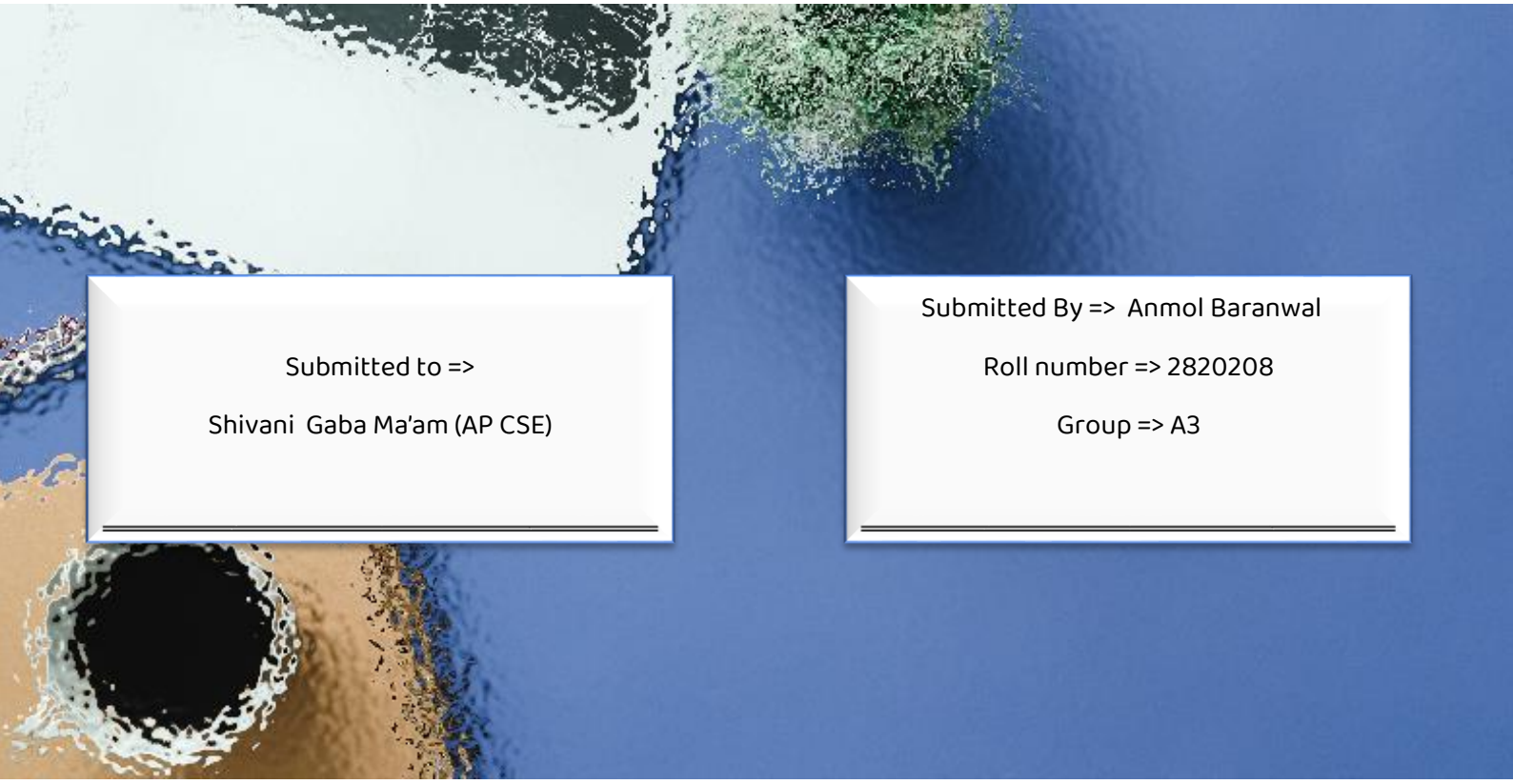


Submitted to =>

Shivani Gaba Ma'am (AP CSE)

Submitted By => Anmol Baranwal

Roll number => 2820208

Group => A3

OOPS LAB File

S no.	AIM	Date
1	Raising a number n to a power p is the same as multiplying n by itself p times. Write a function called power ( ) that takes a double value for n and an int value for p, and returns the result as double value. Use a default argument of 2 for p, so that if this argument is omitted, the number will be squared. Write a main ( ) function that gets values from the user to test this function.	11-11-2021
2	A point on the two dimensional plane can be represented by two numbers: an X coordinate and a Y coordinate. For example, (4,5) represents a point 4 units to the right of the origin along the X axis and 5 units up the Y axis. The sum of two points can be defined as a new point whose X coordinate is the sum of the X coordinates of the points and whose Y coordinate is the sum of their Y coordinates. Write a program that uses a structure called point to model a point. Define three points, and have the user input values to two of them. Then set the third point equal to the sum of the other two, and display the value of the new point. Interaction with the program might look like this: Enter coordinates for P1: 3 4 Enter coordinates for P2: 5 7 Coordinates of P1 + P2 are : 8, 11	25-11-2021
3	Create the equivalent of a four function calculator. The program should request the user to enter a number, an operator, and another number. It should then carry out the specified arithmetical operation: adding, subtracting, multiplying, or dividing the two numbers. (It should use a switch statement to select the operation). Finally it should display the result. When it finishes the calculation, the program should ask if the user wants to do another calculation. The response can be 'Y' or 'N'. Some sample interaction with the program might look like this. Enter first number, operator, and second number: 10/ 3 Answer = 3.333333 Do another (Y/ N)? Y Enter first number, operator, second number 12 + 100 Answer = 112 Do another (Y/ N) ? N	25-11-2021
4	A phone number, such as (212) 767-8900, can be thought of as having three parts: the area code (212), the exchange (767) and the number (8900). Write a program that uses a structure to store these three parts of a phone number separately. Call the structure phone. Create two structure variables of type phone. Initialize one, and have the user input a number for the other one. Then display both numbers. The interchange might look like this: • Enter your area code, exchange, and number: 415 555 1212 • My number is (212) 767-8900 • Your number is (415) 555-1212	2-12-2021
5	Create two classes DM and DB which store the value of distances. DM stores distances in metres and centimeters and DB in feet and inches. Write a program that can read values for the class objects and add one object of DM with another object of DB. Use a friend function to carry out the addition operation. The object that stores the results maybe a DM object or DB objects, depending on the units in which the results are required. The display should be in the format of feet and inches or metres and cenitmetres depending on the object on display.	2-12-2021
6	Create a class rational which represents a numerical value by two double values- NUMERATOR and DENOMINATOR. Include the following public member Functions: • constructor with no arguments (default). • constructor with two arguments. • void reduce( ) that reduces the rational number by eliminating the highest common factor between the numerator and denominator. • Overload + operator to add two rational number. • Overload >> operator to enable input through cin. • Overload << operator to enable output through cout. Write a main ( ) to test all the functions in the class.	9-12-2021

