;
}

void show()
{
    cout<<"Title: "<<title<<endl;
    cout<<"Pages: "<<pg<<endl;
    cout<<"Price: "<<pr<<endl;

}

};

int main ()
{
    Book b1;
    b1.get();
    Book b2(b1);
    Book b3=b1;
    cout<<"\n The detail of b1:"<<endl;
    b1.show();
}
```

```
cout<<"\n The detail of b2:"<<endl;

b2.show();

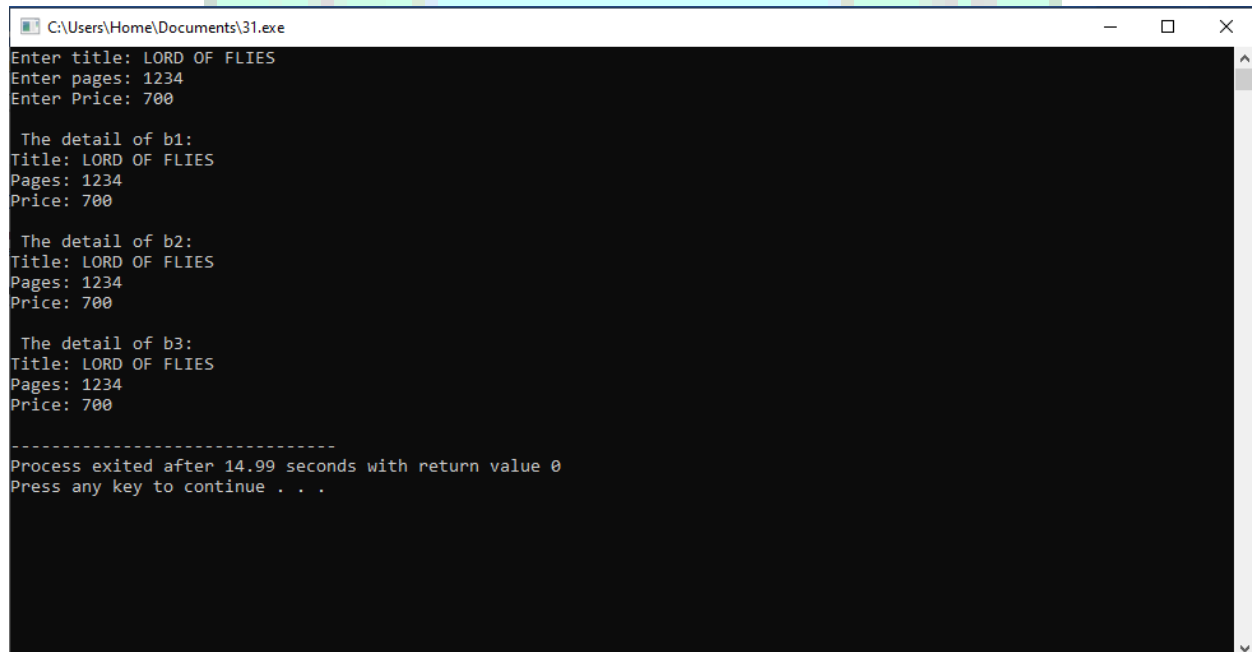
cout<<"\n The detail of b3:"<<endl;

b3.show();

return 0;

}
```

Output:



The screenshot shows a Windows command prompt window titled "C:\Users\Home\Documents\31.exe". The program prompts the user to enter book details. The user enters "LORD OF FLIES" for the title, "1234" for pages, and "700" for price. The program then displays the details for three books (b1, b2, and b3), all of which match the user input. At the bottom, it shows the process exit message: "Process exited after 14.99 seconds with return value 0. Press any key to continue . . .".

```
C:\Users\Home\Documents\31.exe
Enter title: LORD OF FLIES
Enter pages: 1234
Enter Price: 700

The detail of b1:
Title: LORD OF FLIES
Pages: 1234
Price: 700

The detail of b2:
Title: LORD OF FLIES
Pages: 1234
Price: 700

The detail of b3:
Title: LORD OF FLIES
Pages: 1234
Price: 700

-----
Process exited after 14.99 seconds with return value 0
Press any key to continue . . .
```

QUESTION: 5

Write a program that demonstrate the use of Destructor.

SOLUTION:

PROGRAM:

```
#include <iostream>

using namespace std;

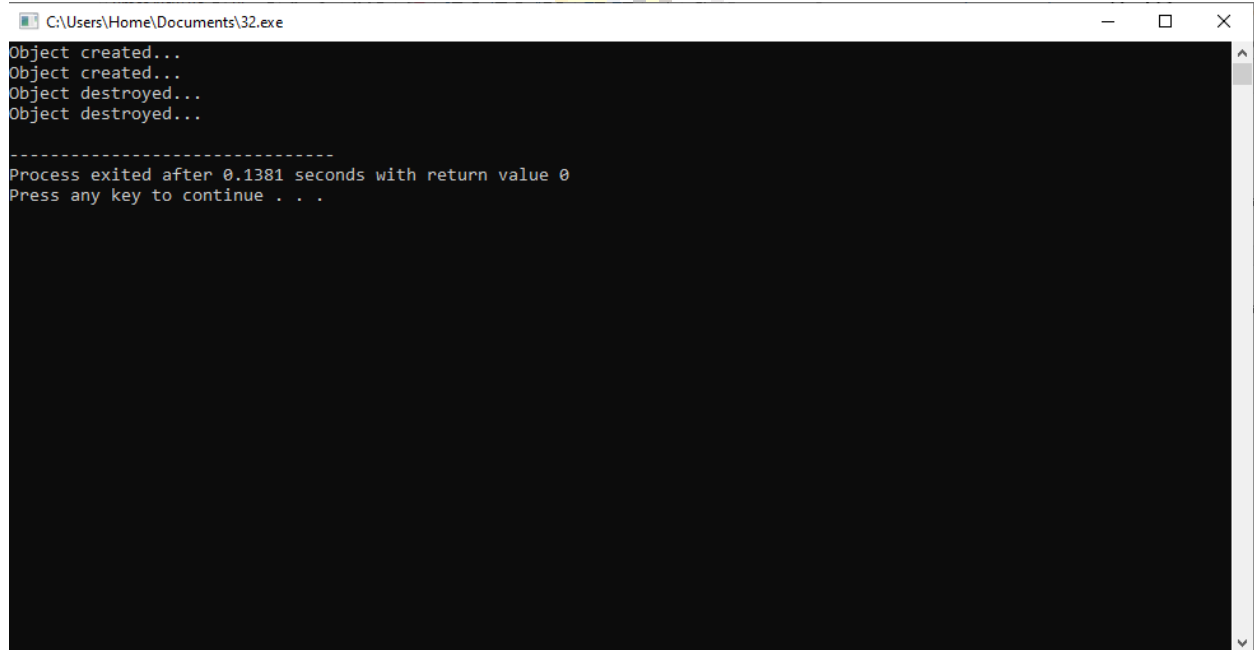
class Test {
    private:
    int n;
    public:
    Test()
    { cout<<"Object created..."<<endl; }
    ~Test()
    { cout<<"Object destroyed..."<<endl; } };

int main ()
{
    Test a, b;

    return 0;
```

}

Output:



```
C:\Users\Home\Documents\32.exe
Object created...
Object created...
Object destroyed...
Object destroyed...

-----
Process exited after 0.1381 seconds with return value 0
Press any key to continue . . .
```


QUESTION :6

Write a class Travel that has the attributes of kilometers and hours. A constructor with no parameter initializes both data members to 0. a member function get() inputs the values and function show() display the values. It has the member function add() that takes an object of type Travel to add the kilometers and hours of calling object and the parameter.

SOLUTION:

PROGRAM:

```
#include <iostream>

using namespace std;

class Travel {
    private:
        int km, hr;
    public:
        Travel()
        { km=hr=0; }
        void get()
        { cout<<"Enter kilometers traveled: ";
          cin>>km;
          cout<<"Enter hours traveled: ";
          cin>>hr;
```

```

    }

    void show()

    { cout<<"You traveled "<<km<<" km in "<<hr<<"
hours"<<endl;

    }

    void add(Travel p)
    {      Travel t;
        t.km=km+p.km;
        t.hr=hr+p.hr;
        cout<<"Total travelling is "<<t.km<<" kilometers in
"<<t.hr<<" hours."<<endl;

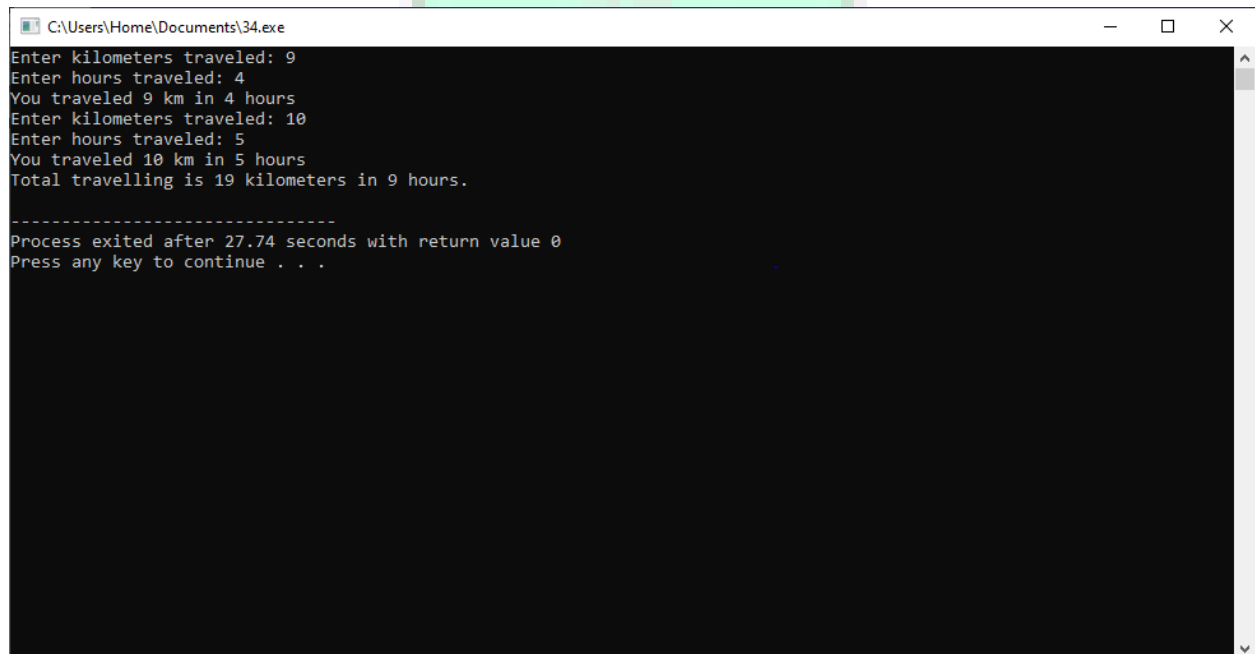
    }
};

int main ()
{
    Travel my, your;
    my.get();
    my.show();
    your.get();
    your.show();
}

```

```
my.add(your);  
    return 0;  
}
```

Output:



```
C:\Users\Home\Documents\34.exe  
Enter kilometers traveled: 9  
Enter hours traveled: 4  
You traveled 9 km in 4 hours  
Enter kilometers traveled: 10  
Enter hours traveled: 5  
You traveled 10 km in 5 hours  
Total travelling is 19 kilometers in 9 hours.  
-----  
Process exited after 27.74 seconds with return value 0  
Press any key to continue . . .
```



QUESTION :7

Write a class Travel that has the attributes of kilometers and hours. A constructor with no parameter initializes both data members to 0. a member function get() inputs the values and function show() display the values. It has the member function add() that takes an object of type Travel, add the kilometers and hours of calling object and the parameter(object parameter) and return an object with added values.

SOLUTION:

PROGRAM:

```
#include <iostream>

using namespace std;

class Travel {
    private:
        int km, hr;
    public:
        Travel()
        { km=hr=0; }
        void get()
        { cout<<"Enter kilometers traveled: ";
          cin>>km;
          cout<<"Enter hours traveled: ";
```

```
        cin>>hr;
    }

    void show()
    { cout<<"You traveled "<<km<<" km in "<<hr<<"
hours"<<endl;
    }

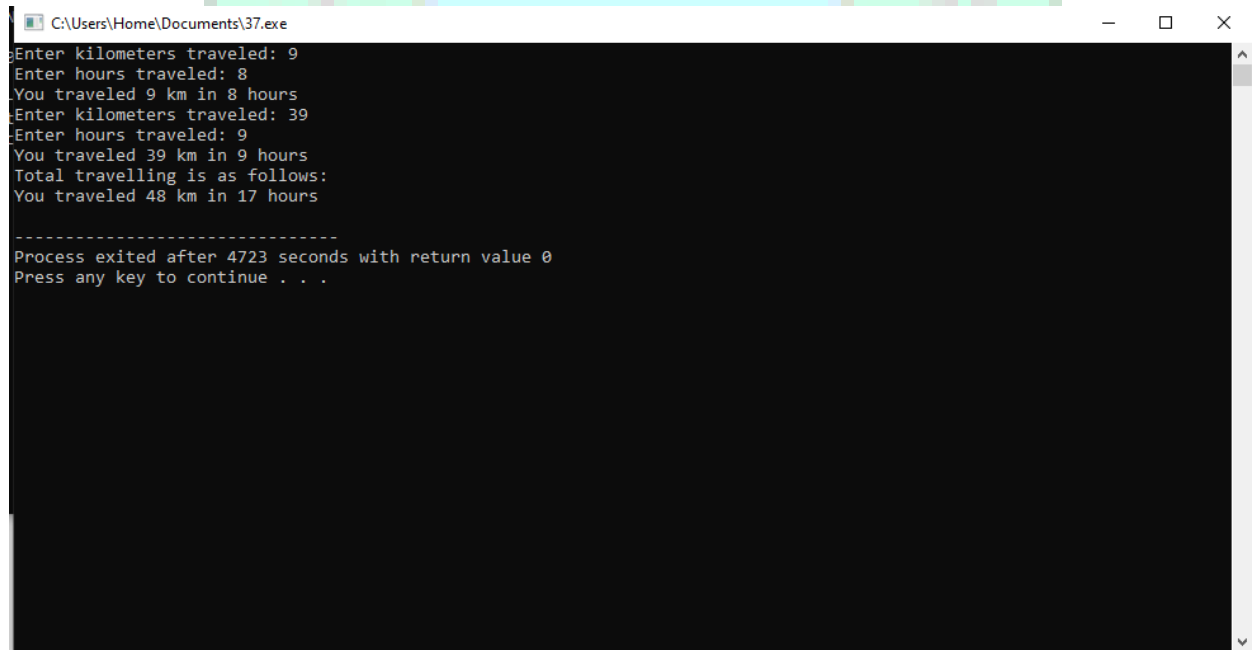
    Travel add(Travel p)
    { Travel t;
      t.km=km+p.km;
      t.hr=hr+p.hr;
      return t;
    }
};

int main ()
{
    Travel my, your, r;

    my.get();
    my.show();
    your.get();
```

```
your.show();  
r=my.add(your);  
cout<<"Total travelling is as follows: "<<endl;  
r.show();  
return 0;  
}
```

OUTPUT:



```
C:\Users\Home\Documents\37.exe  
Enter kilometers traveled: 9  
Enter hours traveled: 8  
You traveled 9 km in 8 hours  
Enter kilometers traveled: 39  
Enter hours traveled: 9  
You traveled 39 km in 9 hours  
Total travelling is as follows:  
You traveled 48 km in 17 hours  
-----  
Process exited after 4723 seconds with return value 0  
Press any key to continue . . .
```

QUESTION :8

Create a class with a name swap test and make two data member and two member function one is for getting value and second for swap the value.[Using concept of constructor overloading]

SOLUTION:

PROGRAM:

```
#include<iostream>

using namespace std;

class swap_test
{
public:
    swap_test(float e,float f)
    {
        int z;

        cout<<"Before Swapping"<<endl;
        cout<<"E="<<e<<endl;
        cout<<"F="<<f<<endl;

        z=e;
        e=f;
        f=z;
    }
}
```

```
    cout<<"After Swapping"<<endl;

    cout<<"E="<<e<<endl;

    cout<<"F="<<f<<endl;

}

swap_test(int a,int b)

{

    int c;

    cout<<"Before Swapping"<<endl;

    cout<<"A="<<a<<endl;

    cout<<"B="<<b<<endl;

    c=a;

    a=b;

    b=c;

    cout<<"After Swapping"<<endl;

    cout<<"A="<<a<<endl;

    cout<<"B="<<b<<endl;

}

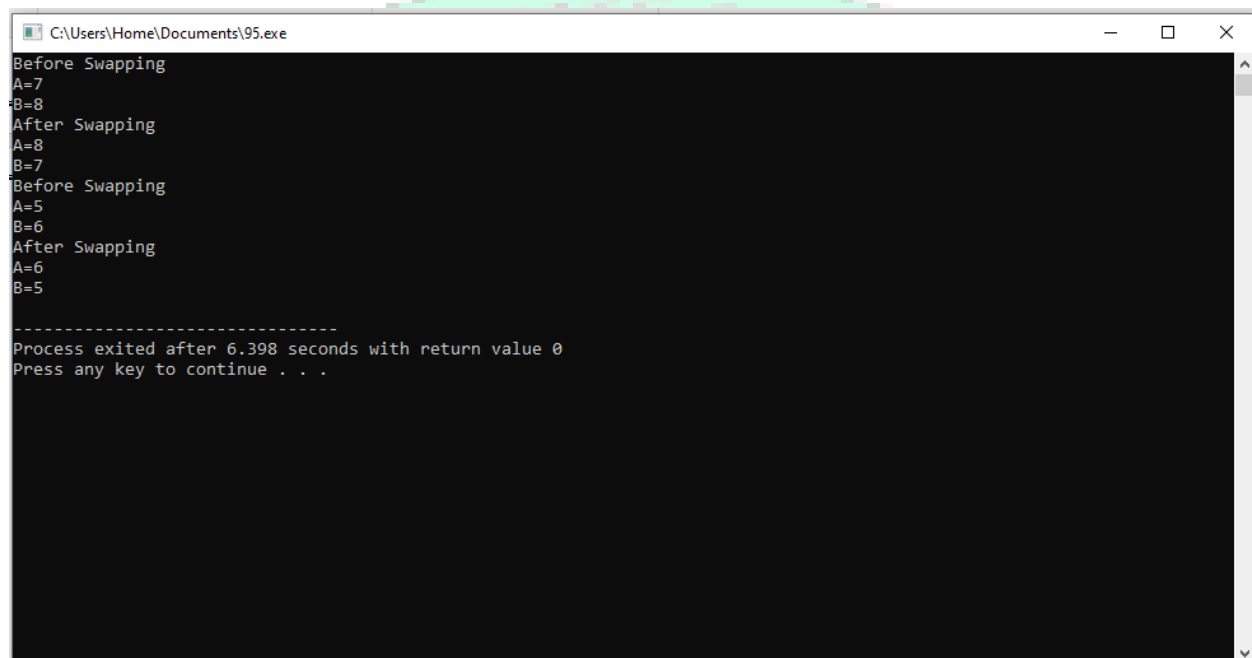
};

main()
```



```
{  
    swap_test s1(7,8);  
    swap_test s2(5,6);  
}
```

Output:



```
C:\Users\Home\Documents\95.exe  
Before Swapping  
A=7  
B=8  
After Swapping  
A=8  
B=7  
Before Swapping  
A=5  
B=6  
After Swapping  
A=6  
B=5  
  
-----  
Process exited after 6.398 seconds with return value 0  
Press any key to continue . . .
```



QUESTION :9

Write a class Marks with three data members to store three marks. Write three member functions

1)in() to input marks,

2)sum() to calculate and return the sum and

3) avg() to calculate and return the average marks.

SOLUTION:

PROGRAM:

```
#include <iostream>
using namespace std;
class Marks
{
    private:
        int a,b,c;
    public:
        Marks()
        {
            cout<<"Enter three marks:";
            cin>>a>>b>>c;
        }
```

```
Marks(int d,int e,int f)
{
    a=d;
    b=e;
    c=f;
}

int sum ()
{
    return(a+b+c);
}

int avg ()
{
    return(a+b+c)/3.0;
};

int main ()
{
    Marks m1;
    int s,add;
```

```
float a,avg;  
s=m1.sum();  
a=m1.avg();  
cout<<"FIRST TIME"<<endl;  
cout<<"Sum="<<s<<endl;  
cout<<"Average="<<a<<endl;  
Marks m2(70,80,90);  
add=m2.sum();  
avg=m2.avg();  
cout<<"SECOND TIME"<<endl;  
cout<<"Sum="<<add<<endl;  
cout<<"Average="<<avg;  
return 0;  
}
```

Output:

```
C:\Users\Home\Documents\96.exe
Enter three marks:90
90
99
FIRST TIME
Sum=279
Average=93
SECOND TIME
Sum=240
Average=80
-----
Process exited after 36.6 seconds with return value 0
Press any key to continue . . .
```





LAB TASK:7

QUESTION :1

Write a program that counts the number of objects created of a particular class.

SOLUTION:

PROGRAM:

```
#include <iostream>

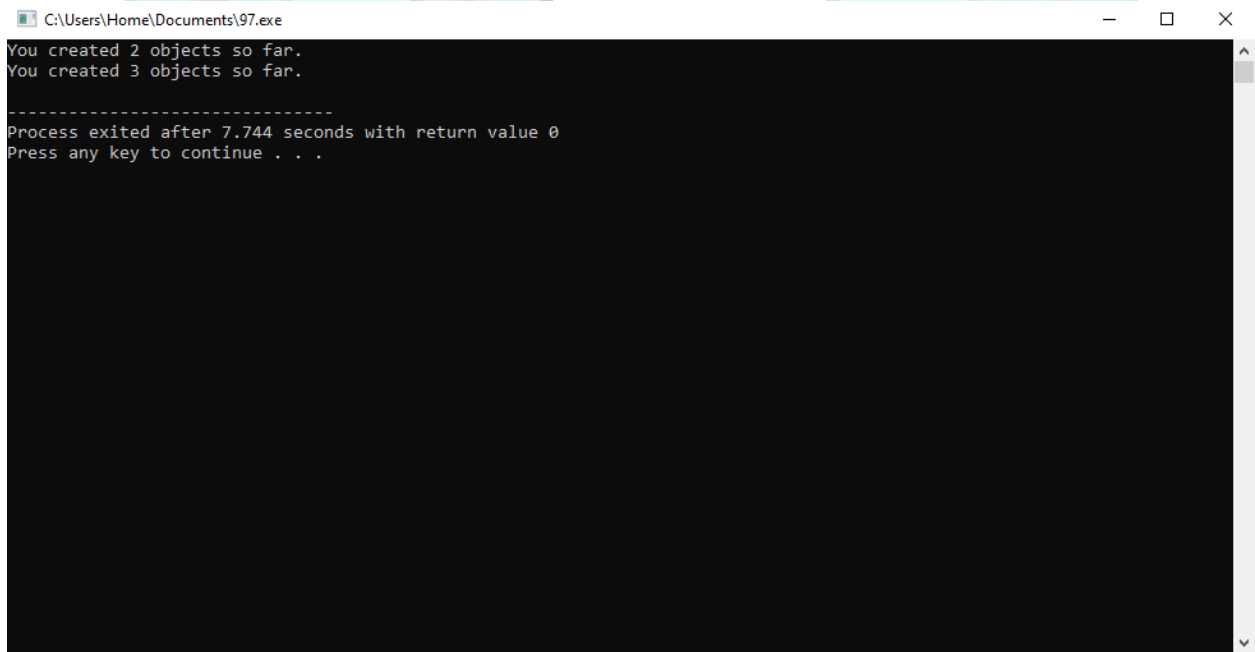
using namespace std;

class Yahoo
{
private:
static int a;
public:
Yahoo()
{
a++;
}

void show ()
{
cout<<"You created "<<a<<" objects so far. "<<endl;
```

```
}  
};  
int Yahoo::a=0;  
main ()  
{  
    Yahoo x,y;  
    x.show();  
    Yahoo z;  
    x.show();  
}
```

OUTPUT:



```
C:\Users\Home\Documents\97.exe  
You created 2 objects so far.  
You created 3 objects so far.  
-----  
Process exited after 7.744 seconds with return value 0  
Press any key to continue . . .
```


QUESTION :2

Write a program that creates three objects of class Student. Each object of class must be assigned a unique roll number. (Hint: Use static data member for unique roll number)

SOLUTION:

PROGRAM:

```
#include <iostream>
using namespace std;
class Student {
private:
static int r;
int rno, marks;
char name[50];
public:
Student()
{
r++;
rno=r;
}
void in ()
```

```
{
cout<<"Enter name: ";
cin.getline(name,50);
cout<<"Enter Marks: ";
cin>>marks;
}

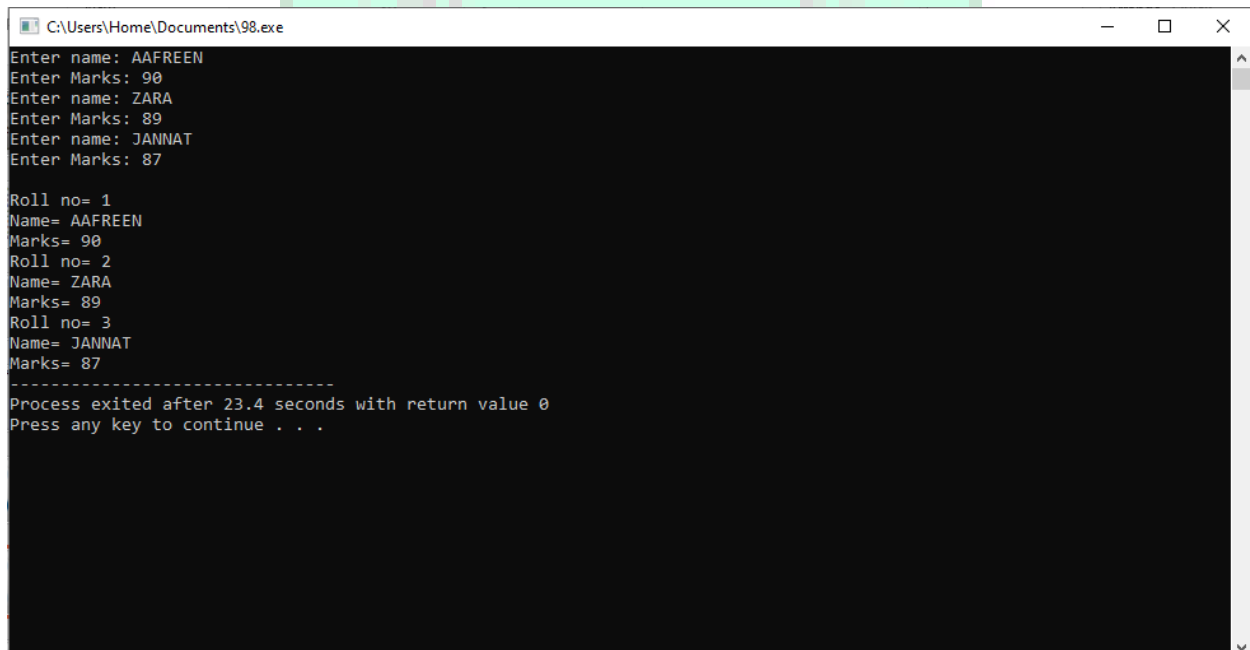
void show ()
{
cout<<endl;
cout<<"Roll no= "<<rno<<endl;
cout<<"Name= "<<name<<endl;
cout<<"Marks= "<<marks;
} };

int Student::r=0;

main ()
{
Student S1, S2, S3;
S1.in();
S2.in();
```

```
S3.in();  
S1.show();  
S2.show();  
S3.show();  
}
```

OUTPUT:



```
C:\Users\Home\Documents\98.exe  
Enter name: AAFREEN  
Enter Marks: 90  
Enter name: ZARA  
Enter Marks: 89  
Enter name: JANNAT  
Enter Marks: 87  
  
Roll no= 1  
Name= AAFREEN  
Marks= 90  
Roll no= 2  
Name= ZARA  
Marks= 89  
Roll no= 3  
Name= JANNAT  
Marks= 87  
-----  
Process exited after 23.4 seconds with return value 0  
Press any key to continue . . .
```

QUESTION :3


SOLUTION:

PROGRAM:

```
#include<iostream>

using namespace std;

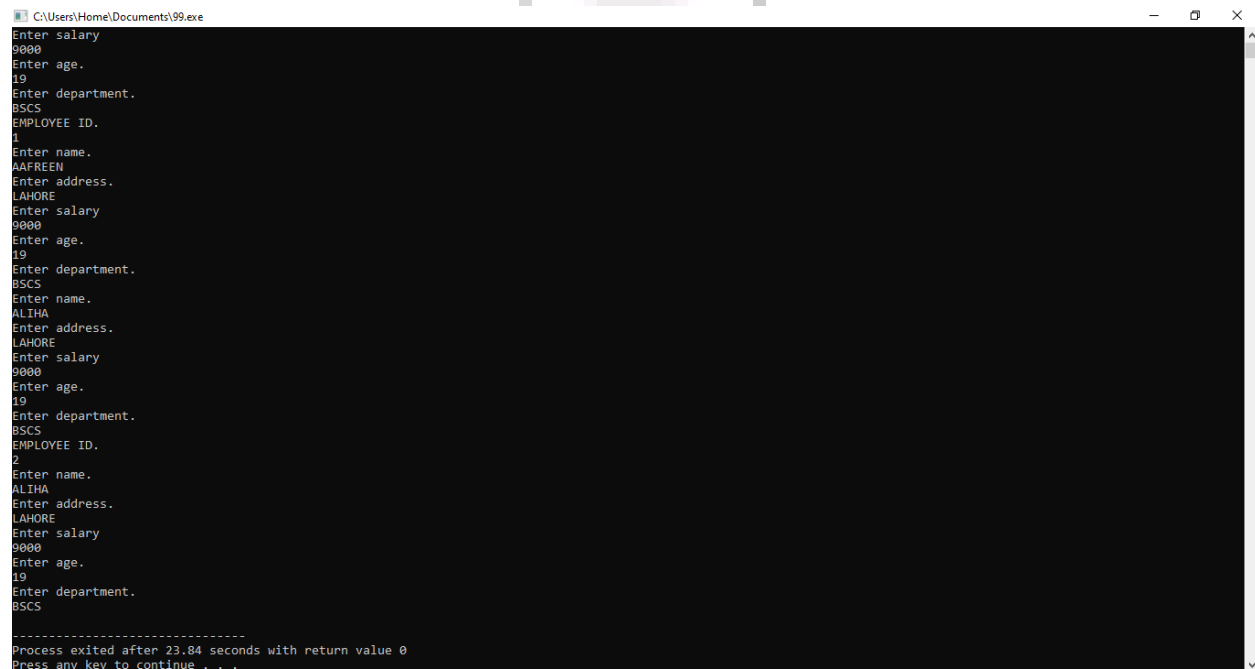
class Employee
{
private:
static int a;
char name[50],dept[40],address[60];
int salary,age,emp_id;
public:
Employee()
{
a++;
emp_id=a;
}
void Get_info()
{
cout<<"Enter name."<<endl;
cin>>name;
cout<<"Enter address."<<endl;
```

The background of the page features a large, semi-transparent watermark of the Al-Farooque Engineering College logo. The logo is circular with a green border containing the text 'AL-FAROOQUE ENGINEERING COLLEGE'. Inside the circle is a blue field with a white star and crescent. Below the circle is a yellow banner with the text 'I SHALL BUILD'.

```
cin>>address;
cout<<"Enter salary"<<endl;
cin>>salary;
cout<<"Enter age."<<endl;
cin>>age;
cout<<"Enter department."<<endl;
cin>>dept;
}
void display_details()
{
cout<<"EMPLOYEE ID."<<endl<<emp_id<<endl;
cout<<"Enter name."<<endl<<name<<endl;
cout<<"Enter address."<<endl<<address<<endl;
cout<<"Enter salary"<<endl<<salary<<endl;
cout<<"Enter age."<<endl<<age<<endl;
cout<<"Enter department."<<endl<<dept<<endl;
}};
int Employee::a=0;
main()
{
Employee e1,e2;
e1.Get_info();
```

```
e1.display_details();  
  
e2.Get_info();  
  
e2.display_details();  
  
}
```

OUTPUT:



```
C:\Users\Home\Documents\99.exe  
Enter salary  
9000  
Enter age.  
19  
Enter department.  
BSCS  
EMPLOYEE ID.  
1  
Enter name.  
AAFREEN  
Enter address.  
LAHORE  
Enter salary  
9000  
Enter age.  
19  
Enter department.  
BSCS  
Enter name.  
ALIHA  
Enter address.  
LAHORE  
Enter salary  
9000  
Enter age.  
19  
Enter department.  
BSCS  
EMPLOYEE ID.  
2  
Enter name.  
ALIHA  
Enter address.  
LAHORE  
Enter salary  
9000  
Enter age.  
19  
Enter department.  
BSCS  
-----  
Process exited after 23.84 seconds with return value 0  
Press any key to continue . . .
```



QUESTION :4

SOLUTION:

PROGRAM:

```
#include<iostream>

using namespace std;

class Employee
{
private:
static int a;
char name[50],dept[40],address[60];
int salary,age,emp_id;
public:
Employee()
{
a++;
emp_id=a;
}
void Get_info()
{
```

```
cout<<"Enter name."<<endl;
cin>>name;
cout<<"Enter address."<<endl;
cin>>address;
cout<<"Enter salary"<<endl;
cin>>salary;
cout<<"Enter age."<<endl;
cin>>age;
cout<<"Enter department."<<endl;
cin>>dept;
}
void display_details()
{
cout<<"EMPLOYEE ID."<<endl<<emp_id<<endl;
cout<<"Enter name."<<endl<<name<<endl;
cout<<"Enter address."<<endl<<address<<endl;
cout<<"Enter salary"<<endl<<salary<<endl;
cout<<"Enter age."<<endl<<age<<endl;
cout<<"Enter department."<<endl<<dept<<endl;
```



```
}};  
int Employee::a=0;  
main()  
{  
Employee e1,e2,e3,e4,e5;  
e1.Get_info();  
e1.display_details();  
e2.Get_info();  
e2.display_details();  
e3.Get_info();  
e3.display_details();  
e4.Get_info();  
e4.display_details();  
e5.Get_info();  
e5.display_details();  
}
```

OUTPUT:

C:\Users\Home\Documents\100.exe

```
Enter name.  
AAFREEN  
Enter address.  
LAHORE  
Enter salary  
9000  
Enter age.  
19  
Enter department.  
BSCS  
EMPLOYEE ID.  
1  
Enter name.  
AAFREEN  
Enter address.  
LAHORE  
Enter salary  
9000  
Enter age.  
19  
Enter department.  
BSCS  
Enter name.  
ALIHA  
Enter address.  
LAHORE  
Enter salary  
9000  
Enter age.  
19  
Enter department.  
BSCS  
EMPLOYEE ID.  
2  
Enter name.  
ALIHA  
Enter address.  
LAHORE  
Enter salary  
9000  
Enter age.  
19  
Enter department.  
BSCS
```



QUESTION :5

Write a program that demonstrate the use of Friend Function

SOLUTION:

PROGRAM:

```
#include <iostream>

using namespace std;

class B;

class A {
    private:
        int a;
    public:
        A()
        { a=10; }
        friend void show (A, B);
};

class B {
    private:
        int b;
    public:
```

B()

```
{ b=20; }
```

```
friend void show (A, B);
```

```
};
```

```
void show (A x, B y)
```

```
{
```

```
    int r;
```

```
    r=x.a+y.b;
```

```
    cout<<"The value of class A object= "<<x.a<<endl;
```

```
    cout<<"The value of class B object= "<<y.b<<endl;
```

```
    cout<<"The sum of both values= "<<r<<endl;
```

```
}
```

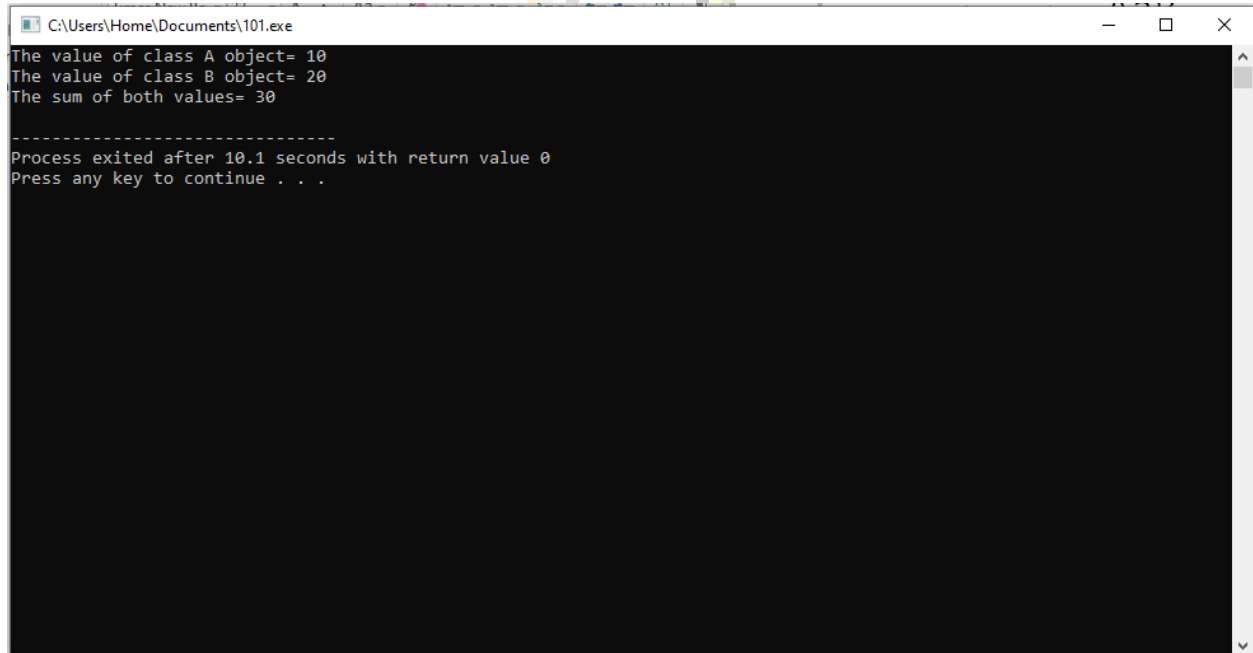
```
int main () {
```

```
    A obj1;
```

```
    B obj2;
```

```
show(obj1, obj2);  
  
return 0;  
  
}
```

OUTPUT:



A screenshot of a Windows command prompt window titled "C:\Users\Home\Documents\101.exe". The window has a black background with white text. The output shows three lines: "The value of class A object= 10", "The value of class B object= 20", and "The sum of both values= 30". Below these, a separator line of dashes is followed by "Process exited after 10.1 seconds with return value 0" and "Press any key to continue . . .".