7	Consider the following class definition
	class father {
	protected : int age;
	public;
	father (int x) {age = x;}
	virtual void iam ( )
	{ cout < < "I AM THE FATHER, my age is : "<< age<< end1:}
	};
	Derive the two classes son and daughter from the above class and for each, define iam ( ) to write our similar but appropriate messages. You should also define suitable constructors for these classes. Now, write a main ( ) that creates objects of the three classes and then calls iam ( ) for them. Declare pointer to father. Successively, assign addresses of objects of the two derived classes to this pointer and in each case, call iam ( ) through the pointer to demonstrate polymorphism in action.
		9-12-2021

S no.	AIM	Date
8	Write a program that creates a binary file by reading the data for the students from the terminal. The data of each student consist of roll no., name (a string of 30 or lesser no. of characters) and marks.	16-12-2021
9	A hospital wants to create a database regarding its indoor patients. The information to store include a) Name of the patient b) Date of admission c) Disease d) Date of discharge Create a structure to store the date (year, month and date as its members). Create a base class to store the above information. The member function should include functions to enter information and display a list of all the patients in the database. Create a derived class to store the age of the patients. List the information about all the to store the age of the patients. List the information about all the pediatric patients (less than twelve years in age).	16-12-2021
10	Make a class **Employee** with a name and salary. Make a class **Manager** inherit from **Employee**. Add an instance variable, named department, of type string. Supply a method to **to String** that prints the manager's name, department and salary. Make a class **Executive** inherits from **Manager**. Supply a method **to String** that prints the string **"Executive"** followed by the information stored in the **Manager** superclass object. Supply a test program that tests these classes and methods.	23-12-2021
11	Imagine a tollbooth with a class called toll Booth. The two data items are a type unsigned int to hold the total number of cars, and a type double to hold the total amount of money collected. A constructor initializes both these to 0. A member function called payingCar ( ) increments the car total and adds 0.50 to the cash total. Another function, called nopayCar ( ), increments the car total but adds nothing to the cash total. Finally, a member function called displays the two totals. Include a program to test this class. This program should allow the user to push one key to count a paying car, and another to count a nonpaying car. Pushing the ESC kay should cause the program to print out the total cars and total cash and then exit.	23-12-2021
12	Write a function called reversit ( ) that reverses a string (an array of char). Use a for loop that swaps the first and last characters, then the second and next to last characters and so on. The string should be passed to reversit ( ) as an argument. Write a program to exercise reversit ( ). The program should get a string from the user, call reversit ( ), and print out the result. Use an input method that allows embedded blanks.	6-1-2022
13	Create some objects of the string class, and put them in a Deque-some at the head of the Deque and some at the tail. Display the contents of the Deque using the forEach ( ) function and a user written display function. Then search the Deque for a particular string, using the first That ( ) function and display any strings that match. Finally remove all the items from the Deque using the getLeft ( ) function and display each item. Notice the order in which the items are displayed: Using getLeft ( ), those inserted on the left (head) of the Deque are removed in "last in first out" order while those put on the right side are removed in "first in first out" order. The opposite would be true if getRight ( ) were used.	6-1-2022
14	Assume that a bank maintains two kinds of accounts for customers, one called as savings account and the other as current account. The savings account provides compound interest and withdrawal facilities but no cheque book facility. The current account provides cheque book facility but no interest. Current account holders should also maintain a minimum balance and if the balance falls below this level, a service charge is imposed. Create a class account that stores customer name, account number and type of account. From this derive the classes cur_acct and sav_acct to make them more specific to their requirements. Include necessary member functions in order to achieve the following tasks: a) Accept deposit from a customer and update the balance. b) Display the balance. c) Compute and deposit interest. d) Permit withdrawal and update the balance. e) Check for the minimum balance, impose penalty, necessary and update the balance. f) Do not use any constructors. Use member functions to initialize the class members.	6-1-2c022
15	Create a base class called shape. Use this class to store two double type values that could be used to compute the area of figures. Derive two specific classes called triangle and rectangle from the base shape. Add to the base class, a member function get_data( ) to initialize baseclass data members and another member function display_area( ) to compute and display the area of figures. Make display_area ( ) as a virtual function and redefine this function in the derived classes to suit their requirements. Using these three classes, design a program that will accept dimensions of a triangle or a rectangle interactively and display the area. Remember the two values given as input will be treated as lengths of two sides in the case of rectangles and as base and height in the case of triangles and used as follows: Area of rectangle = x * y Area of triangle = ½ * x * y	13-1-2022

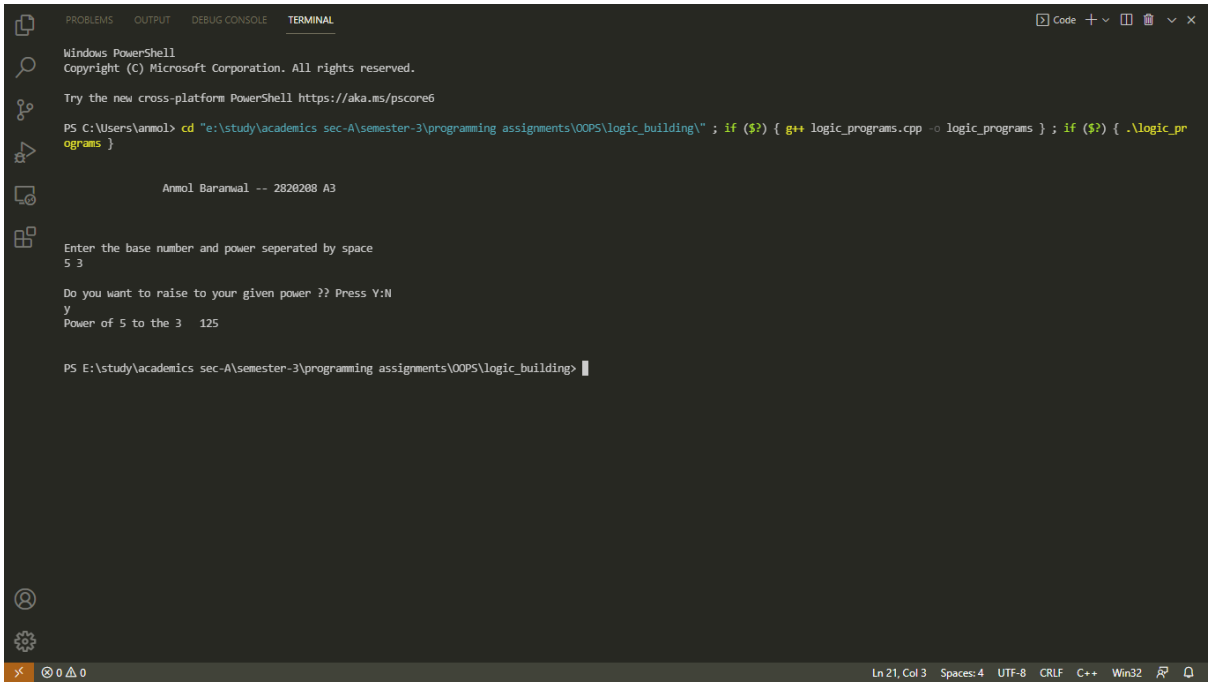
Question 1

Raising a number n to a power p is the same as multiplying n by itself p times. Write a function called power ( ) that takes a double value for n and an int value for p, and returns the result as double value. Use a default argument of 2 for p, so that if this argument is omitted, the number will be squared. Write a main ( ) function that gets values from the user to test this function.

Answer 1

```
#include<bits/stdc++.h>
using namespace std;

double power(double n, int p=2){

   if(p == 0){
      return n*n;
   } else {
      double res=1;
      for(int i=0;i<p;i++){
         res*=n;
      }
      return res;
   }
}

int main()
{
  cout<<"\n\n\t\tAnmol Baranwal -- 2820208 A3\n\n";

  double n;
  int p;
```

```
  char ch;
  cout<<"\n\nEnter the base number and power seperated by space\n";
  cin>>n>>p;
  cout<<"\nDo you want to raise to your given power ?? Press Y:N\n";
  cin>>ch;
 ch = tolower(ch);
  if(ch == 'y'){
     cout<<"Power of "<< n <<" to the "<< p <<"    " <<power(n,p);
  } else if (ch == 'n'){
     cout<<"Square of "<< n <<" is " <<"    " <<power(n);
  }
  cout<<"\n\n\n";
 return 0;
}
```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OUTPUT
DEBUG CONSOLE
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PS C:\Users\anmol> cd "e:\study\academics sec-A\semester-3\programming assignments\OOPS\logic_building\" ; if ($?) { g++ logic_programs.cpp -o logic_programs } ; if ($?) { .\logic_programs }
Anmol Baranwal -- 2820208 A3
Enter the base number and power seperated by space
5 3
Do you want to raise to your given power ?? Press Y:N
y
Power of 5 to the 3 125
PS E:\study\academics sec-A\semester-3\programming assignments\OOPS\logic_building>
0 0
Ln 21, Col 3
Spaces: 4
UTF-8
CRLF
C++
Win32