```
C:\Users\Home\Documents\101.exe  
The value of class A object= 10  
The value of class B object= 20  
The sum of both values= 30  
  
-----  
Process exited after 10.1 seconds with return value 0  
Press any key to continue . . .
```



QUESTION :6

Write a program that demonstrates the use of Friend Classes.

SOLUTION:

PROGRAM:

```
#include <iostream>

using namespace std;

class B;

class A {
    private:
        int a,b;
    public:
        A()
        { a=10;
          b=20; }
        friend class B;
};

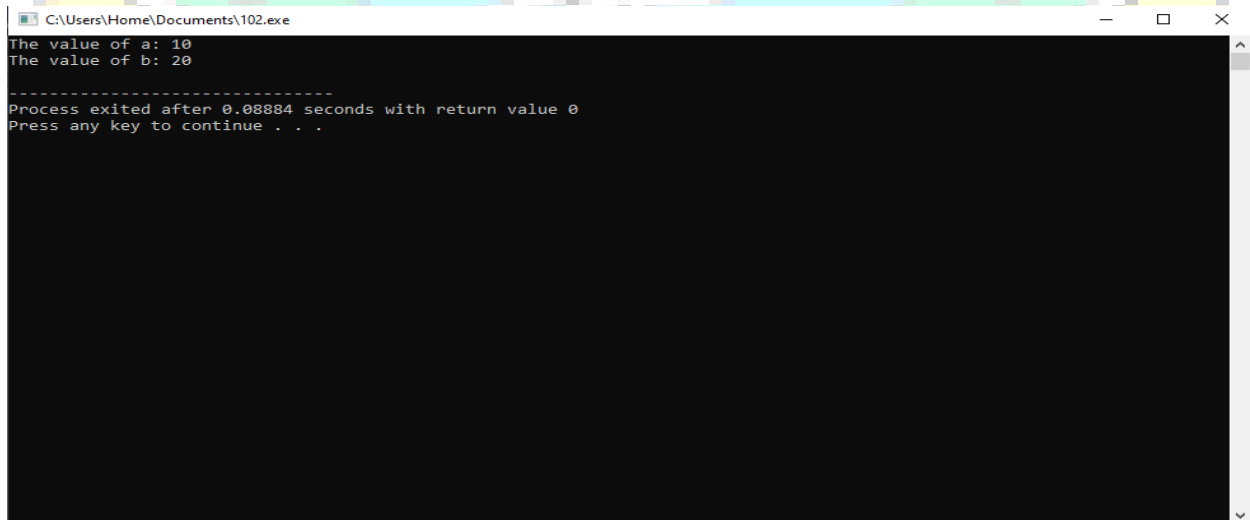
class B {
    public:
        void showA (A obj)
```

```
{   cout<<"The value of a: "<<obj.a<<endl; }

void showB (A obj)
{ cout<<"The value of b: "<<obj.b<<endl; }
};

int main ()
{
    A x;
    B y;
    y.showA(x);
    y.showB(x);
    return 0;
}
```

OUTPUT:



```
C:\Users\Home\Documents\102.exe
The value of a: 10
The value of b: 20

-----
Process exited after 0.08884 seconds with return value 0
Press any key to continue . . .
```

QUESTION :7

Write a program that demonstrate the use of Static Functions.

SOLUTION:

PROGRAM:

```
#include <iostream>

using namespace std;

class Test {
    private:
        static int n;
    public:
        static void show ()
        {
            cout<<"n= "<<n<<endl;
        }
};

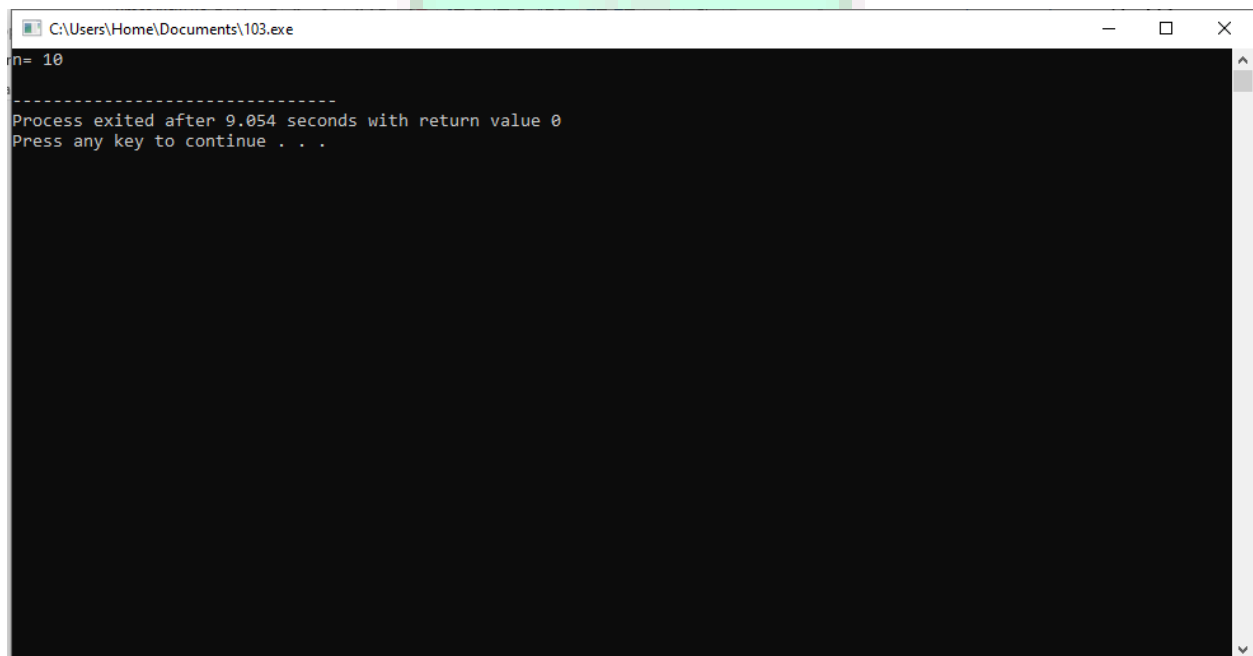
int Test::n=10;

int main () {
```



```
Test::show();  
  
return 0;  
  
}
```

OUTPUT:



```
C:\Users\Home\Documents\103.exe  
n= 10  
-----  
Process exited after 9.054 seconds with return value 0  
Press any key to continue . . .
```



QUESTION :8

Write a program that counts the number of objects created for a particular class. The program must be able to display the results even if no object is created so far.

SOLUTION:

PROGRAM:

```
#include <iostream>

using namespace std;

class Yahoo {
    private:
        static int n;
    public:
        Yahoo()
        {    n++; }

        static void show ()
        {    cout<<"You have created "<<n<<" objects so far.
"<<endl; }
};

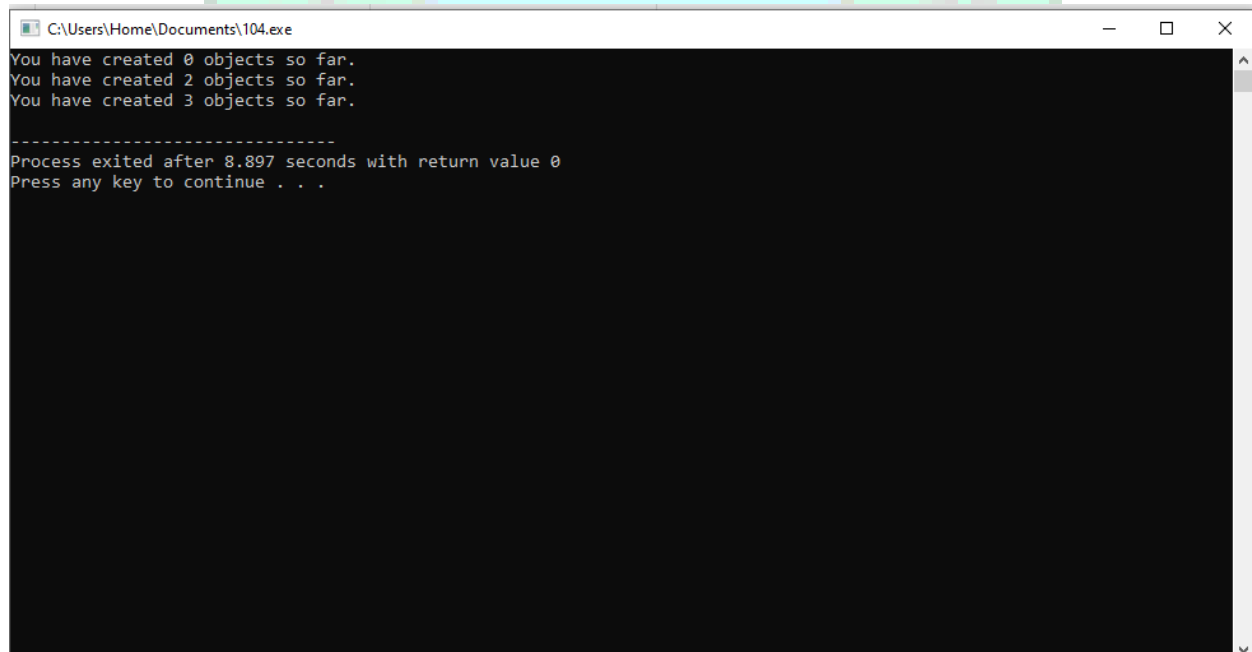
int Yahoo::n=0;

int main () {

    Yahoo::show();
```

```
Yahoo x,y;  
x.show();  
Yahoo z;  
x.show();  
return 0;  
}
```

OUTPUT:

A screenshot of a Windows command prompt window. The title bar shows the file path "C:\Users\Home\Documents\104.exe". The window has standard Windows window controls (minimize, maximize, close). The output text is as follows:

```
You have created 0 objects so far.  
You have created 2 objects so far.  
You have created 3 objects so far.  
  
-----  
Process exited after 8.897 seconds with return value 0  
Press any key to continue . . .
```



LAB TASK #8

QUESTION :1

Write a program that overloads increment operator to work with user-defined objects.

SOLUTION:

PROGRAM:

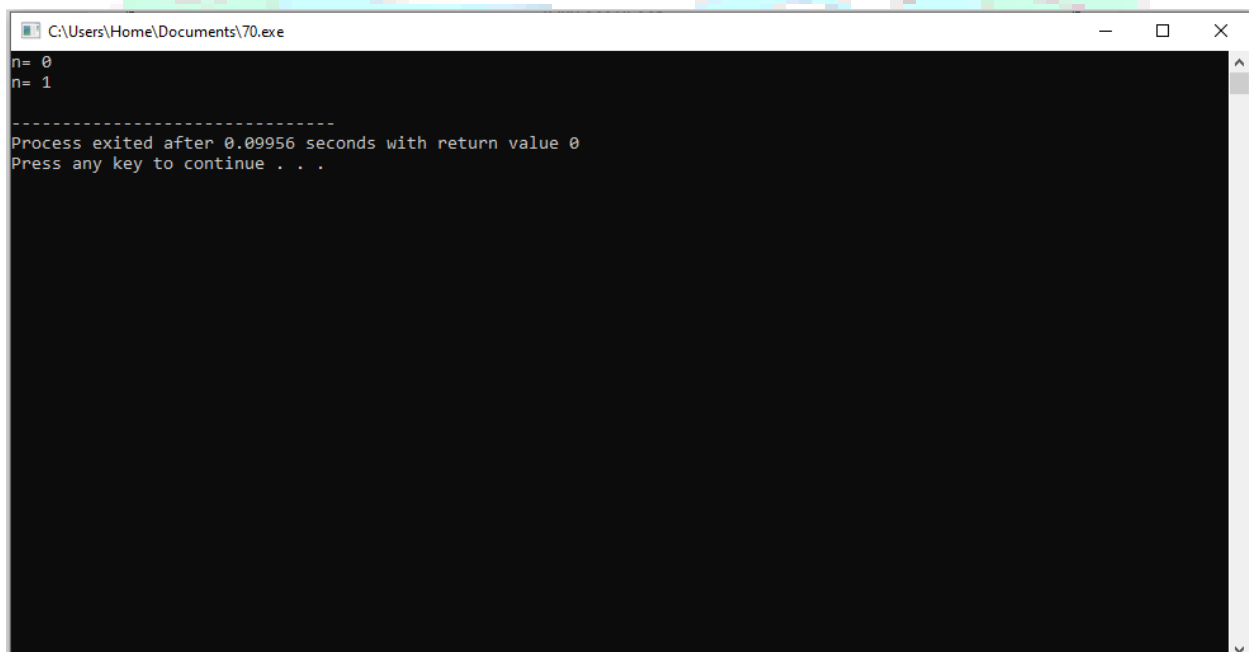
```
#include <iostream>

using namespace std;

class Count {
    private:
        int n;
    public:
        Count ()
        {
            n=0;
        }
        void show ()
        {
            cout<<"n= "<<n<<endl;
        }
}
```

```
void operator ++()  
{ n=n+1; } };  
  
int main () {  
Count obj;  
obj.show();  
++obj;  
obj.show();  
return 0;  
}
```

OUTPUT:



```
C:\Users\Home\Documents\70.exe  
n= 0  
n= 1  
-----  
Process exited after 0.00956 seconds with return value 0  
Press any key to continue . . .
```

QUESTION :2

Write a program that overloads increment operator to work with the user-defined objects. The overloaded function should return an object after incrementing the data member

SOLUTION:

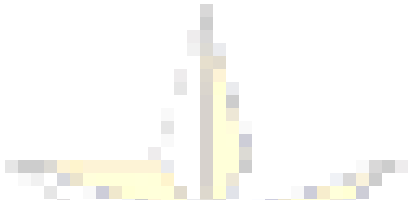
PROGRAM:

```
#include <iostream>
using namespace std;
class Count {
private:
    int n;
public:
    Count ()
    {
        n=0;
    }
    void show ()
    {
        cout<<"n= "<<n<<endl;
    }
}
```

Count operator ++()

```
{ Count temp;  
    n=n+1;  
    temp.n = n;  
    return temp;  
}  
  
};  
  
int main ()  
{  
    Count x,y;  
    x.show();  
    y.show();  
    y= ++x;  
    x.show();  
    y.show();  
    return 0;  
}
```


OUTPUT:



```
C:\Users\Home\Documents\71.exe
n= 0
n= 0
n= 1
n= 1
-----
Process exited after 0.09295 seconds with return value 0
Press any key to continue . . .
```



QUESTION :3

Write a program that overloads prefix and postfix increment operator to work with user-defined objects.

SOLUTION:

PROGRAM:

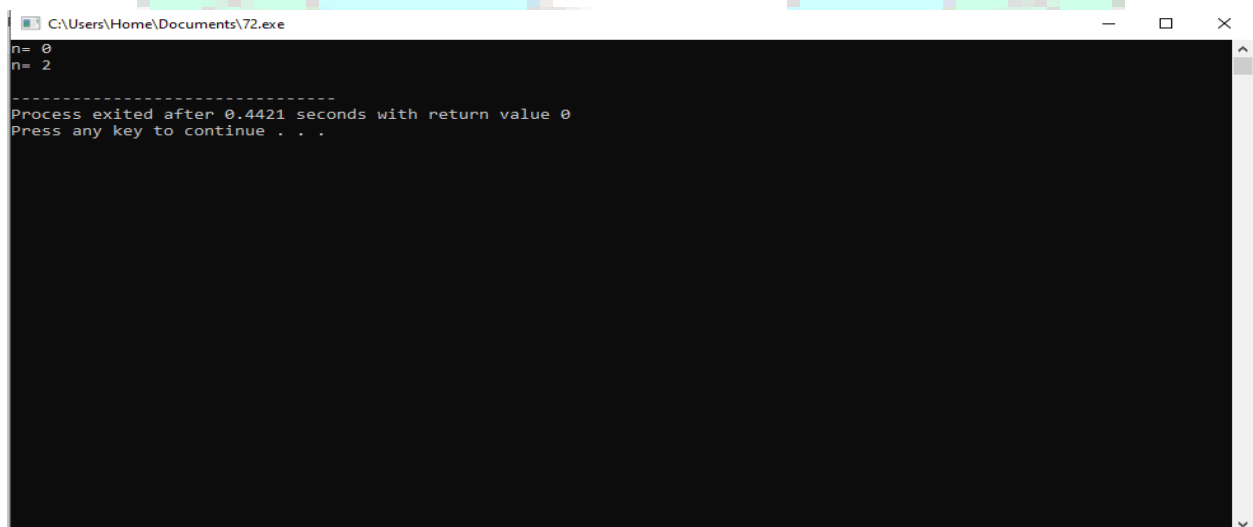
```
#include <iostream>

using namespace std;

class Count {
private:
    int n;
public:
    Count ()
    { n=0; }
    void show ()
    { cout<<"n= "<<n<<endl; }
    void operator ++()
    {
        n=n+1;
    }
    void operator ++(int)
```

```
{  
    n=n+1; }  
};  
int main () {  
    Count x,y;  
    x.show();  
    ++x;  
    x++;  
    x.show();  
    return 0;  
}
```

OUTPUT:



```
C:\Users\Home\Documents\72.exe  
n= 0  
n= 2  
-----  
Process exited after 0.4421 seconds with return value 0  
Press any key to continue . . .
```

QUESTION :4

Write a program that overloads increment operator both for prefix and postfix to work with the user-defined objects. The overloaded function should return an object after incrementing the data member.

SOLUTION:

PROGRAM:

```
#include <iostream>

using namespace std;

class Count {
private:
    int n;
public:
    Count ()
    { n=0; }

    void show ()
    { cout<<"n= "<<n<<endl; }

    Count operator ++()
    { Count temp;
      n=n+1;
      temp.n = n;
```

```
return temp; }
```

Count operator ++(int)

```
{ Count temp;
```

```
  n=n+1;
```

```
  temp.n = n;
```

```
  return temp;} };
```

```
int main () {
```

```
  Count x,y;
```

```
  x.show();
```

```
  y.show();
```

```
  y=++x;
```

```
  y=x++;
```

```
  x.show();
```

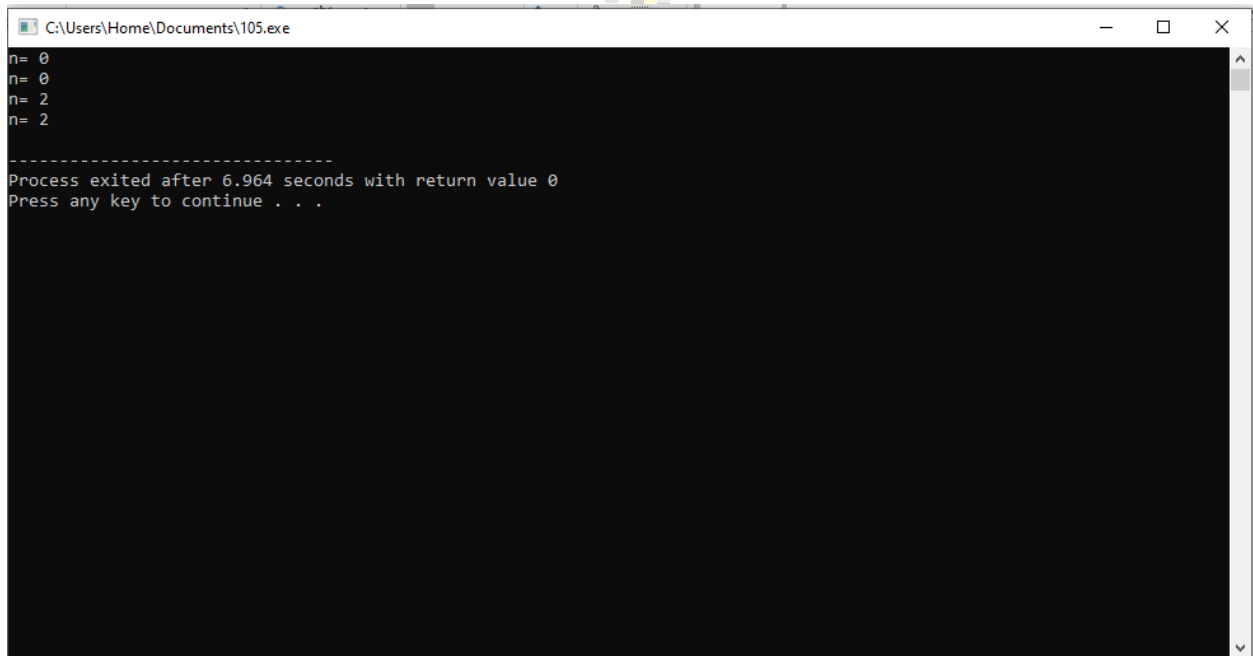
```
  y.show();
```

```
  return 0;
```

```
}
```



OUTPUT:



A screenshot of a Windows command prompt window. The title bar shows the file path "C:\Users\Home\Documents\105.exe". The window has standard Windows window controls (minimize, maximize, close) on the right. The command prompt area is black with white text. The output shows four lines of "n=" followed by values 0, 0, 2, and 2. Below these is a separator line of dashes, followed by the message "Process exited after 6.964 seconds with return value 0" and "Press any key to continue . . .".