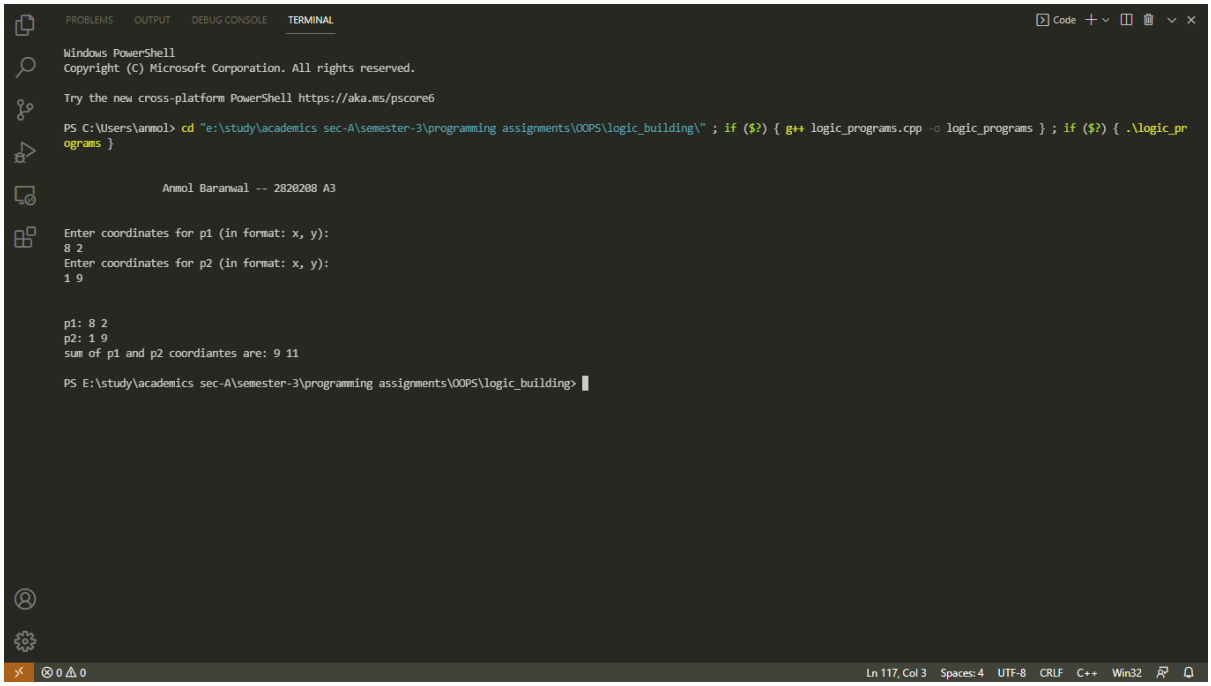
Question 2

A point on the two dimensional plane can be represented by two numbers: an X coordinate and a Y coordinate. For example, (4,5) represents a point 4 units to the right of the origin along the X axis and 5 units up the Y axis. The sum of two points can be defined as a new point whose X coordinate is the sum of the X coordinates of the points and whose Y coordinate is the sum of their Y coordinates. Write a program that uses a structure called point to model a point. Define three points, and have the user input values to two of them. Then set the third point equal to the sum of the other two, and display the value of the new point. Interaction with the program might look like this: Enter coordinates for P1: 3 4 Enter coordinates for P2: 5 7 Coordinates of P1 + P2 are : 8, 11

Answer 2

```
#include<bits/stdc++.h>
using namespace std;

struct point
{
  int x_co; // x-coordinate
  int y_co; // y-coordinate

}p1,p2,p3;

void display(const point &p){
    cout << p.x_co << ", " << p.y_co;
}

int main()
{
  cout<<"\n\n\t\tAnmol Baranwal -- 2820208 A3\n\n";

  cout << "\nEnter coordinates for p1 (in format: x, y): \n"; //get 2 points
  cin >> p1.x_co >> p1.y_co;
  cout << "Enter coordinates for p2 (in format: x, y): \n";
  cin >> p2.x_co >> p2.y_co;
```

```
  p3.x_co = p1.x_co + p2.x_co;
  p3.y_co = p1.y_co + p2.y_co;

  cout<<"\n\np1: "<<p1.x_co<<" "<<p1.y_co;
  cout<<"\np2: "<<p2.x_co<<" "<<p2.y_co;

  cout<<"\nsum of p1 and p2 coordiantes are: "<<p3.x_co<<"
"<<p3.y_co<<endl<<endl;

  return 0;
}
```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Anmol Baranwal -- 2820208 A3
Enter coordinates for p1 (in format: x, y):
8 2
Enter coordinates for p2 (in format: x, y):
1 9
p1: 8 2
p2: 1 9
sum of p1 and p2 coordiantes are: 9 11
PS E:\study\academics sec-A\semester-3\programming assignments\OOPS\logic_building>
Ln 117, Col 3
Spaces: 4
UTF-8
CRLF
C++
Win32

Question 3

Create the equivalent of a four function calculator. The program should request the user to enter a number, an operator, and another number. It should then carry out the specified arithmetical operation: adding, subtracting, multiplying, or dividing the two numbers. (It should use a switch statement to select the operation). Finally it should display the result. When it finishes the calculation, the program should ask if the user wants to do another calculation. The response can be 'Y' or 'N'. Some sample interaction with the program might look like this. Enter first number, operator, and second number: 10/ 3 Answer = 3.333333 Do another (Y/ N)? Y Enter first number, operator, second number 12 + 100 Answer = 112 Do another (Y/ N) ? N

Answer 3

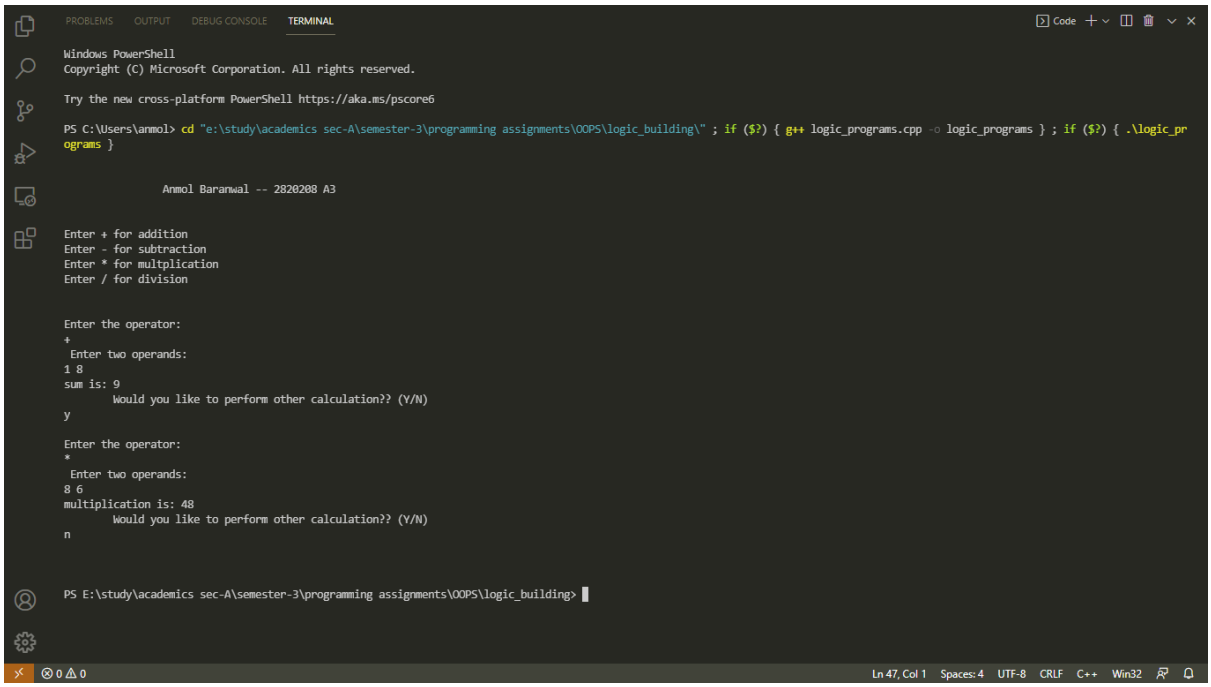
```
#include<bits/stdc++.h>
using namespace std;

void display(){
      cout<< "\nEnter + for addition\n";
      cout<< "Enter - for subtraction\n";
      cout<< "Enter * for multplication\n";
      cout<< "Enter / for division\n\n";
}
int main()
{
     cout<<"\n\n\t\tAnmol Baranwal -- 2820208 A3\n\n";
     display();
      char ch, ans;
      bool run=true;
      int n1,n2;

   do{
      cout<<"\nEnter the operator:\n";
      cin>>ch;
```

```
      cout<< " Enter two operands:"<<endl;
      cin>>n1>>n2;
    switch(ch)
    {
       display();
      case '+':
         cout<< "sum is: "<<n1+n2;
         break;
      case '-':
         cout<< "subtraction is: "<<n1-n2;
         break;
      case '/':
         cout<< "division is: "<<n1/n2;
         break;
      case '*':
         cout<< "multiplication is: "<<n1*n2;
         break;
      default:
         cout<<"Error! operator is not correct!!";
         break;
    }
      cout<<"\n\tWould you like to perform other calculation?? (Y/N)\n";
      cin >> ans;
      ans = tolower(ans);
   }while(ans == 'y');
   cout<<"\n\n\n";

 return 0;
}
```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DEBUG CONSOLE
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Code
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Anmol Baranwal -- 2820208 A3
Enter + for addition
Enter - for subtraction
Enter * for multplication
Enter / for division
Enter the operator:
+
Enter two operands:
1 8
sum is: 9
Would you like to perform other calculation?? (Y/N)
y
Enter the operator:
*
Enter two operands:
8 6
multiplication is: 48
Would you like to perform other calculation?? (Y/N)
n
PS E:\study\academics sec-A\semester-3\programming assignments\OOPS\logic_building>
Ln 47, Col 1
Spaces: 4
UTF-8
CRLF
C++
Win32

Question 4

A phone number, such as (212) 767-8900, can be thought of as having three parts: the area code (212), the exchange (767) and the number (8900). Write a program that uses a structure to store these three parts of a phone number separately. Call the structure phone. Create two structure variables of type phone. Initialize one, and have the user input a number for the other one. Then display both numbers. The interchange might look like this: • Enter your area code, exchange, and number: 415 555 1212 • My number is (212) 767-8900 • Your number is (415) 555-1212