```
C:\Users\Home\Documents\105.exe
n= 0
n= 0
n= 2
n= 2
-----
Process exited after 6.964 seconds with return value 0
Press any key to continue . . .
```



QUESTION :5

Write a program that overloads binary addition operator +.

SOLUTION:

PROGRAM:

```
#include <iostream>
```

```
using namespace std;
```

```
class Add {
```

```
private:
```

```
    int a, b;
```

```
public:
```

```
    Add ()
```

```
    { a=b=0; }
```

```
    void in()
```

```
    { cout<<"a = ";
```

```
      cin>>a;
```

```
      cout<<"b = ";
```

```
      cin>>b;
```

```
    }
```

```
    void show()
```

```
{ cout<<"a = "<<a<<endl;
  cout<<"b = "<<b<<endl;
}
```

Add operator +(Add p)

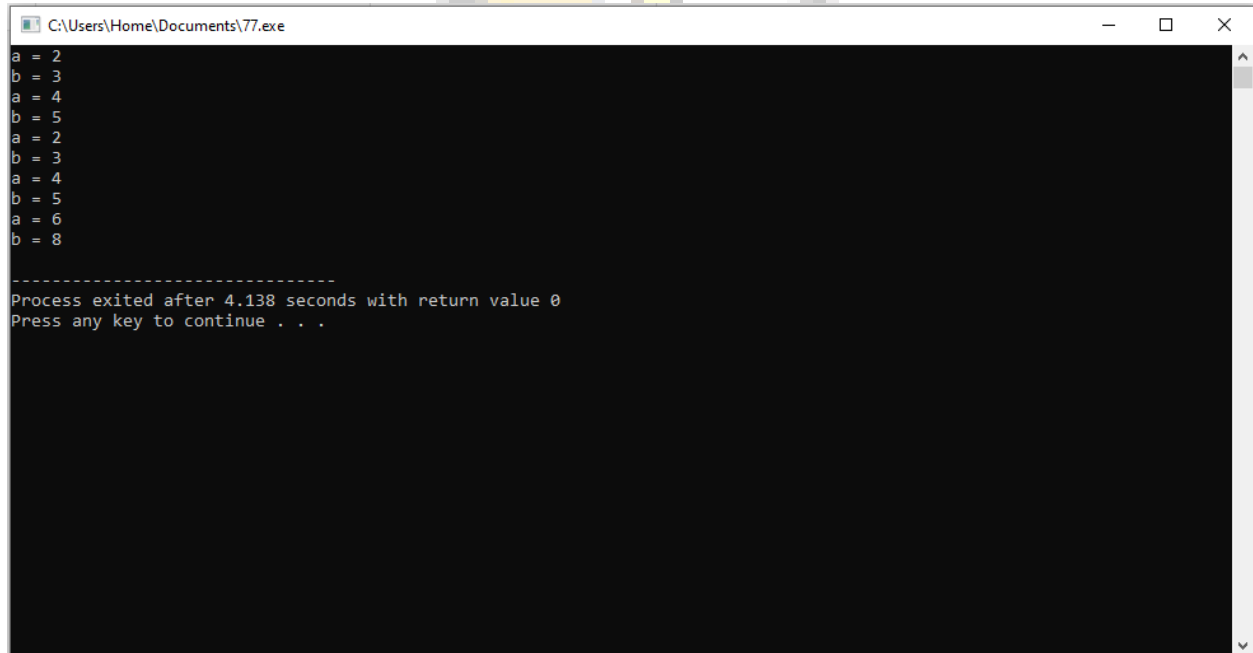
```
{ Add temp;
  temp.a= p.a+a;
  temp.b= p.b+b;
  return temp;
};
```

```
int main () {
  Add x, y, z;
  x.in();
  y.in();
  z=x+y;
  x.show();
  y.show();
  z.show();
}
```



```
return 0;
```

```
}
```



```
C:\Users\Home\Documents\77.exe
a = 2
b = 3
a = 4
b = 5
a = 2
b = 3
a = 4
b = 5
a = 6
b = 8
-----
Process exited after 4.138 seconds with return value 0
Press any key to continue . . .
```



QUESTION :6

Write a program that overloads arithmetic addition operator + for concatenating two string values.

SOLUTION:

PROGRAM:

```
#include <iostream>
#include<string.h>
using namespace std;
class String {
private:
    char str[50];
public:
    String ()
    { str[0]= '\0'; }
    void in()
    { cout<<"Enter String: ";
      gets(str); }
    void show()
    { cout<<str<<endl; }
```


String operator +(String s)

```
{ String temp;  
  strcpy(temp.str, str);  
  strcat(temp.str, s.str);  
  return temp;  
} };
```

```
int main () {  
  String s1, s2, s3;  
  s1.in();  
  s2.in();  
  cout<<"S1 =";  
  s1.show();  
  cout<<"S2 =";  
  s2.show();  
  cout<<"S3 =";  
  s3.show();  
  cout<<"Concatenating s1 and s2 in s3... "<<endl;  
  s3=s1+s2;  
  cout<<"S3 =";
```

```
s3.show();  
  
return 0;  
  
}
```

OUTPUT:



```
C:\Users\Home\Documents\106.exe  
Enter String: AAFREEN ZAHRA KAZMI  
Enter String: KASHAF ZAHRA  
S1 =AAFREEN ZAHRA KAZMI  
S2 =KASHAF ZAHRA  
S3 =  
Concatenating s1 and s2 in s3...  
S3 =AAFREEN ZAHRA KAZMIKASHAF ZAHRA  
  
-----  
Process exited after 38.81 seconds with return value 0  
Press any key to continue . . .
```



QUESTION :7

Write a program that overloads the comparison operators == to work with String class. The result of the comparison must be 1 if the two strings are of same length and 0 otherwise.

SOLUTION:

PROGRAM:

```
#include <iostream>
#include<string.h>
using namespace std;
class String {
    private:
        char str[50];
    public:
        String ()
        { str[0]= '\0'; }
        void in()
        { cout<<"Enter String: ";
          gets(str);
        }
        void show()
```

```
{ cout<<str<<endl;
}
int operator ==(String s)
{ if(strlen(s.str)==strlen(str))
    return 1;
    else
    return 0;
} };

int main () {
    String s1, s2;
    s1.in();
    s2.in();
    cout<<"S1 =";
    s1.show();
    cout<<"S2 =";
    s2.show();
    if(s1==s2)
        cout<<"Both strings are of equal length.";
```

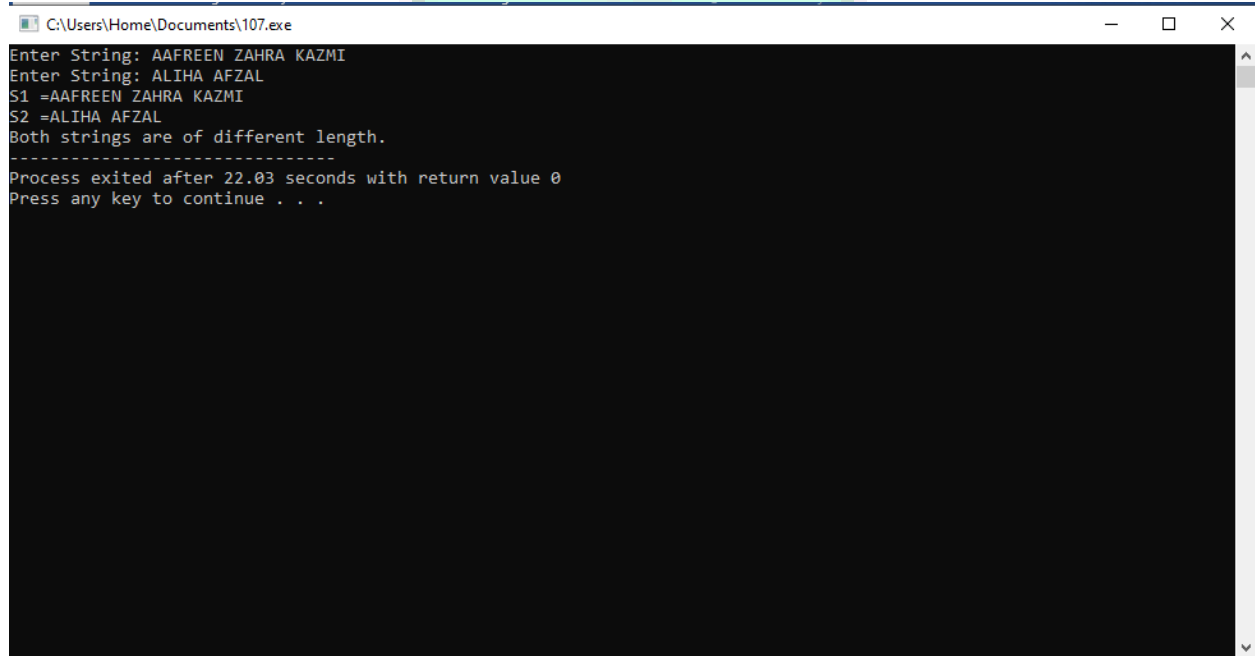
else

```
cout<<"Both strings are of different length.";
```

```
return 0;
```

```
}
```

OUTPUT:

A screenshot of a Windows command prompt window titled "C:\Users\Home\Documents\107.exe". The window shows the execution of a C++ program. The user enters two strings: "AAFREEN ZAHRA KAZMI" and "ALIHA AFZAL". The program outputs "Both strings are of different length." followed by a series of dashes. At the bottom, it states "Process exited after 22.03 seconds with return value 0" and "Press any key to continue . . .".

```
C:\Users\Home\Documents\107.exe
Enter String: AAFREEN ZAHRA KAZMI
Enter String: ALIHA AFZAL
S1 =AAFREEN ZAHRA KAZMI
S2 =ALIHA AFZAL
Both strings are of different length.
-----
Process exited after 22.03 seconds with return value 0
Press any key to continue . . .
```



QUESTION :8

Write a program that overloads arithmetic assignment operator to work with user-defined objects.

SOLUTION:

PROGRAM:

```
#include <iostream>
#include<string.h>
using namespace std;
class Read {
    private:
        int days, pages;
    public:
        Read ()
        { days=pages=0; }
        void in()
        { cout<<"How many days have you read? ";
          cin>>days;
          cout<<"How many pages have you read? ";
          cin>>pages;
```



```
}  
  
void show()  
{ cout<<"You have read " <<pages<< " pages in "<<days<<"  
days."<<endl;  
}  
  
void operator +=(Read r)  
{ days=days+r.days;  
  pages=pages+r.pages;  
} };  
  
int main () {  
  Read r1, r2;  
  r1.in();  
  r2.in();  
  cout<<"\n Reading number 1..."<<endl;  
  r1.show();  
  cout<<"\n Reading number 2..."<<endl;  
  r2.show();  
  cout<<"\n Adding r1 and r2 using += operator..."<<endl;
```

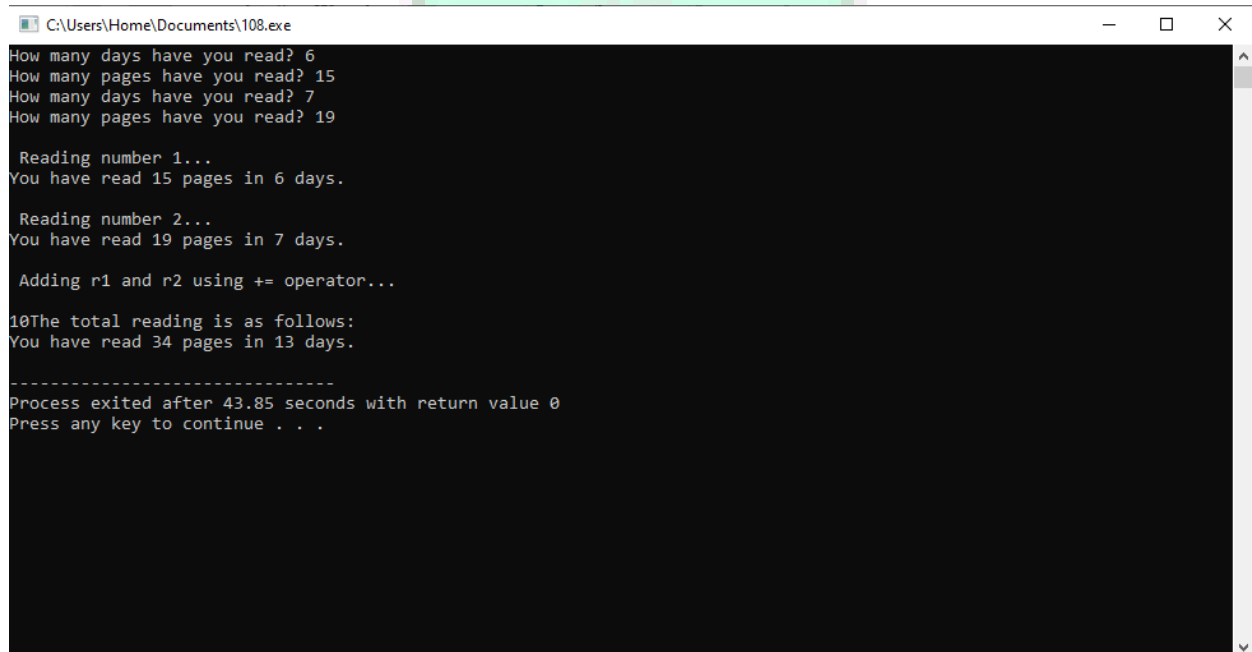
```
r2+=r1;

cout<<"\n10The total reading is as follows:"<<endl;

r2.show();

}
```

OUTPUT:



```
C:\Users\Home\Documents\108.exe
How many days have you read? 6
How many pages have you read? 15
How many days have you read? 7
How many pages have you read? 19

Reading number 1...
You have read 15 pages in 6 days.

Reading number 2...
You have read 19 pages in 7 days.

Adding r1 and r2 using += operator...

10The total reading is as follows:
You have read 34 pages in 13 days.

-----
Process exited after 43.85 seconds with return value 0
Press any key to continue . . .
```



QUESTION :9

Create a class name Spaces take three data members,Getdata(), Display() use overloaded decrement operator to decrement the value.

SOLUTION:

PROGRAM:

```
#include<iostream>

using namespace std;

class Space
{
    private:
    int x,y,z;
    public:
    Space()
    {
        x=y=z=0;
    }
    void get_data()
    {
        cout<<"ENETR VALUE OF  x ="<<endl;
        cin>>x;
```

```
cout<<"ENTER VALUE OF y="<<endl;
cin>>y;
cout<<"ENTER VALUE OF z"<<endl;
cin>>z;
}

void display()
{
    cout<<"VALUE OF X ="<<x<<endl;
    cout<<"VALUE OF Y ="<<y<<endl;
    cout<<"VALUE OF Z ="<<z<<endl;
}

void operator --()
{
    x=x-1;
    y=y-1;
    z=z-1;
}

};

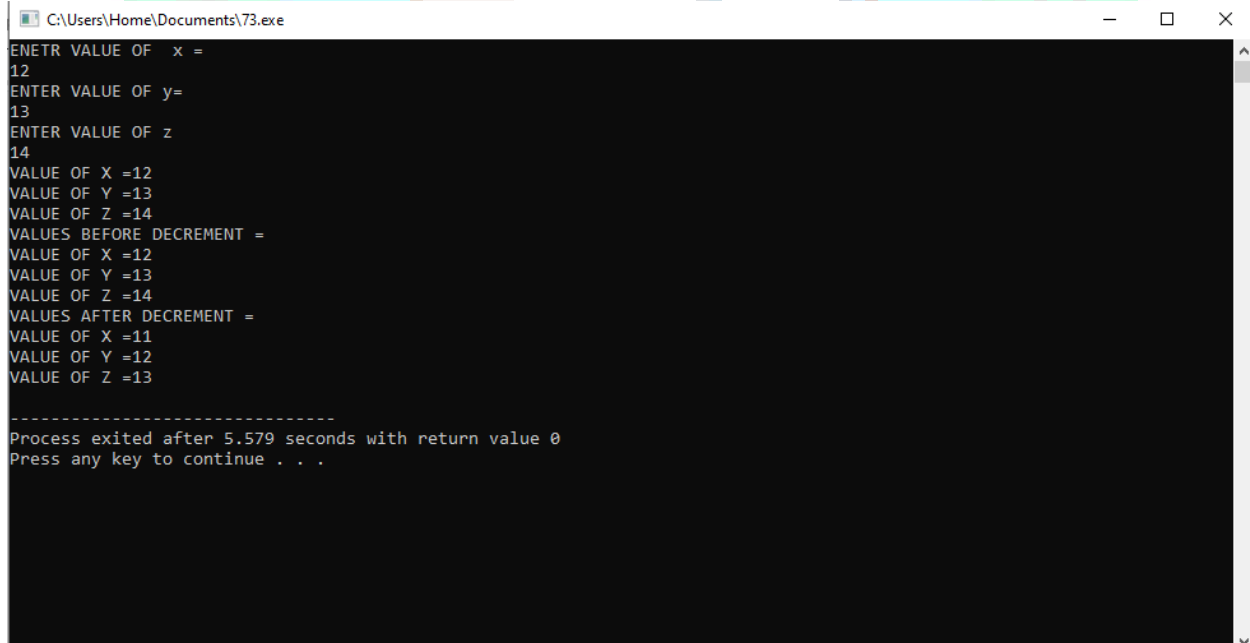
int main()
```

```

{
    Space a,b;
    a.get_data();
    a.display();
    cout<<"VALUES BEFORE DECREMENT ="<<endl;
    a.display();
    --a;
    cout<<"VALUES AFTER DECREMENT ="<<endl;
    a.display();
}

```

OUTPUT:



```

C:\Users\Home\Documents\73.exe
ENTER VALUE OF x =
12
ENTER VALUE OF y=
13
ENTER VALUE OF z
14
VALUE OF X =12
VALUE OF Y =13
VALUE OF Z =14
VALUES BEFORE DECREMENT =
VALUE OF X =12
VALUE OF Y =13
VALUE OF Z =14
VALUES AFTER DECREMENT =
VALUE OF X =11
VALUE OF Y =12
VALUE OF Z =13
-----
Process exited after 5.579 seconds with return value 0
Press any key to continue . . .

```

Task :2

QUESTION :10

Create a class pen with one datamember create one constructor without parameter, and one with parameter, showcount() function create two overloaded increment operator for pre or post fix.

SOLUTION:

PROGRAM:

```
#include<iostream>
```

```
using namespace std;
```

```
class Pen
```

```
{
```

```
private:
```

```
    int x;
```

```
public:
```

```
Pen()
```

```
{
```

```
    x=0;
```

```
}
```

```
Pen(int n)
```

```
{
```

```
    x=n;
```

```
}  
void show_count()  
{  
    cout<<"THE VALUE OF VARIABLE ="<<x<<endl;  
}  
void operator ++()  
{  
    x=x+1;  
}  
void operator ++(int)  
{  
    x=x+1;  
}  
};  
int main()  
{  
    Pen a,b(5);  
    a.show_count();  
    ++a;
```

```
a.show_count();
```

```
cout<<endl;
```

```
b.show_count();
```

```
++b;
```

```
b.show_count();
```

```
cout<<endl;
```

```
a++;
```

```
a++;
```

```
a.show_count();
```

```
cout<<endl;
```

```
b++;
```

```
b++;
```

```
b.show_count();
```

```
cout<<endl;
```

```
++a;
```

```
a.show_count();
```

```
cout<<endl;
```

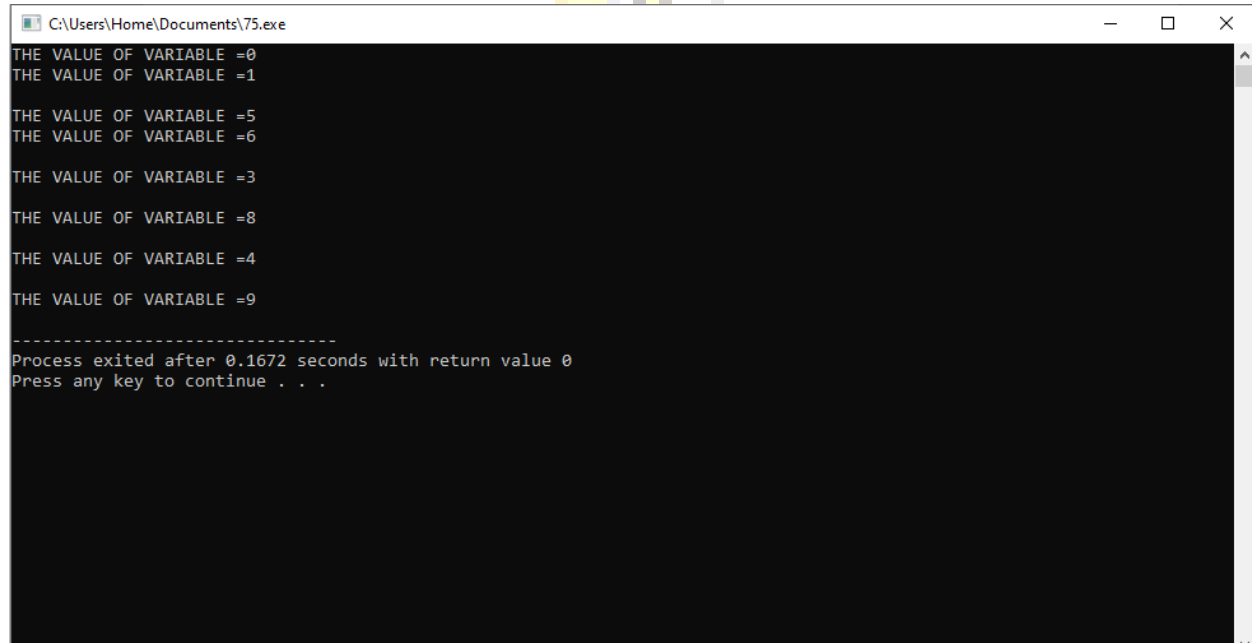
```
++b;
```

```
b.show_count();
```



```
    return 0;  
}
```

OUTPUT:



```
C:\Users\Home\Documents\75.exe  
THE VALUE OF VARIABLE =0  
THE VALUE OF VARIABLE =1  
  
THE VALUE OF VARIABLE =5  
THE VALUE OF VARIABLE =6  
  
THE VALUE OF VARIABLE =3  
  
THE VALUE OF VARIABLE =8  
  
THE VALUE OF VARIABLE =4  
  
THE VALUE OF VARIABLE =9  
  
-----  
Process exited after 0.1672 seconds with return value 0  
Press any key to continue . . .
```



QUESTION :11

Create a class book have two data member and one constructor with parameter or create a increment overloaded operator or decrement overloaded operator.

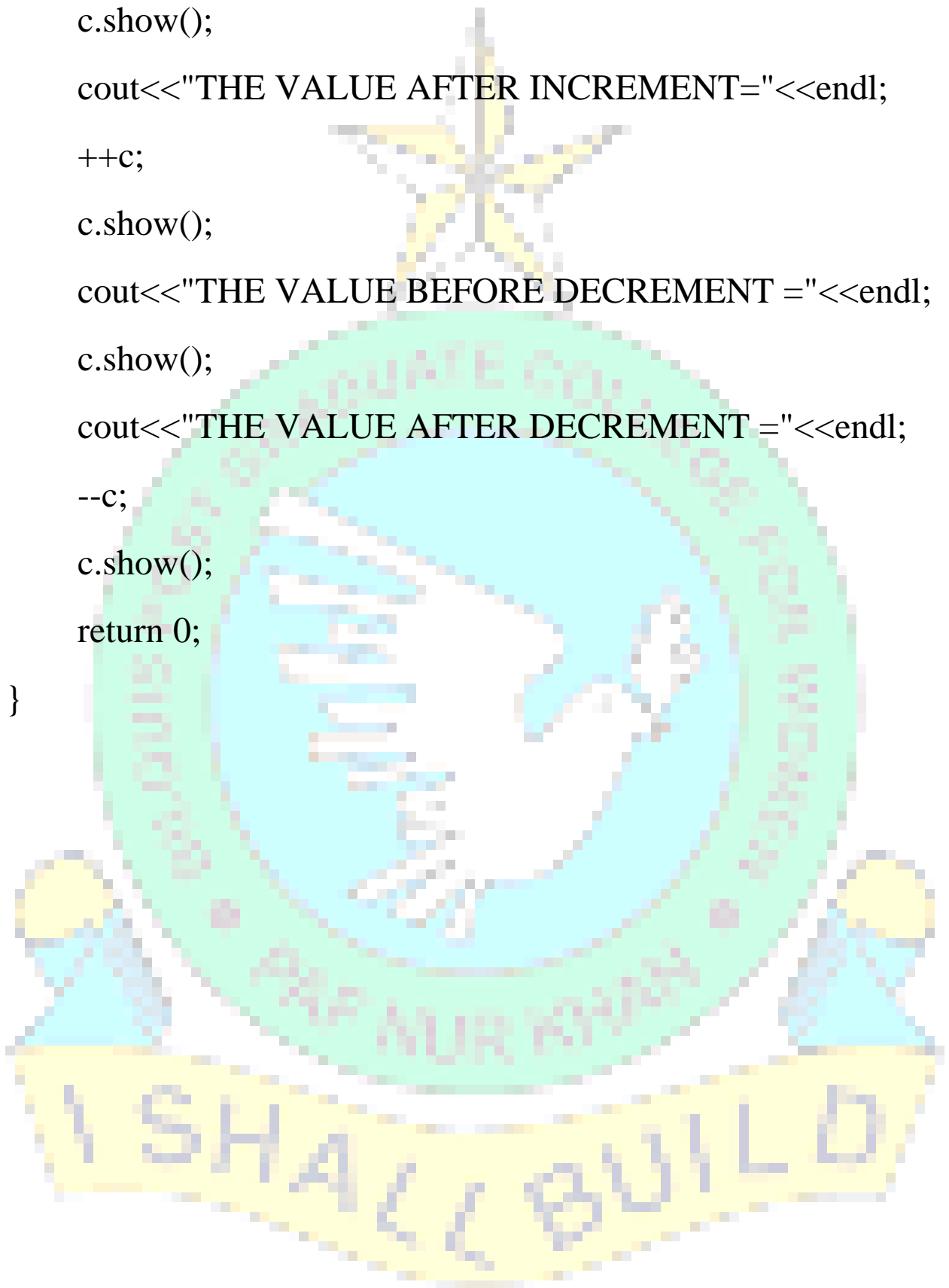
SOLUTION:

PROGRAM:

```
#include<iostream>
using namespace std;
class Book
{
    private:
        int a,b;
    public:
        Book(int x,int y)
        {
            a=x;
            b=y;
        }
        void show()
        {
```

```
        cout<<"THE VALUE OF a "<<a<<endl;
        cout<<"THE VALUE OF b "<<b<<endl;
    }
void operator ++()
{
    a++;
    b++;
}
void operator --()
{
    a--;
    b--;
}
};
int main()
{
    Book c(3,4);
    cout<<"THE VALUE BEFORE INCREMENT ="<<endl;
```

```
c.show();  
  
cout<<"THE VALUE AFTER INCREMENT="<<endl;  
  
++c;  
  
c.show();  
  
cout<<"THE VALUE BEFORE DECREMENT ="<<endl;  
  
c.show();  
  
cout<<"THE VALUE AFTER DECREMENT ="<<endl;  
  
--c;  
  
c.show();  
  
return 0;  
  
}
```



OUTPUT:

```
C:\Users\Home\Documents\76.exe
THE VALUE BEFORE INCREMENT =
THE VALUE OF a 3
THE VALUE OF b 4
THE VALUE AFTER INCREMENT=
THE VALUE OF a 4
THE VALUE OF b 5
THE VALUE BEFORE DECREMENT =
THE VALUE OF a 4
THE VALUE OF b 5
THE VALUE AFTER DECREMENT =
THE VALUE OF a 3
THE VALUE OF b 4
-----
Process exited after 13.6 seconds with return value 0
Press any key to continue . . .
```



QUESTION :12

Create a class with name time that have three data member with name hours, minutes or seconds. Create a parameterized constructor that take values as parameter and assign to data member. This operator having a overloaded addition operator that add 1 in data member values and have a overloaded subtraction operator that decreased the value of data member with 1.

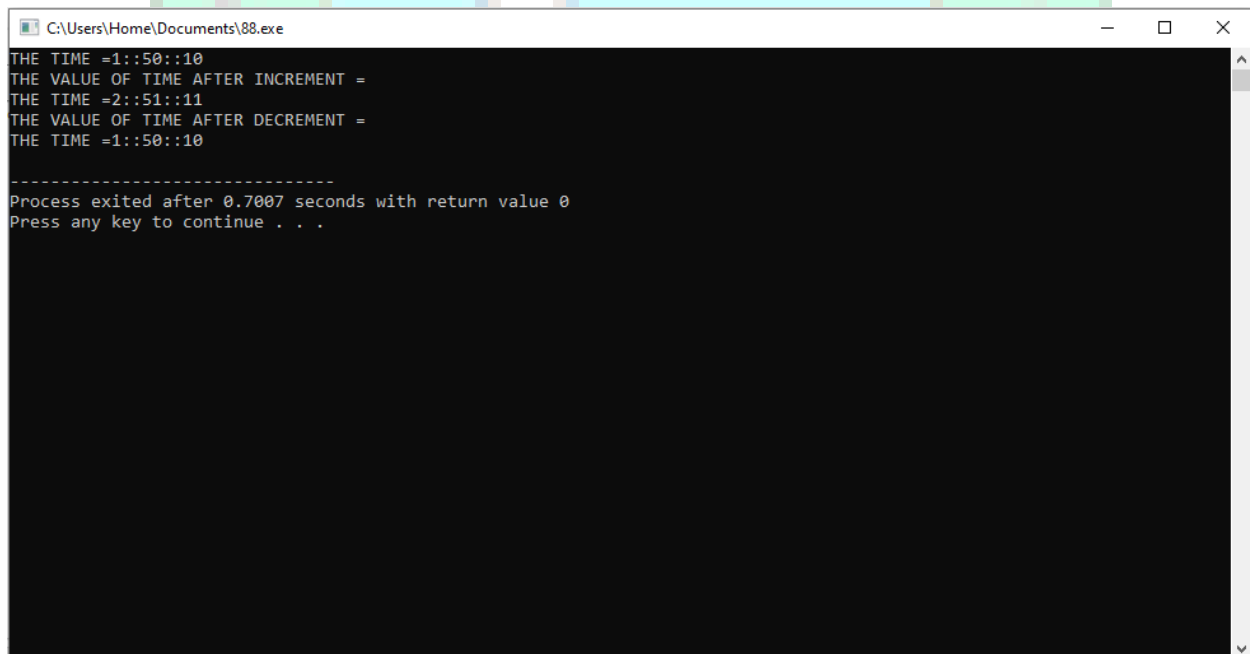
SOLUTION:

PROGRAM:

```
#include<iostream>
using namespace std;
class Time
{
    private:
    int hours, minutes, seconds;
    public:
    Time()
    {
        hours=1;
        minutes=50;
        seconds=10;
    }
    void show()
    {
        cout<<"THE TIME =" <<hours<<":"<<minutes<<":"<<seconds<<endl;
    }
    void operator ++()
    {
        hours=hours+1;
        minutes=minutes+1;
        seconds=seconds+1;
    }
    void operator --()
    {
        minutes=minutes-1;
        hours=hours-1;
        seconds=seconds-1;
    }
}
```

```
}  
};  
int main()  
{  
    Time p1;  
    p1.show();  
    cout<<"THE VALUE OF TIME AFTER INCREMENT ="<<endl;  
    ++p1;  
    p1.show();  
    cout<<"THE VALUE OF TIME AFTER DECREMENT ="<<endl;  
    --p1;  
    p1.show();  
    return 0;  
}
```

OUTPUT:



```
C:\Users\Home\Documents\88.exe  
THE TIME =1:50:10  
THE VALUE OF TIME AFTER INCREMENT =  
THE TIME =2:51:11  
THE VALUE OF TIME AFTER DECREMENT =  
THE TIME =1:50:10  
  
-----  
Process exited after 0.7007 seconds with return value 0  
Press any key to continue . . .
```

QUESTION:13

Write a program that overloads the comparison operators == to work with String class. The result of the comparison must be 1 if the two strings are of same length and 0 otherwise.

SOLUTION:

PROGRAM:

```
#include <iostream>
#include<string.h>
using namespace std;
class String {
    private:
        char str[50];
    public:
        String ()
        { str[0]= '\0'; }
        void in()
        { cout<<"Enter String: ";
          gets(str);
        }
        void show()
```



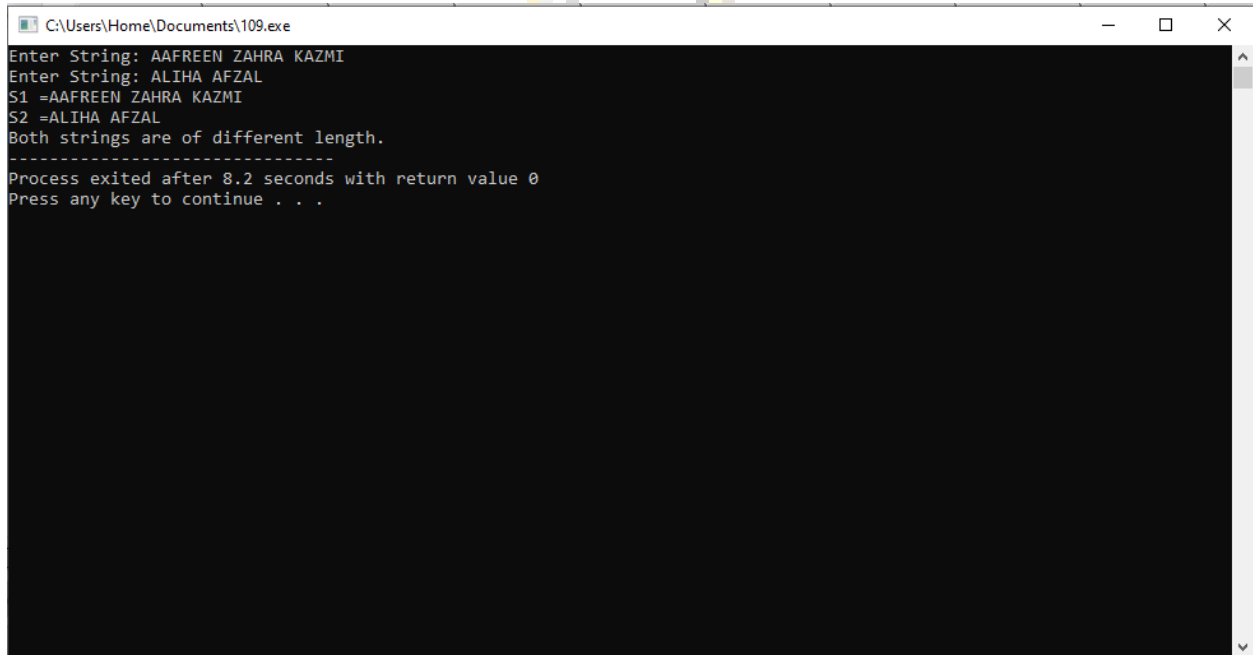
```
{ cout<<str<<endl;
}
int operator ==(String s)
{ if(strlen(s.str)==strlen(str))
    return 1;
    else
    return 0;
} };
int main () {
    String s1, s2;
    s1.in();
    s2.in();
    cout<<"S1 =";
    s1.show();
    cout<<"S2 =";
    s2.show();
    if(s1==s2)
        cout<<"Both strings are of equal length.";
    else
```

```
cout<<"Both strings are of different length.";

return 0;

}
```

OUTPUT:



```
C:\Users\Home\Documents\109.exe
Enter String: AAFREEN ZAHRA KAZMI
Enter String: ALIHA AFZAL
S1 =AAFREEN ZAHRA KAZMI
S2 =ALIHA AFZAL
Both strings are of different length.
-----
Process exited after 8.2 seconds with return value 0
Press any key to continue . . .
```





QUESTION :1

Write a program that explains the concepts of execution of constructor in single inheritance.

SOLUTION:

PROGRAM:

```
#include <iostream>

using namespace std;

class BB {
    public:
    BB()
    { cout<<"Constructor of Base Class\n";
    }
};

class DD:public BB
{ public:
    DD()
    { cout<<"Constructor of Derived Class";
    }
}
```

```
};
```

```
int main ()
```

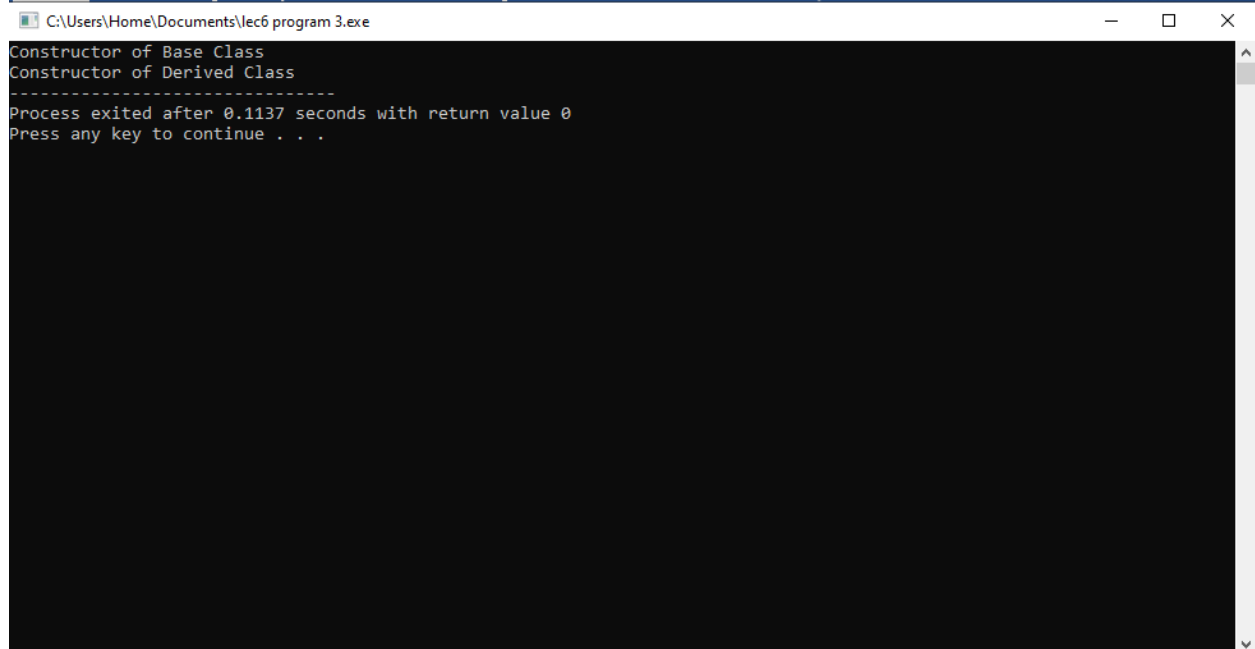
```
{
```

```
    DD obj;
```

```
    return 0;
```

```
}
```

OUTPUT:



```
C:\Users\Home\Documents\lec6 program 3.exe
Constructor of Base Class
Constructor of Derived Class
-----
Process exited after 0.1137 seconds with return value 0
Press any key to continue . . .
```

QUESTION :2

Write a class Person that has attributes of id, name and address. It has a constructor to initialize, a member function to input and a member function to display data members. Create another class Student that inherits Person class. It has additional attributes of roll number and marks. It has member function to input and display its data members.

SOLUTION:

PROGRAM:

```
#include <iostream>

using namespace std;

class Person {
protected:
    int id;
    char name[50], address[100];
public:
    Person()
    { id=0;
      name[0]='\0';
      address[0]='\0';    }
    void GetInfo()
```

```
{ cout<<"Enter your id: ";
    cin>>id;
    cout<<"Enter your name: ";
    cin>>name;
    cout<<"Enter your address: ";
    cin>>address; }
void ShowInfo()
{ cout<<"Your Personal information is as follows:\n";
    cout<<"Id= "<<id<<endl;
    cout<<"Name= "<<name<<endl;
    cout<<"Address= "<<address<<endl; }
};

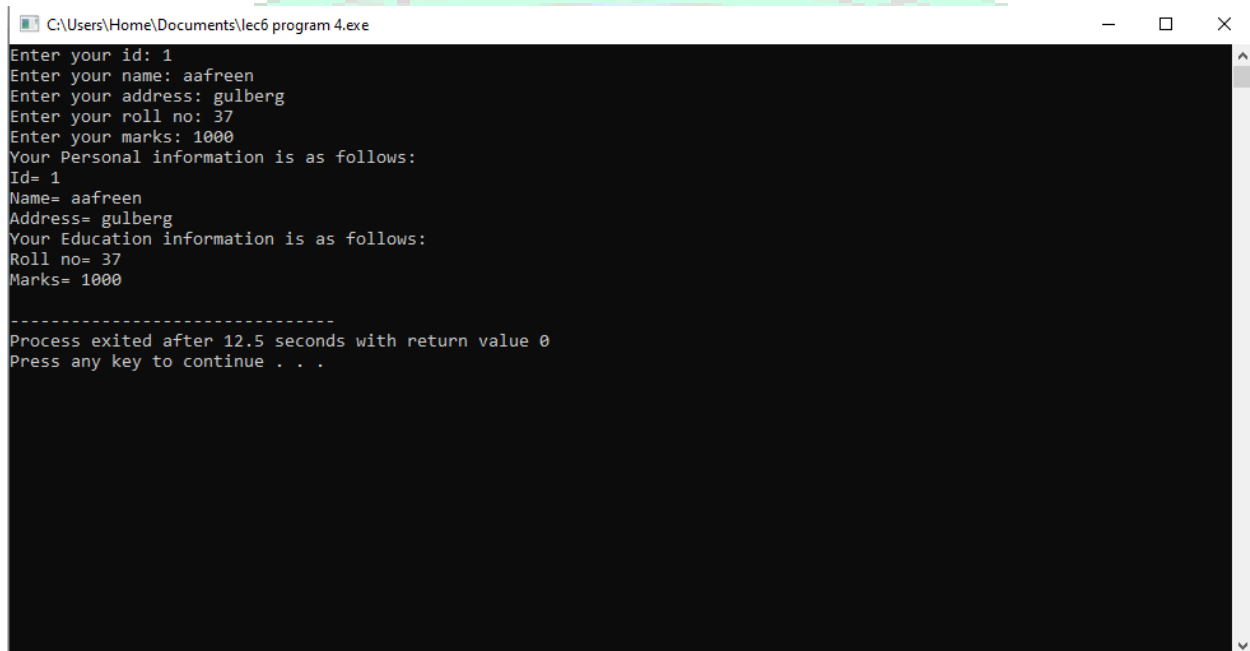
class Student:public Person
{private:
    int rno, marks;
public:
    Student()
    { Student::Person();
```

```
    rno=marks=0;
}
void GetEdu()
{ cout<<"Enter your roll no: ";
  cin>>rno;
  cout<<"Enter your marks: ";
  cin>>marks;
}
void ShowEdu()
{ cout<<"Your Education information is as follows:\n";
  cout<<"Roll no= "<<rno<<endl;
  cout<<"Marks= "<<marks<<endl;
}
};
int main ()
{
  Student s;
  s.GetInfo();
}
```



```
s.GetEdu();  
  
s.ShowInfo();  
  
s.ShowEdu();  
  
return 0;  
  
}
```

OUTPUT:



```
C:\Users\Home\Documents\lec6 program 4.exe  
Enter your id: 1  
Enter your name: aafreen  
Enter your address: gulberg  
Enter your roll no: 37  
Enter your marks: 1000  
Your Personal information is as follows:  
Id= 1  
Name= aafreen  
Address= gulberg  
Your Education information is as follows:  
Roll no= 37  
Marks= 1000  
  
-----  
Process exited after 12.5 seconds with return value 0  
Press any key to continue . . .
```

QUESTION :3

- Write two classes Parent and Child
- Parent class has a data member int n and a function show() to show the value of data member
- Child class has a data member char ch and a function show() to show the value of data member
- Note: object of derived class will pass values to the constructor and the derived class function show() will override the show() function of parent class.

SOLUTION:

PROGRAM:

```
#include <iostream>

using namespace std;

class Parent {
protected:
    int n;
public:
    Parent(int p)
    { n=p;
    }
    void show()
    {cout<<"n= "<<n<<endl;
```

```
    }  
};  
  
class Child:public Parent  
{  
    private:  
        char ch;  
  
    public:  
        Child(char c, int m):Parent(m)  
        {   ch=c;  
        }  
        void show()  
        { Parent::show();  
          cout<<"Ch= "<<ch<<endl;  
        }  
};  
  
int main ()  
{  
    Child obj('@', 100);  
    obj.show();  
    return 0;  
}
```

}



OUTPUT:

```
Select C:\Users\Home\Documents\lec 6program5.exe
n= 100
Ch= @
-----
Process exited after 0.1041 seconds with return value 0
Press any key to continue . . .
```



QUESTION :4

- Write a class two classes. The parent class is called Simple that has two data members a and b to store two numbers. It also has four member function:
- The add() function adds two numbers and displays the result.
- The sub() function subtracts two members and display the result.
- The mul() function multiples two numbers and displays the result.
- The div() function divides two numbers and displays the result.

SOLUTION:

PROGRAM:

```
#include <iostream>

using namespace std;

class Simple{
protected:
    int a,b;
public:
    Simple()
    { a=b=0; }
    void in()
    { cout<<"Enter a: ";
      cin>>a;
```

```

    cout<<"Enter b: ";

    cin>>b;

}

void add()
{ cout<<"a + b= "<<a+b<<endl; }

void sub()
{ cout<<"a - b= "<<a-b<<endl; }

void mul()
{ cout<<"a * b= "<<a*b<<endl; }

void div()
{ cout<<"a / b= "<<a/b<<endl; } };

class Complex:public Simple
{
public:
    void add()
    { if(a<=0 || b<=0)

        cout<<"Inavlid vlaues."<<endl;

        else

        Simple::add(); }
}

```

```
void sub()
{ if(a<=0 || b<=0)
  cout<<"Inavlid vlaues."<<endl;
  else
  Simple::sub(); }

void mul()
{ if(a<=0 || b<=0)
  cout<<"Inavlid vlaues."<<endl;
  else
  Simple::mul(); }

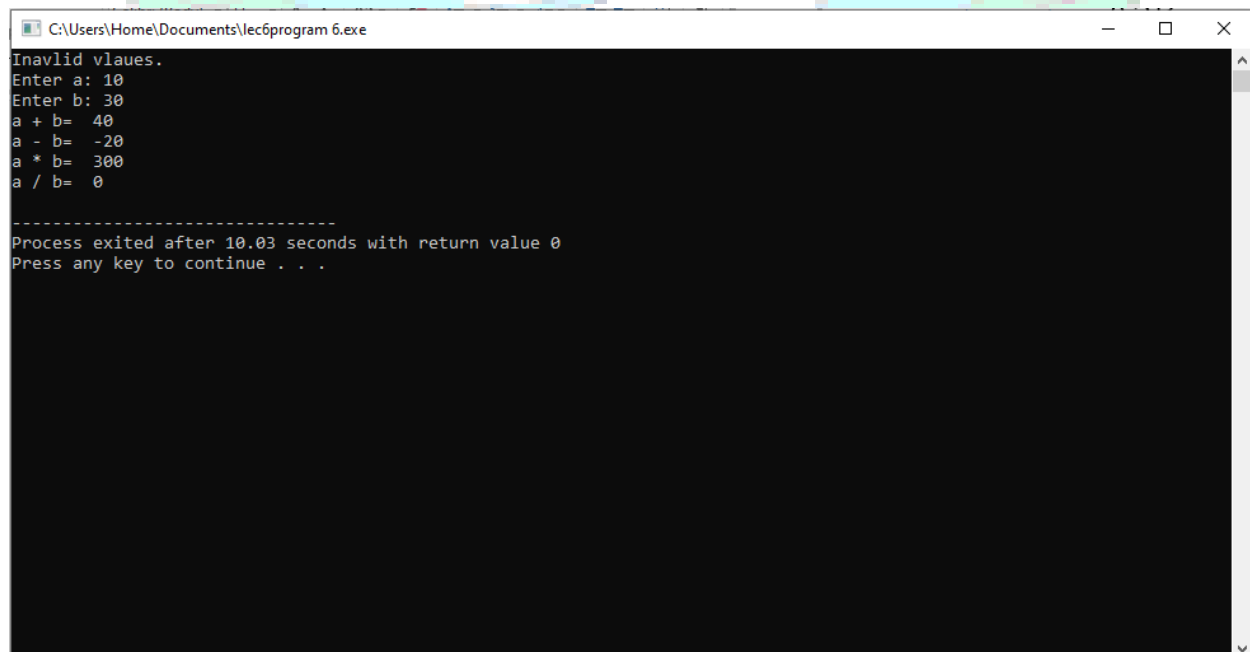
void div()
{ if(a<=0 || b<=0)
  cout<<"Inavlid vlaues."<<endl;
  else
  Simple::div(); }

};

int main ()
```

```
{  
    Complex obj;  
    obj.add();  
    obj.in();  
    obj.add();  
    obj.sub();  
    obj.mul();  
    obj.div();  
    return 0;  
}
```

OUTPUT:



```
C:\Users\Home\Documents\lec6program 6.exe  
Invalid vlaues.  
Enter a: 10  
Enter b: 30  
a + b= 40  
a - b= -20  
a * b= 300  
a / b= 0  
  
-----  
Process exited after 10.03 seconds with return value 0  
Press any key to continue . . .
```


QUESTION :5

Write a base class **Computer** that contains data members of **wordSize** (in bits), **memorySize** (in megabytes), **storageSize** (in megabytes) and **speed** (in megahertz). Derive a **Laptop** class that is a kind of **Computer** class but also specifies the object's **length**, **width**, **height** and **weight**. Member functions of both classes should include a default constructor, a constructor to initialize all components and a function to display data member.

SOLUTION:

PROGRAM:

```
#include <iostream>

using namespace std;

class Computer{
protected:
    int wordSize;
    int memorySize;
    double storageSize;
    int speed;
public:
    Computer() { }
    Computer(int, int, double, int);
    void show();
```

```

};

class Laptop:public Computer
{
    private:
        double lenght, width, height;
        double weight;

    public:
        Laptop() {}
        Laptop(int, int, double, int, double, double, double,
double);
        void show();
};

Computer::Computer(int wdsiz, int memsiz, double storsiz, int
spd)
{
    wordSize=wdsiz;
    memorySize=memsiz;
    storageSize=storsiz;
    speed=spd; }

void Computer::show()
{
    cout<<"Word size :"<<wordSize<<endl;

```

```
cout<<"Memory size : "<<memorySize<<endl;
```

```
cout<<"Storage size : "<<storageSize<<endl;
```

```
cout<<"Speed : "<<speed<<"Mhz"<<endl; }
```

```
Laptop::Laptop(int wdsiz, int memsiz, double storsiz, int spd,  
double len, double wid, double ht, double wt) :
```

```
Computer(wdsiz, memsiz, storsiz, spd)
```

```
{ lenght=len;
```

```
width=wid;
```

```
height=ht;
```

```
weight=wt; }
```

```
void Laptop::show()
```

```
{ Computer::show();
```

```
cout<<"Lenght: "<<lenght<<endl;
```

```
cout<<"Width: "<<width<<endl;
```

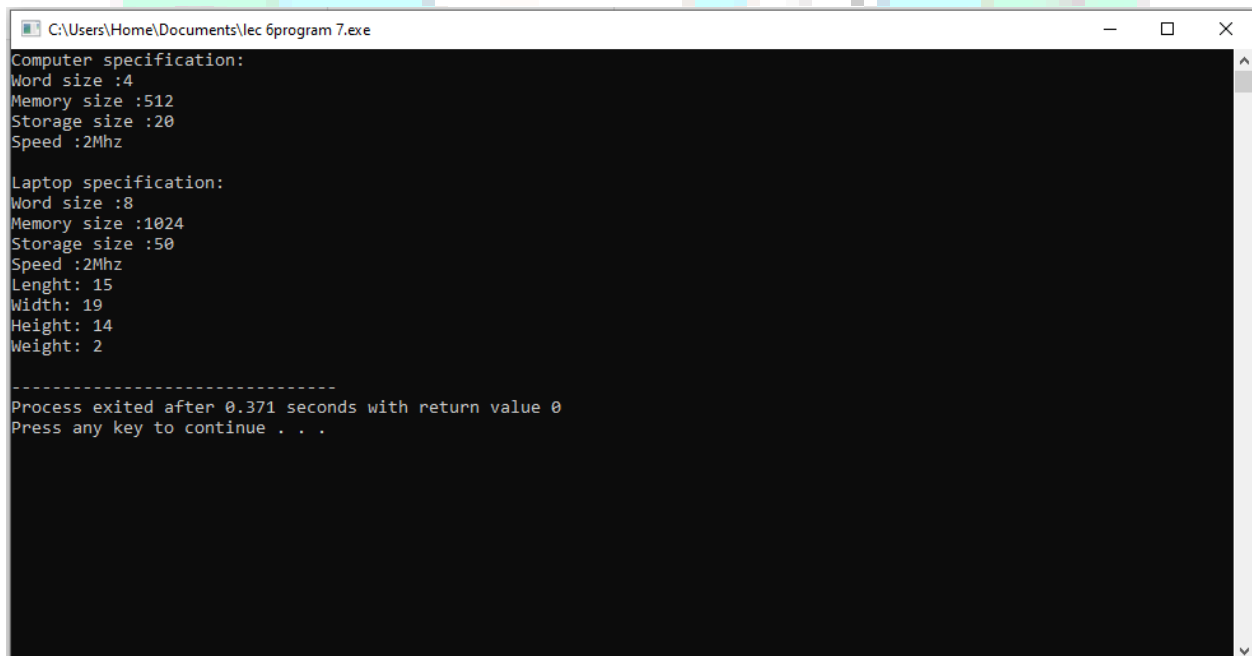
```
cout<<"Height: "<<height<<endl;
```

```
cout<<"Weight: "<<weight<<endl; }
```

```
int main ()
```

```
{  
    Computer comp(4,512,20,2);  
    Laptop lap(8,1024, 50,2, 15, 19,14,2);  
    cout<<"Computer specification:"<<endl;  
    comp.show();  
    cout<<"\nLaptop specification:"<<endl;  
    lap.show();  
    return 0;  
}
```

OUTPUT:

A screenshot of a Windows command prompt window titled "C:\Users\Home\Documents\lec 6program 7.exe". The window displays the output of a C++ program. It first shows "Computer specification:" followed by "Word size :4", "Memory size :512", "Storage size :20", and "Speed :2Mhz". Then, it shows "Laptop specification:" followed by "Word size :8", "Memory size :1024", "Storage size :50", "Speed :2Mhz", "Lenght: 15", "Width: 19", "Height: 14", and "Weight: 2". At the bottom, it states "-----", "Process exited after 0.371 seconds with return value 0", and "Press any key to continue . . .".

```
C:\Users\Home\Documents\lec 6program 7.exe  
Computer specification:  
Word size :4  
Memory size :512  
Storage size :20  
Speed :2Mhz  
  
Laptop specification:  
Word size :8  
Memory size :1024  
Storage size :50  
Speed :2Mhz  
Lenght: 15  
Width: 19  
Height: 14  
Weight: 2  
  
-----  
Process exited after 0.371 seconds with return value 0  
Press any key to continue . . .
```

QUESTION :6

Write a program that declares two classes and defines a relationship between them using public inheritance.

SOLUTION:

PROGRAM:

```
#include <iostream>

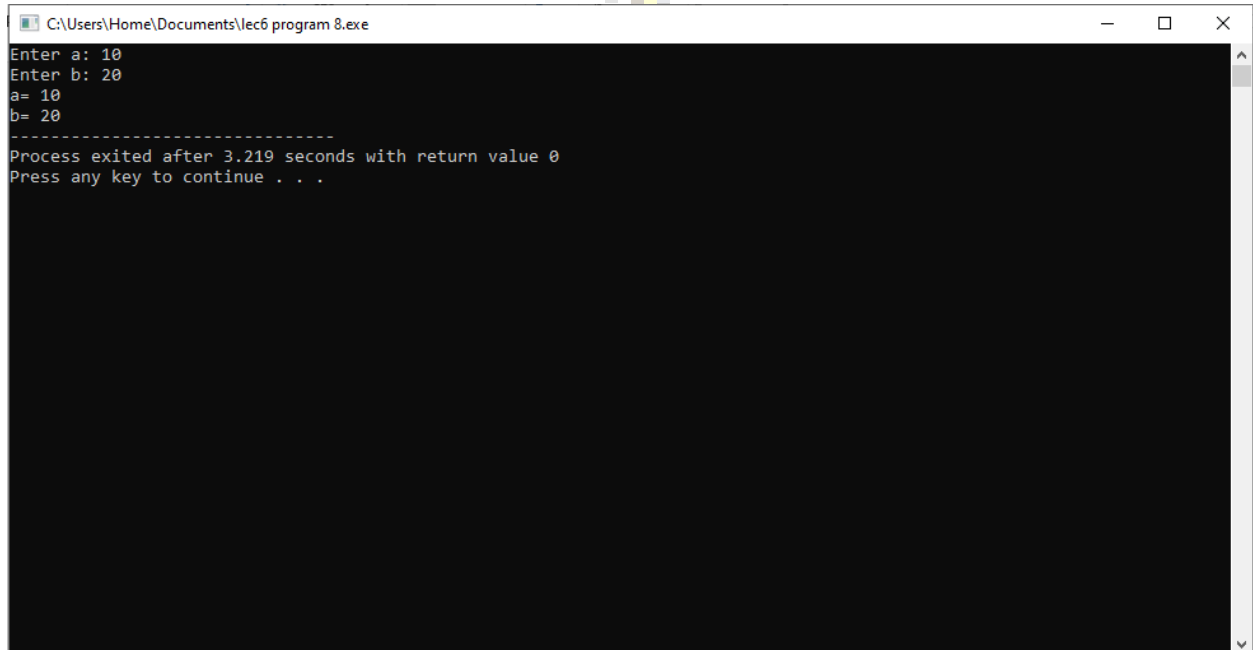
using namespace std;

class Parent{
    private:
        int c;
    protected:
        int b;
    public:
        int a;
};

class Child: public Parent
{ public:
    void in()
    {
```

```
cout<<"Enter a: ";  
cin>>a;  
cout<<"Enter b: ";  
cin>>b;  
}  
void out()  
{  
    cout<<"a= "<<a<<endl;  
    cout<<"b= "<<b;  
};  
int main ()  
{  
    Child obj;  
    obj.in();  
    obj.out();  
    return 0;  
}
```

OUTPUT:



A screenshot of a Windows command prompt window titled "C:\Users\Home\Documents\lec6 program 8.exe". The window has a black background with white text. The text shows the program's execution: it prompts for 'a' and 'b', receives inputs of 10 and 20 respectively, and then displays the values. After a series of dashes, it shows the process exit time and a prompt to press a key to continue.