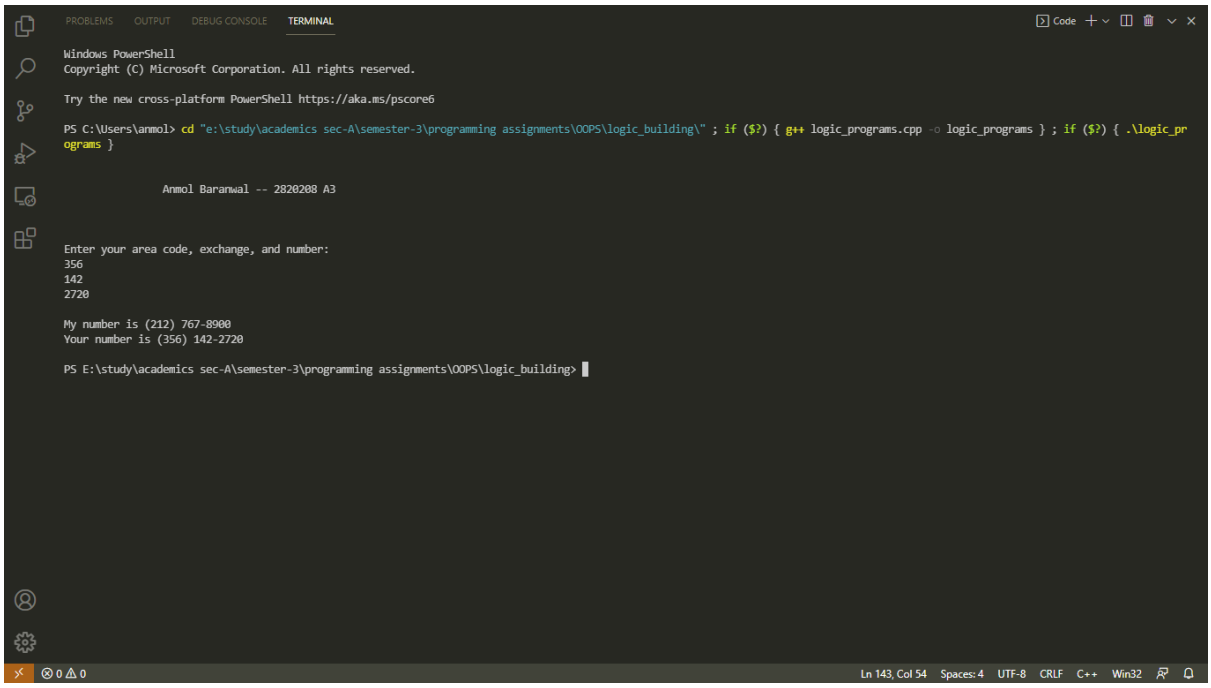
Answer 4

```
#include<bits/stdc++.h>
using namespace std;

struct phone{
   int area, exchange, number;
}p1,p2;

int main()
{
cout<<"\n\n\t\tAnmol Baranwal -- 2820208 A3\n\n";

   p1 = { 212, 767, 8900};
   cout<<"\n\nEnter your area code, exchange, and number: \n";
   cin>>p2.area>>p2.exchange>>p2.number;
   cout<<"\nMy number is "<< "(" << p1.area << ") " << p1.exchange << "-" << p1.number;
   cout<<"\nYour number is "<< "(" << p2.area << ") " << p2.exchange << "-" << p2.number;
   cout<<"\n\n";
   return 0;
}
```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Anmol Baranwal -- 2820208 A3
Enter your area code, exchange, and number:
356
142
2720
My number is (212) 767-8900
Your number is (356) 142-2720
PS E:\study\academics sec-A\semester-3\programming assignments\OOPS\logic_building>
Ln 143, Col 54
Spaces: 4
UTF-8
CRLF
C++
Win32

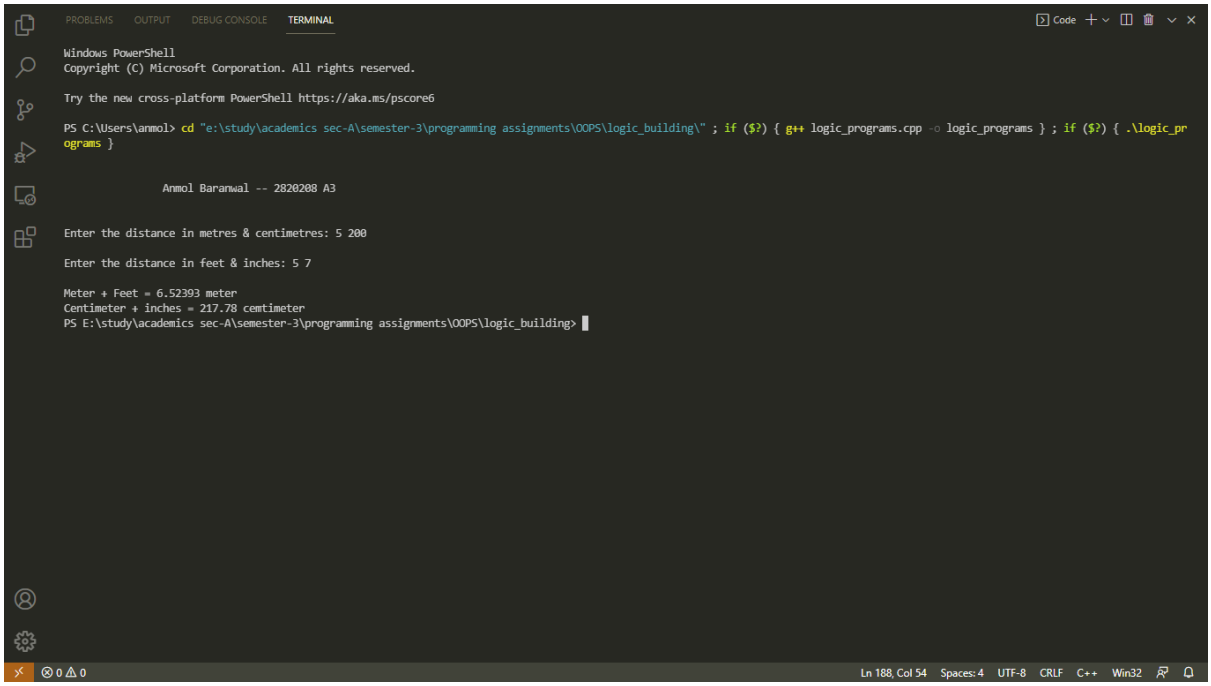
Question 5

Create two classes DM and DB which store the value of distances. DM stores distances in metres and centimeters and DB in feet and inches. Write a program that can read values for the class objects and add one object of DM with another object of DB. Use a friend function to carry out the addition operation. The object that stores the results maybe a DM object or DB objects, depending on the units in which the results are required. The display should be in the format of feet and inches or metres and cenitmetres depending on the object on display