```
C:\Users\Home\Documents\lec6 program 8.exe
Enter a: 10
Enter b: 20
a= 10
b= 20
-----
Process exited after 3.219 seconds with return value 0
Press any key to continue . . .
```



QUESTION :7

Write a program that declares two classes and defines a relationship between them using protected inheritance.

SOLUTION:

PROGRAM:

```
#include <iostream>

using namespace std;

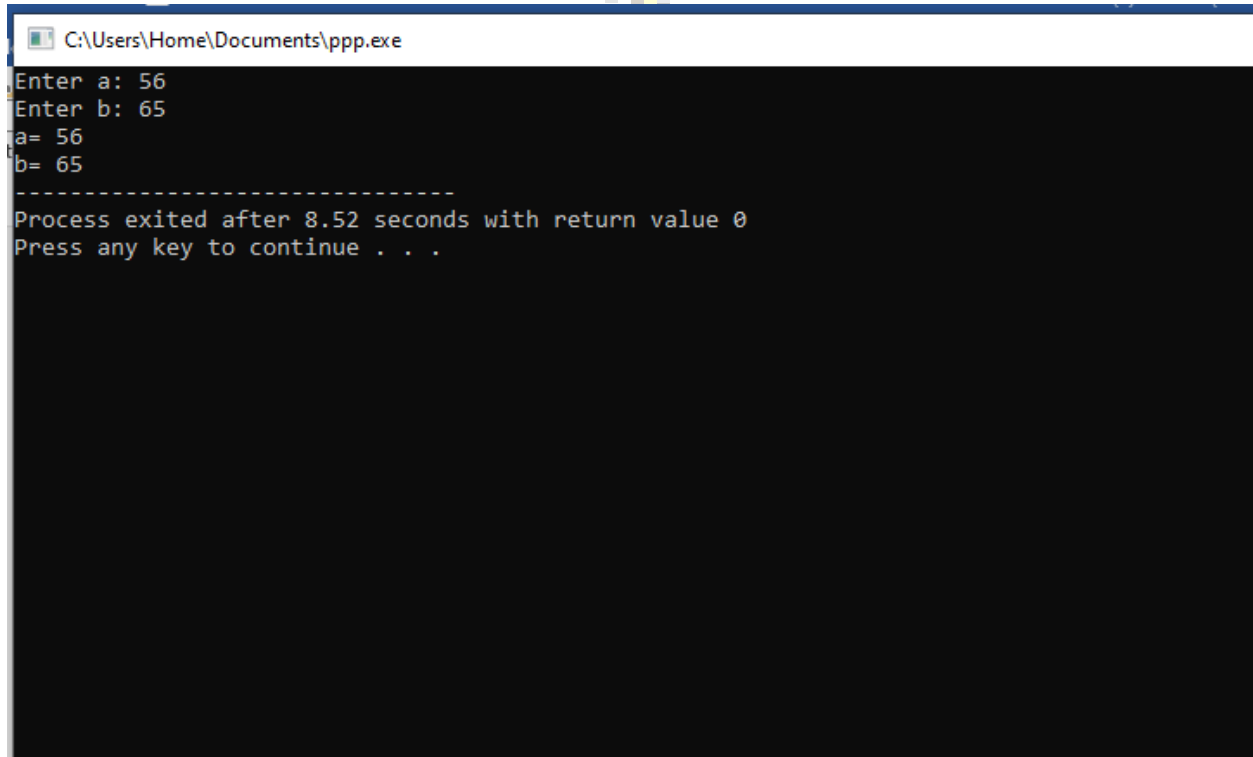
class Parent{
    private:
        int c;
    protected:
        int b;
    public:
        int a;
};

class Child: protected Parent
{ public:
    void in()
    {
```



```
cout<<"Enter a: ";  
cin>>a;  
cout<<"Enter b: ";  
cin>>b;  
}  
void out()  
{  
    cout<<"a= "<<a<<endl;  
    cout<<"b= "<<b;  
};  
int main ()  
{  
    Child obj;  
    obj.in();  
    obj.out();  
    return 0;  
}
```

OUTPUT:



```
C:\Users\Home\Documents\ppp.exe
Enter a: 56
Enter b: 65
a= 56
b= 65
-----
Process exited after 8.52 seconds with return value 0
Press any key to continue . . .
```



QUESTION :8

Write a program that declares two classes and defines a relationship between them using private inheritance.

SOLUTION:

PROGRAM:

```
#include <iostream>

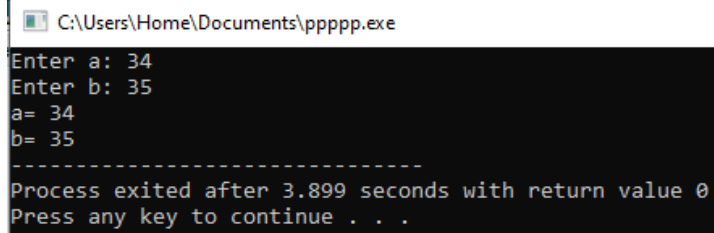
using namespace std;

class Parent{
    private:
        int c;
    protected:
        int b;
    public:
        int a;
};

class Child: private Parent
{ public:
    void in()
    {
```

```
cout<<"Enter a: ";  
cin>>a;  
cout<<"Enter b: ";  
cin>>b;  
}  
void out()  
{  
    cout<<"a= "<<a<<endl;  
    cout<<"b= "<<b;  
    };  
int main ()  
{  
    Child obj;  
    obj.in();  
    obj.out();  
    return 0;  
}
```

OUTPUT:



```
C:\Users\Home\Documents\ppppp.exe
Enter a: 34
Enter b: 35
a= 34
b= 35
-----
Process exited after 3.899 seconds with return value 0
Press any key to continue . . .
```



QUESTION :9

Write a program that declares two classes and defines a relationship between them using private inheritance.

SOLUTION:

PROGRAM:

```
#include <iostream>

using namespace std;

class A
{ private:
    int a;
public:
    void in()
    {cout<<"Enter a: ";
    cin>>a; }
    void out()
    { cout<<"a= "<<a<<endl; }
};

class B: public A
{ private:
```

```
int b;

public:

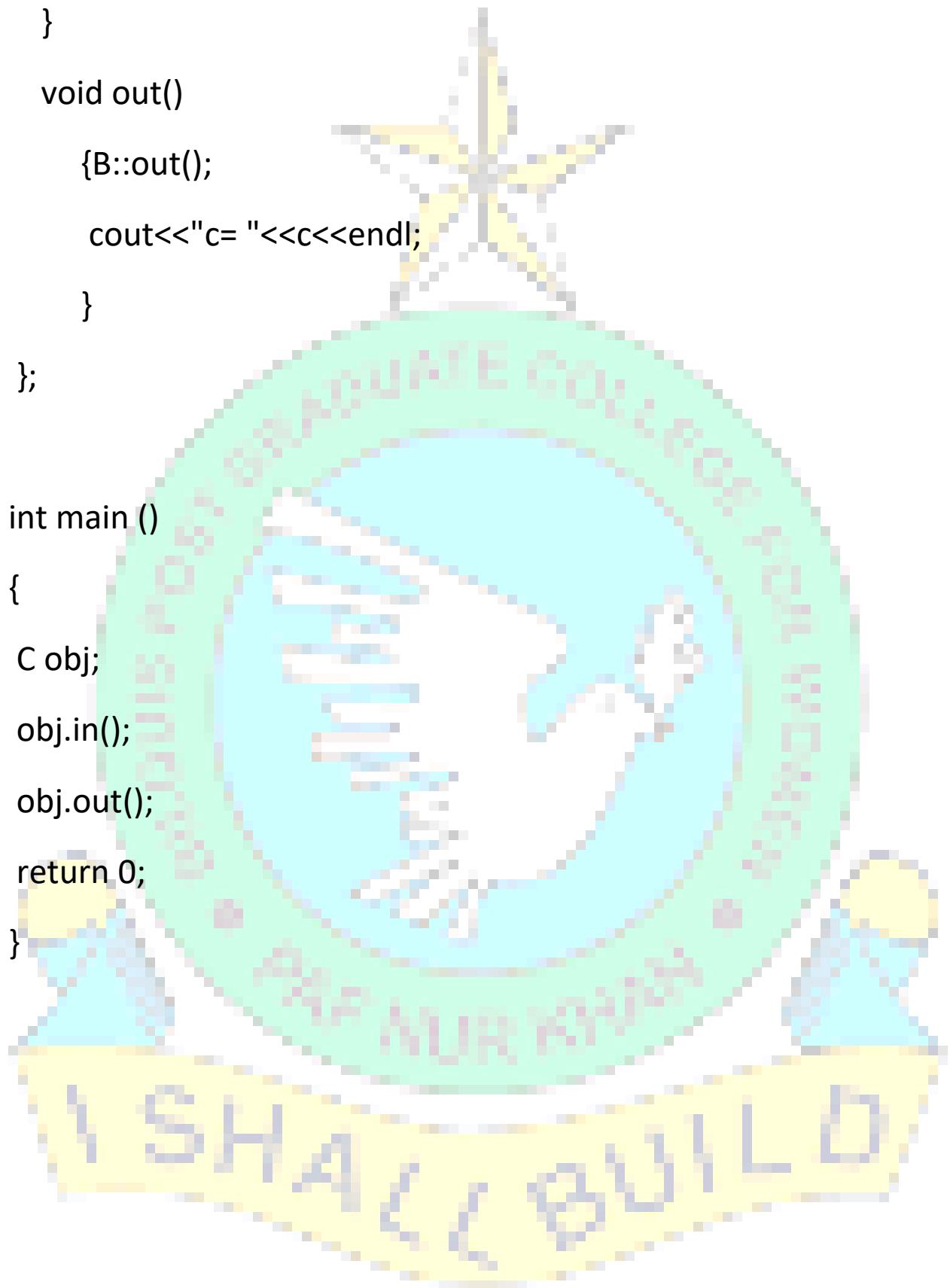
void in()
{A::in();
cout<<"Enter b: ";
cin>>b; }

void out()
{ A::out();
cout<<"b= "<<b<<endl; }

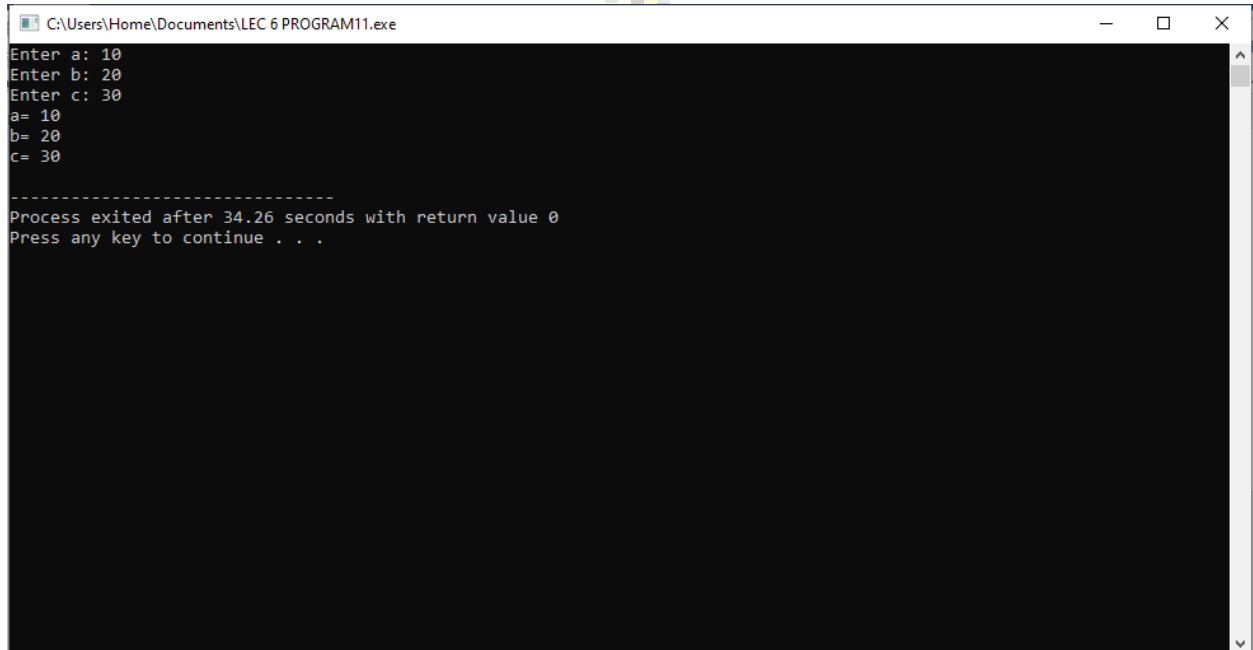
};

class C: public B
{ private:
int c;
public:
void in()
{ B::in();
cout<<"Enter c: ";
cin>>c;
```

```
}  
  
void out()  
{B::out();  
  cout<<"c= "<<c<<endl;  
}  
  
};  
  
int main ()  
{  
  C obj;  
  obj.in();  
  obj.out();  
  return 0;  
}
```



OUTPUT:



A screenshot of a Windows command prompt window titled "C:\Users\Home\Documents\LEC 6 PROGRAM11.exe". The window has a black background with white text. The text shows the program prompting for three variables: "Enter a: 10", "Enter b: 20", and "Enter c: 30". It then displays the values: "a= 10", "b= 20", and "c= 30". Below this, a separator line of dashes is shown, followed by the message "Process exited after 34.26 seconds with return value 0" and "Press any key to continue . . .".

```
C:\Users\Home\Documents\LEC 6 PROGRAM11.exe
Enter a: 10
Enter b: 20
Enter c: 30
a= 10
b= 20
c= 30
-----
Process exited after 34.26 seconds with return value 0
Press any key to continue . . .
```



QUESTION :10

Write a class Person that has the attributes of id, name and address. It has a constructor to initialize, a member function to input and a member function to display data members.

Create 2nd class Student that inherits Person class. It has additional attributes of roll number and marks. It also has member function to input and display its data members.

Create 3rd class Scholarship that inherits Student class. It has additional attributes of Scholarship name and amount. It also has member function to input and display its data members.

SOLUTION:

PROGRAM:

```
#include <iostream>

using namespace std;

class Person{
protected:
    int id;
    char name[50], address[100];
public:
    Person()
    {id=0;
    name[0]='\0';
```

```
address[0]='\0';}

void input()
{ cout<<"Enter your id: ";
  cin>>id;
  cout<<"Enter your name: ";
  cin>>name;
  cout<<"Enter your address: ";
  cin>>address; }

void output()
{cout<<"Personal Information:\n";
  cout<<"Id= "<<id<<endl;
  cout<<"Name= "<<name<<endl;
  cout<<"Address= "<<address<<endl;
  };

class Student: public Person
{ private:
  int rno, marks;
  public:
```

```
Student()
{ Person();
  rno=marks=0; }

void input()
{Person::input();
  cout<<"Enter your roll no: ";
  cin>>rno;
  cout<<"Enter your marks: ";
  cin>>marks; }

void output()
{ Person::output();
  cout<<"\nEducational Information:\n";
  cout<<"Roll no= "<<rno<<endl;
  cout<<"Marks= "<<marks<<endl;
}

};

class Scholarship: public Student
{ private:
```

```
char sname[50];

long amount;

public:

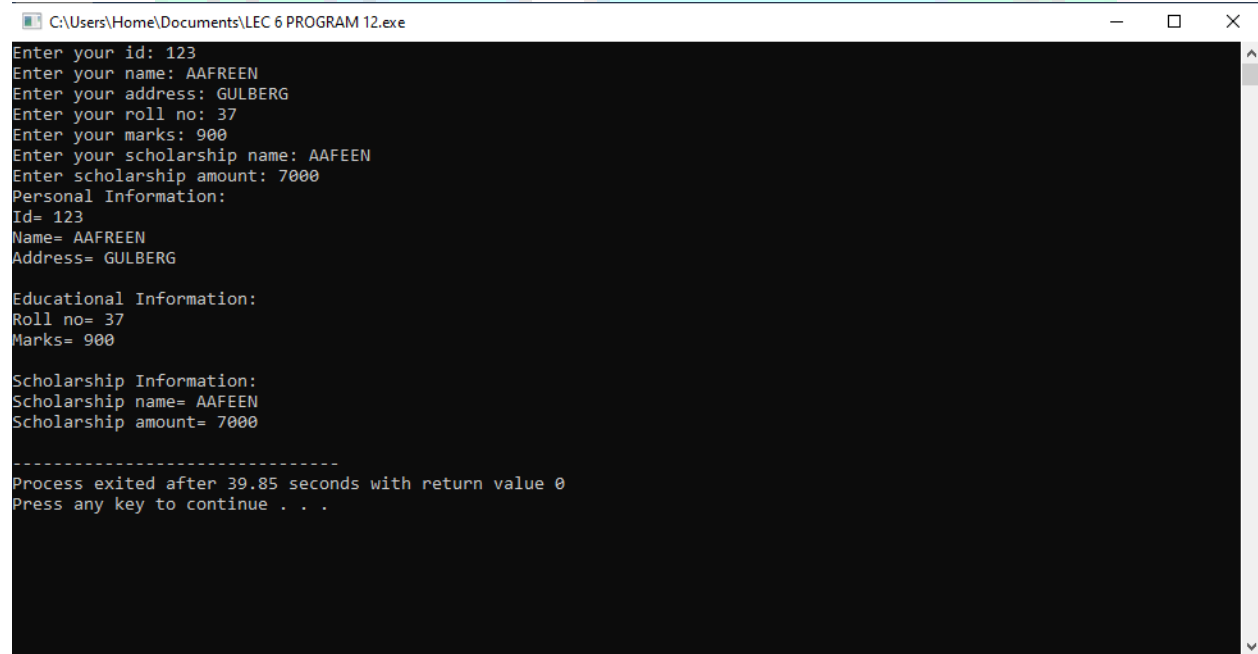
void input()
{ Student::input();
cout<<"Enter your scholarship name: ";
cin>>sname;
cout<<"Enter scholarship amount: ";
cin>>amount;
}

void output()
{ Student::output();
cout<<"\nScholarship Information:\n";
cout<<"Scholarship name= "<<sname<<endl;
cout<<"Scholarship amount= "<<amount<<endl;
}
};

int main ()
```

```
{  
    Scholarship obj;  
    obj.input();  
    obj.output();  
    return 0;  
}
```

OUTPUT:



```
C:\Users\Home\Documents\LEC 6 PROGRAM 12.exe  
Enter your id: 123  
Enter your name: AAFREEN  
Enter your address: GULBERG  
Enter your roll no: 37  
Enter your marks: 900  
Enter your scholarship name: AAFEEN  
Enter scholarship amount: 7000  
Personal Information:  
Id= 123  
Name= AAFREEN  
Address= GULBERG  
  
Educational Information:  
Roll no= 37  
Marks= 900  
  
Scholarship Information:  
Scholarship name= AAFEEN  
Scholarship amount= 7000  
  
-----  
Process exited after 39.85 seconds with return value 0  
Press any key to continue . . .
```

QUESTION :11

Write a program that demonstrate the use of multilevel inheritance(with parameters).

SOLUTION:

PROGRAM:

```
#include <iostream>

using namespace std;

class A{
    private:
        int a;
    public:
        void set(int x)
        { a=x; }
        void out()
        { cout<<"a= "<<a<<endl;
        }
};

class B: public A
{ private:
    int b;
```

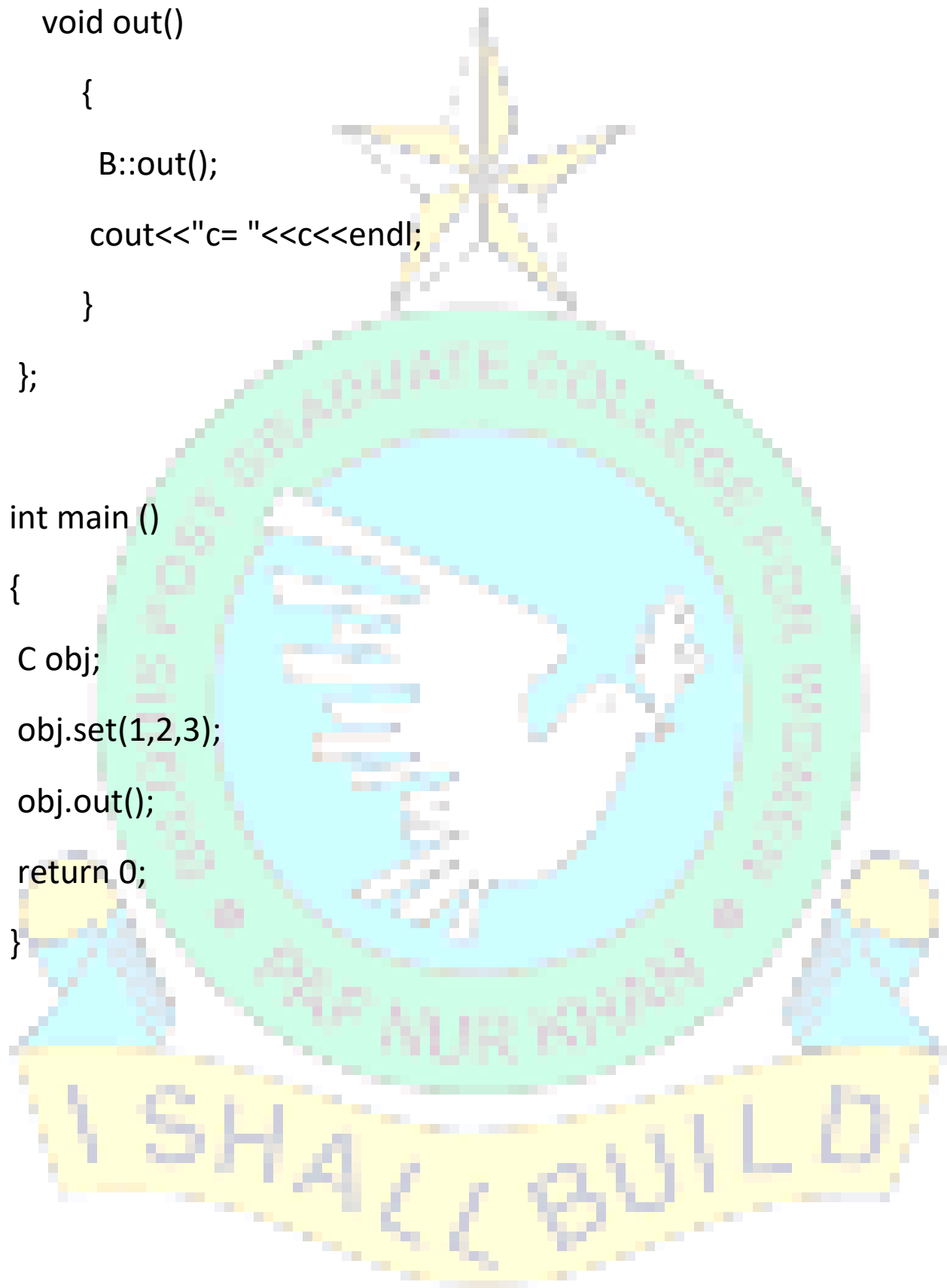
```
public:
    void set(int m, int n)
    { A::set(m);
      b=n; }
    void out()
    { A::out();
      cout<<"b= "<<b<<endl;
    }
};
class C: public B
{ private:
    int c;
public:
    void set(int g, int h, int k)
    {
        B::set(g,h);
        c=k;
    }
}
```



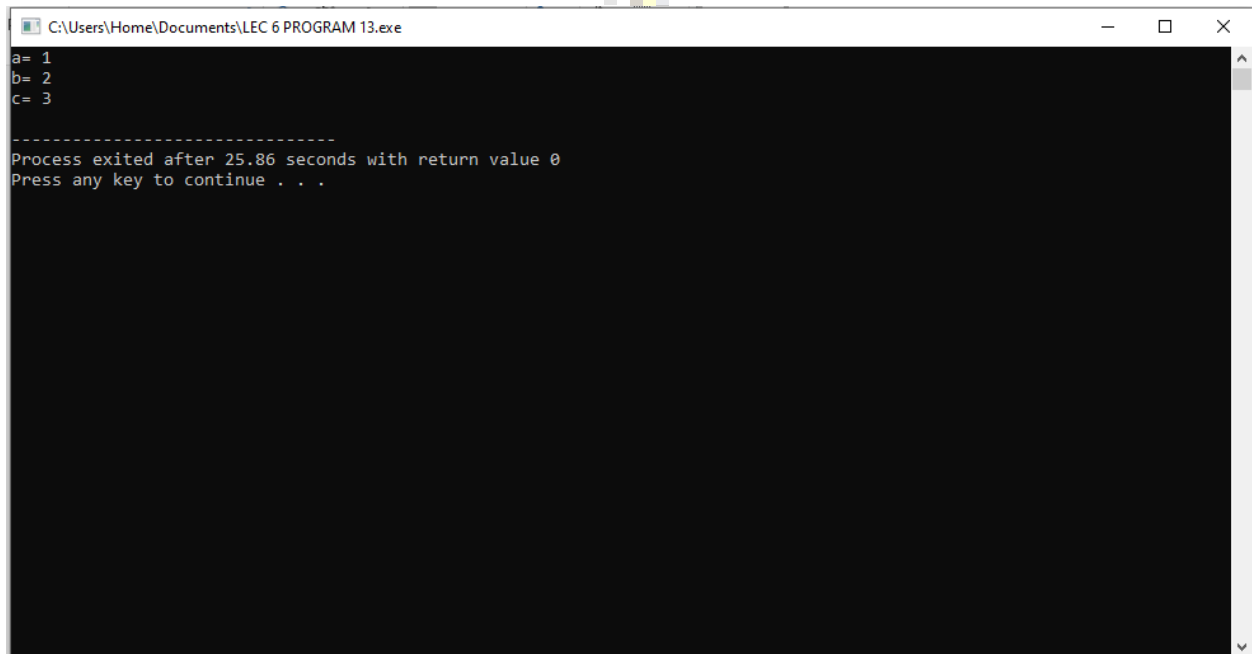
```
void out()
{
    B::out();
    cout<<"c= "<<c<<endl;
}