Answer 5

```
#include<bits/stdc++.h>
using namespace std;

class DB;

class DM{
   float meterDM, centimeterDM;
      public:
    void setDistanceDM(){
      cout<<"\nEnter the distance in metres & centimetres: ";
      cin>>meterDM>>centimeterDM;
   }
   friend void add(DM, DB);
};

class DB{
   float feetDB, inchDB;
      public:
    void setDistanceDB(){
```

```
        cout<<"\nEnter the distance in feet & inches: ";
        cin>>feetDB>>inchDB;
    }
    friend void add(DM, DB);
};

void add(DM dm, DB db){
    float distance1,distance2;
    dm.setDistanceDM();
    db.setDistanceDB();
    distance1=dm.meterDM+(db.feetDB)/3.281;
    distance2=dm.centimeterDM+(db.inchDB)*2.54;
    cout<<"\nMeter + Feet = "<<distance1<<" meter";
    cout<<"\nCentimeter + inches = "<<distance2<<" cemtimeter";
}

int main(){
cout<<"\n\n\t\tAnmol Baranwal -- 2820208 A3\n\n";


    DM dm;
    DB db;

    add(dm, db);

    return 0;
}
```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Anmol Baranwal -- 2820208 A3
Enter the distance in metres & centimetres: 5 200
Enter the distance in feet & inches: 5 7
Meter + Feet = 6.52393 meter
Centimeter + inches = 217.78 cemtimeter
PS E:\study\academics sec-A\semester-3\programming assignments\OOPS\logic_building>
0 0
Ln 188, Col 54
Spaces: 4
UTF-8
CRLF
C++
Win32

Question 6

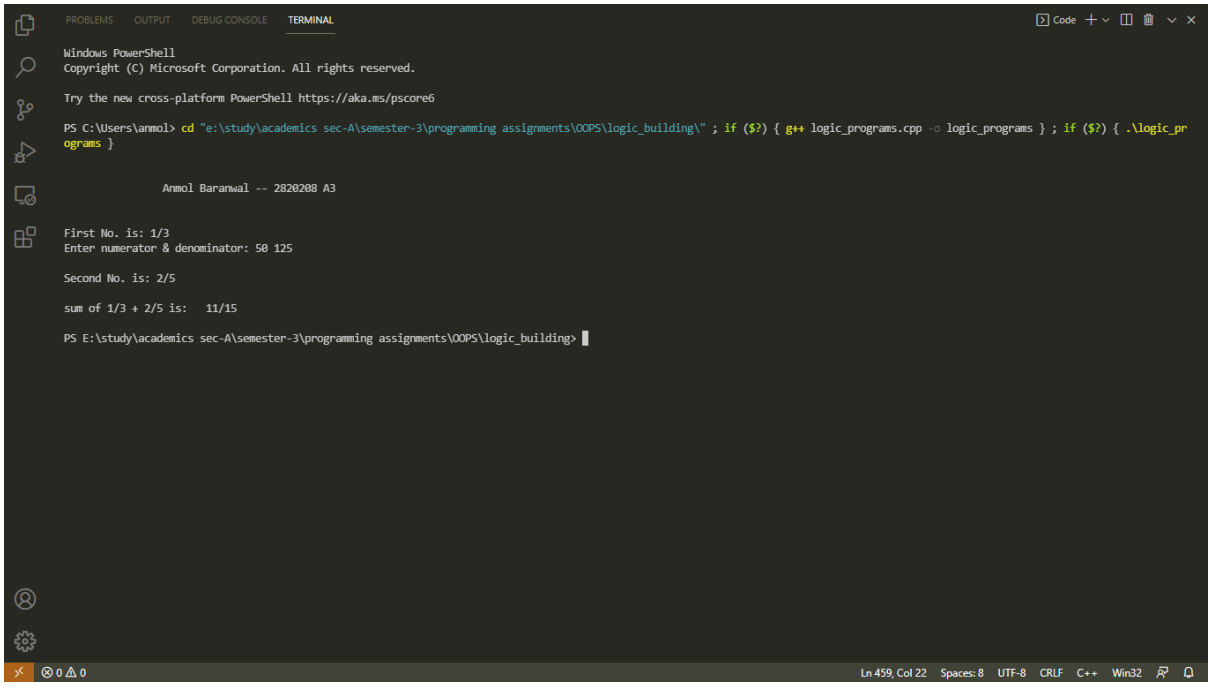
Create a class rational which represents a numerical value by two double values- NUMERATOR and DENOMINATOR. Include the following public member Functions: • constructor with no arguments (default). • constructor with two arguments. • void reduce( ) that reduces the rational number by eliminating the highest common factor between the numerator and denominator. • Overload + operator to add two rational number. • Overload >> operator to enable input through cin. • Overload << operator to enable output through cout. Write a main ( ) to test all the functions in the class.

Answer 6

```
#include<bits/stdc++.h>
using namespace std;

double gcd(int a, int b){
   if(b==0){
      return a;
   } else {
      return gcd(b,a%b);
   }
}

class rational
{
      private:
        int numerator,denominator;
      public:
        rational()

{
    numerator=0;
    denominator=0;
```

```
    }
    rational(int a,int b)
    {
      numerator=a;
      denominator=b;
    }
    void reduced()
    {
      int p;
      if(numerator>denominator)
      p=denominator;
      else
      p=numerator;
      for(int i=2;i<=p;i++)
      while(numerator%i==0 &&
      denominator%i==0)
      {
        numerator=numerator/i;
        denominator=denominator/i;
      }
    }
    rational operator +(rational b)

{
      rational c;
      c.numerator=numerator*b.denominator+b.numerator*denominator;
      c.denominator=denominator*b.denominator;
      c.reduced();
      return c;
    }
```

```
    friend ostream& operator << (ostream&out,rational &r);
    friend istream& operator >> (istream& in,rational &r);
};
ostream& operator<<(ostream&out,rational& r)
{
    r.reduced();
    out<<r.numerator<<"/"<<r.denominator;

}
istream& operator >>(istream&in,rational& r)
{
    cout<<"\nEnter numerator & denominator: ";
    cin>>r.numerator>>r.denominator;
    return in;
}
int main()
{
    cout<<"\n\n\t\tAnmol Baranwal -- 2820208 A3\n\n";

    rational a(34,102),b,c;
    cout<<"\nFirst No. is: "<<a;
    cin>>b;
    cout<<"\nSecond No. is: "<<b;
    c=a+b;
    cout<<"\n\nsum of "<<a<<" + "<<b<<" is:   "<<c;
    cout<<endl<<endl;

    return 0;
}
```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Anmol Baranwal -- 2820208 A3
First No. is: 1/3
Enter numerator & denominator: 50 125
Second No. is: 2/5
sum of 1/3 + 2/5 is: 11/15
PS E:\study\academics sec-A\semester-3\programming assignments\OOPS\logic_building>
Ln 459, Col 22
Spaces: 8
UTF-8
CRLF
C++
Win32