};

int main ()
{
    C obj;
    obj.set(1,2,3);
    obj.out();
    return 0;
}
```



OUTPUT:



```
C:\Users\Home\Documents\LEC 6 PROGRAM 13.exe
a= 1
b= 2
c= 3
-----
Process exited after 25.86 seconds with return value 0
Press any key to continue . . .
```



QUESTION :12

Write a program that demonstrate the use of multiple inheritance

SOLUTION:

PROGRAM:

```
#include <iostream>

using namespace std;

class A{
    private:
        int a;
    public:
        void in()
        { cout<<"Enter a:";
          cin>>a; }
        void out()
        { cout<<"a= "<<a<<endl;
          } };

class B
{ private:
    int b;
```

public:

void input()

{ cout<<"Enter b:";

cin>>b;

}

void output()

{ cout<<"b= "<<b<<endl;

} };

class C: public A, public B

{ private:

int c;

public:

void get()

{ A::in();

B::input();

cout<<"Enter c:";

cin>>c;

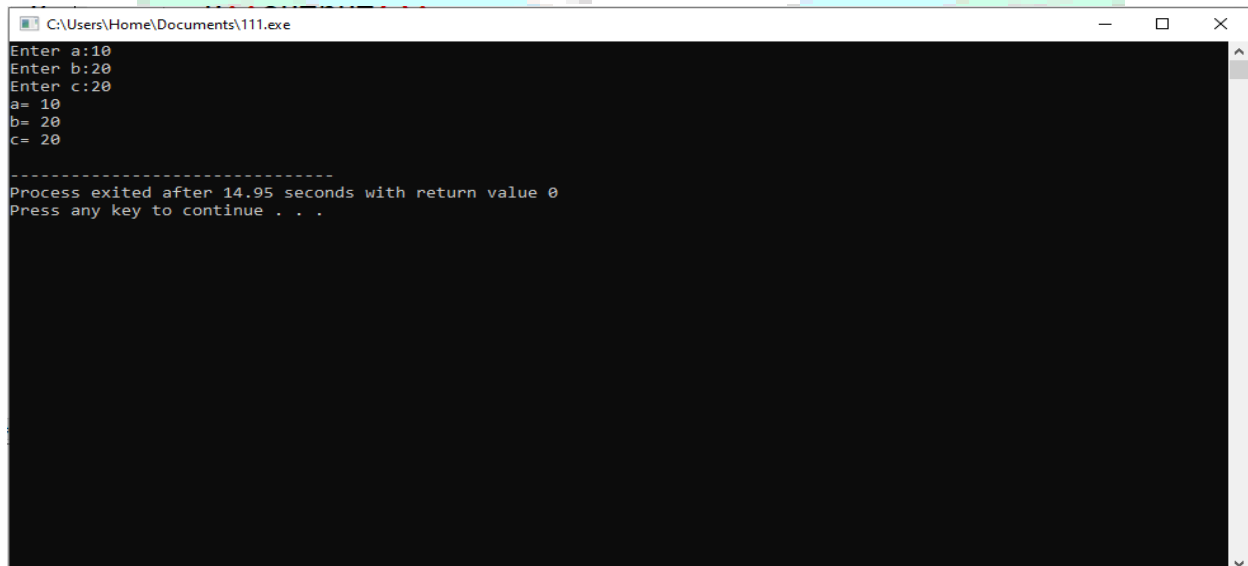
}

void show()

```
{ A::out();  
  B::output();  
  cout<<"c= "<<c<<endl;  
} };
```

```
int main ()  
{ C obj;  
  obj.get();  
  obj.show();  
  return 0;  
}
```

OUTPUT:



```
C:\Users\Home\Documents\111.exe  
Enter a:10  
Enter b:20  
Enter c:20  
a= 10  
b= 20  
c= 20  
-----  
Process exited after 14.95 seconds with return value 0  
Press any key to continue . . .
```

QUESTION :13

Write a program that demonstrates the use of constructor (without parameter) in multiple inheritance.

SOLUTION:

PROGRAM:

```
#include <iostream>

using namespace std;

class A{
public:
    A()
    {
        cout<<"Constructor of class A..."<<endl;
    }
};

class B
{
public:
    B()
    {
        cout<<"Constructor of class B..."<<endl;
    }
};
```

```
    } };  
class C: public A, public B  
{  
    public:  
    C():B(),A()  
{  
    cout<<"Constructor of class C..."<<endl;  
    } };  
int main ()  
{  
    C obj;  
    return 0;  
}
```

OUTPUT:

```
C:\Users\Home\Documents\112.exe
Constructor of class A...
Constructor of class B...
Constructor of class C...
-----
Process exited after 0.1013 seconds with return value 0
Press any key to continue . . .
```



QUESTION :14

Write a program that demonstrates the use of constructor (with parameter) in multiple inheritance.

SOLUTION:

PROGRAM:

```
#include <iostream>

using namespace std;

class A{
    private:
        int a;
    public:
        A()
        { a=0; }
        A(int n)
        { a=n; }
        void showA()
        { cout<<"a= "<<a<<endl; } };

class B{
    private:
```

```
int b;

public:
    B()
    { b=0; }
    B(int n)
    { b=n; }
    void showB()
    { cout<<"b= "<<b<<endl;
      } };

class C: public A, public B
{
    private:
        int c;
    public:
        C():B(), A()
        { c=0;
        }
        C(int x, int y, int z): A(x), B(y)
        { c=z;
```

```
}  
  
void showC()  
{ A::showA();  
  B::showB();  
  cout<<"c= "<<c<<endl;  
  };  
  
int main ()  
{  
  C obj(1,2,3);  
  obj.showC();  
  return 0;  
}
```

OUTPUT:

```
C:\Users\Home\Documents\113.exe
a= 1
b= 2
c= 3
-----
Process exited after 8.649 seconds with return value 0
Press any key to continue . . .
```



QUESTION :15

Write a program that demonstrate ambiguity in multiple inheritance.

SOLUTION:

PROGRAM:

```
#include <iostream>

using namespace std;

class A{
public:
    void show()
    {
        cout<<"Class A..."<<endl;
    }
};

class B
{
public:
    void show()
    {
        cout<<"Class B..."<<endl;
    }
}
```

```

    }

};

class C: public A, public B
{
};

int main ()
{
    C obj;
    obj.show();
    return 0;
}

```

OUTPUT:

Compiler (4)			Resources	Compile Log	Debug	Find Results	Console	Close
Line	Col	File	Message					
		C:\Users\Home\Documents\114.cpp	In function 'int main()':					
25	6	C:\Users\Home\Documents\114.cpp	[Error] request for member 'show' is ambiguous					
13	11	C:\Users\Home\Documents\114.cpp	[Note] candidates are: 'void B::show()'					
5	10	C:\Users\Home\Documents\114.cpp	[Note] 'void A::show()'					

I SHALL BUILD

QUESTION :16

Write a program that demonstrate ambiguity in multiple inheritance.

SOLUTION:

PROGRAM:

```
#include <iostream>

using namespace std;

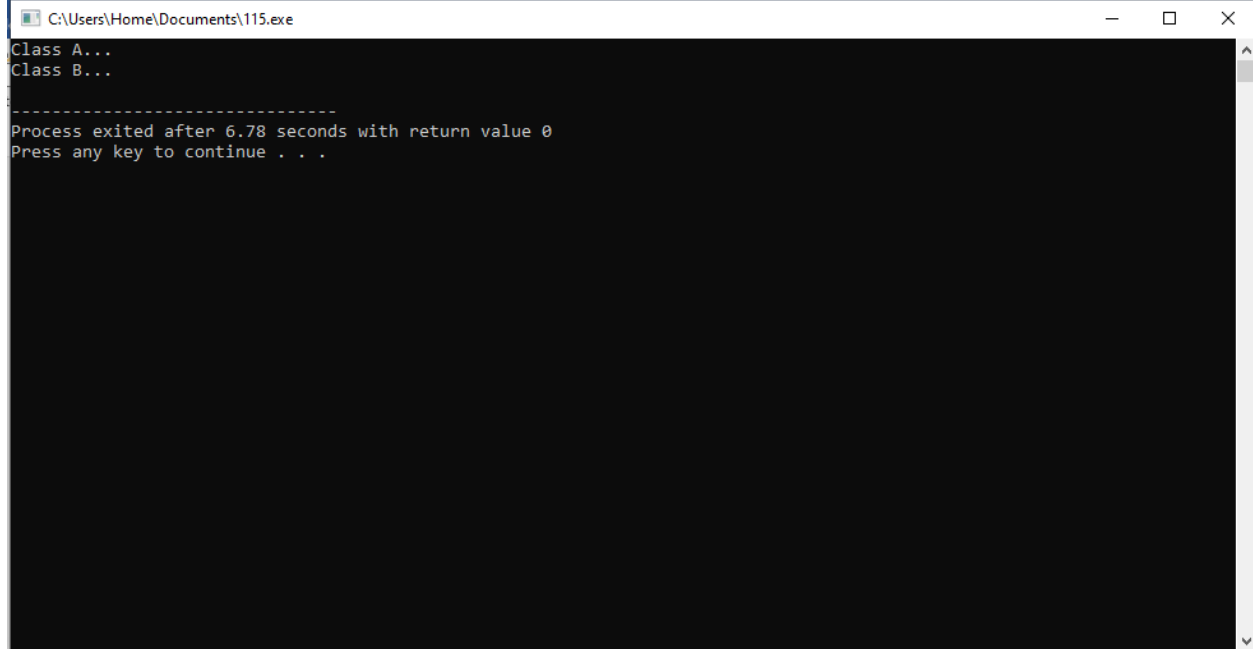
class A{
public:
    void show()
    {
        cout<<"Class A..."<<endl;
    }
};

class B
{
public:
    void show()
    {
        cout<<"Class B..."<<endl;
    }
}
```

```
    }  
};  
class C: public A, public B  
{  
};  
int main ()  
{  
    C obj;  
    obj.A::show();  
    obj.B::show();  
    return 0;  
}
```



OUTPUT:



A screenshot of a Windows command prompt window titled "C:\Users\Home\Documents\115.exe". The window has standard Windows window controls (minimize, maximize, close) in the top right corner. The text displayed in the black command prompt area is as follows:

```
Class A...  
Class B...  
-----  
Process exited after 6.78 seconds with return value 0  
Press any key to continue . . .
```



QUESTION :17

Write a program that removes the ambiguity in multiple inheritance.

SOLUTION:

PROGRAM:

```
#include <iostream>

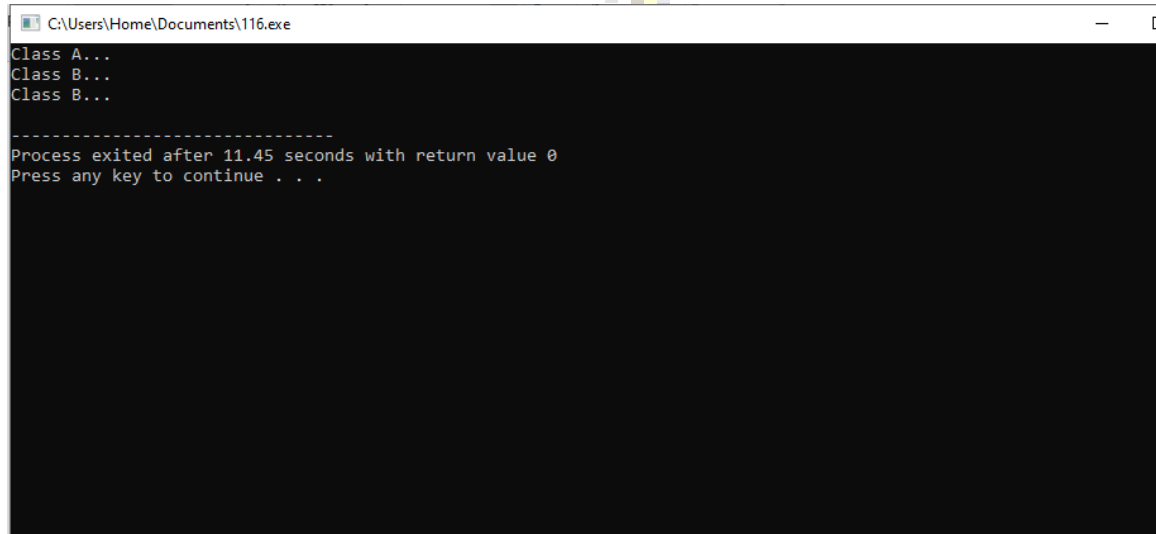
using namespace std;

class A{
public:
    void show()
    {
        cout<<"Class A..."<<endl;
    }
};

class B
{
public:
    void show()
    {
        cout<<"Class B..."<<endl;
    }
};
```

```
    }  
};  
class C: public A, public B  
{  
public:  
    void show()  
    {  
        A::show();  
        B::show();  
        cout<<"Class B..."<<endl;  
    }  
};  
int main ()  
{  
    C obj;  
    obj.show();  
    return 0;  
}
```

OUTPUT:



A screenshot of a Windows command prompt window. The title bar shows the file path "C:\Users\Home\Documents\116.exe". The window has a black background with white text. The output text is as follows:

```
Class A...
Class B...
Class B...

-----
Process exited after 11.45 seconds with return value 0
Press any key to continue . . .
```



QUESTION :18

Write a class Result that has an array of integers as attributes. It has a member function to input and a member function to display average of array elements.

Create another class Student that inherits Result class. It has additional attributes of roll number, name and an object of type Result. It has a member function to input and a member function to display its data members

SOLUTION:

PROGRAM:

```
#include <iostream>

using namespace std;

class Result{
    private:
        int marks[3];
    public:
        void input()
        { for(int i=0; i<3; i++)
          { cout<<"Enter marks: ";
            cin>>marks[i];
          } }
        void show()
```

```
{    int t=0;

    cout<<"\nResult Card: \n";

    for(int i=0; i<3; i++)
    {
        cout<<"Marks= "<<marks[i]<<endl;

        t=t+marks[i];
    }

    cout<<"Total Marks= "<<t<<endl; cout<<"Average Marks=
"<<float(t)/3.0<<endl;

    }

};

class Student
{ private:

    int rno;

    char name[50];

    Result res;

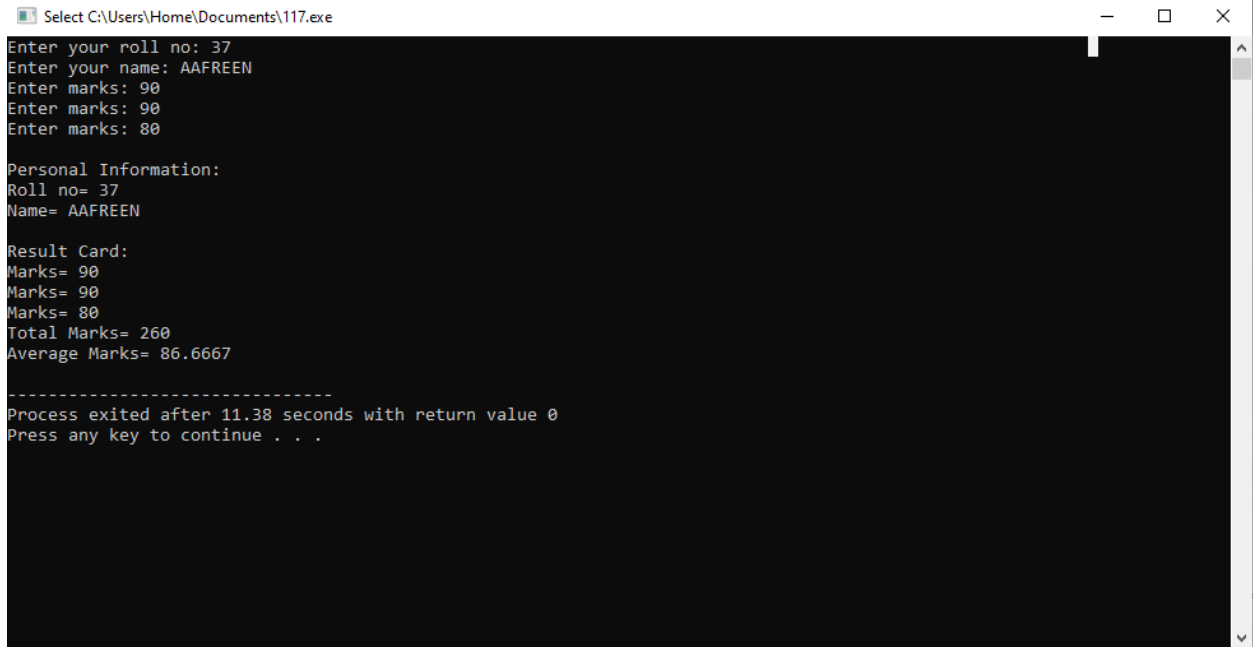
    public:

    void input()
    {cout<<"Enter your roll no: ";
```

```
cin>>rno;
cout<<"Enter your name: ";
cin>>name;
res.input();
}
void show()
{
cout<<"\nPersonal Information:\n";
cout<<"Roll no= "<<rno<<endl;
cout<<"Name= "<<name<<endl;
res.show();
}
};
int main ()
{
Student obj;
obj.input();
obj.show();
return 0;
```

}

OUTPUT:



```
Select C:\Users\Home\Documents\117.exe

Enter your roll no: 37
Enter your name: AAFREEN
Enter marks: 90
Enter marks: 90
Enter marks: 80

Personal Information:
Roll no= 37
Name= AAFREEN

Result Card:
Marks= 90
Marks= 90
Marks= 80
Total Marks= 260
Average Marks= 86.6667

-----
Process exited after 11.38 seconds with return value 0
Press any key to continue . . .
```