Question 7

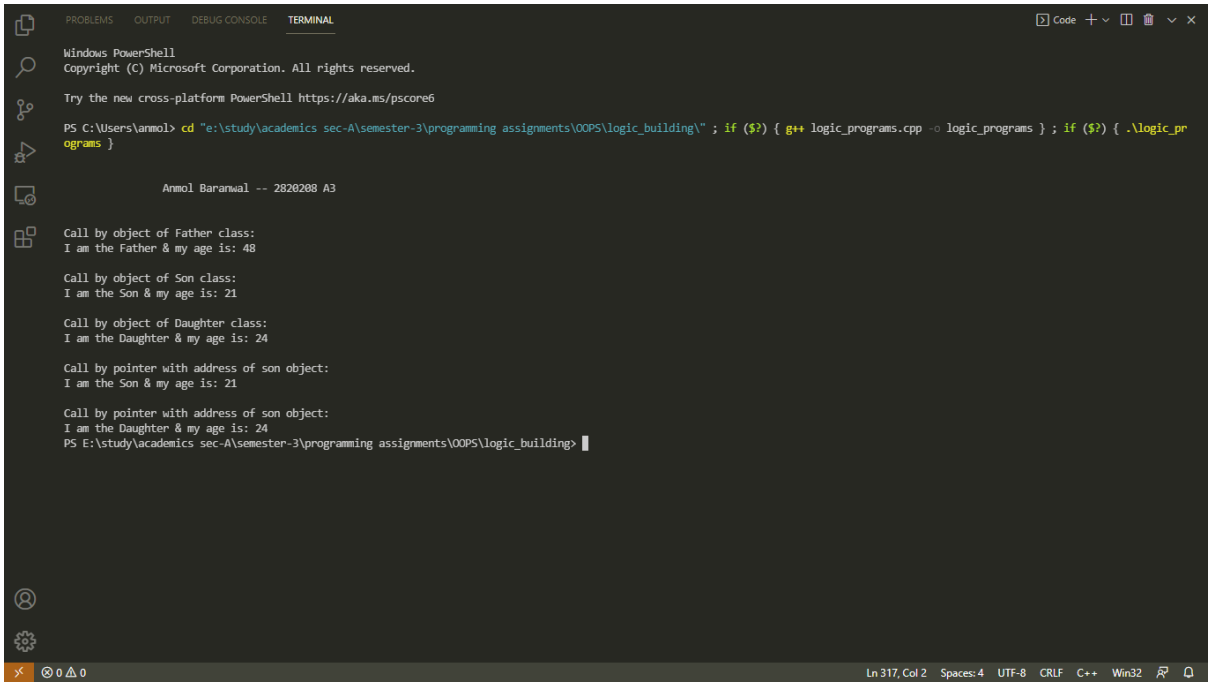
Consider the following class definition class father { protected : int age; public; father (int x) {age = x;} virtual void iam ( ) { cout < < “I AM THE FATHER, my age is : ”<< age<< end1:} ;Derive the two classes son and daughter from the above class and for each, define iam ( ) to write our similar but appropriate messages. You should also define suitable constructors for these classes. Now, write a main ( ) that creates objects of the three classes and then calls iam ( ) for them. Declare pointer to father. Successively, assign addresses of objects of the two derived classes to this pointer and in each case, call iam ( ) through the pointer to demonstrate polymorphism in action.

Answer 7

```
#include<bits/stdc++.h>
using namespace std;

class Father
{
    protected:
   unsigned int age;
    public:
   Father(){
    age=50;
   }
   Father(int x){
    age=x;
   }
   virtual void iAm(){
    cout<<"I am the Father & my age is: "<<age<<"\n";
   }
};
```

```
class Son:public Father
{
    public:
   Son(){
    age=20;
   }
   Son(int x){
    age=x;
   }
   void iAm(){
    cout<<"I am the Son & my age is: "<<age<<"\n";
   }
};

class Daughter:public Father
{
    public:
   Daughter(){
    age=26;
   }
   Daughter(int x){
    age=x;
   }
   void iAm(){
    cout<<"I am the Daughter & my age is: "<<age<<"\n";
   }
};

int main()
{
```

```
    Father fatherObj(48), *ptr;
    Son sonObj(21);
    Daughter daughterObj(24);
    cout<<"\nCall by object of Father class: \n";
    fatherObj.iAm();
    cout<<"\nCall by object of Son class: \n";
    sonObj.iAm();
    cout<<"\nCall by object of Daughter class: \n";
    daughterObj.iAm();
    cout<<"\nCall by pointer with address of son object: \n";
    ptr=&sonObj;
    ptr->iAm();  //(*ptr).iAm()
    cout<<"\nCall by pointer with address of son object: \n";
    ptr=&daughterObj;
    ptr->iAm();  //(*ptr).iAm()
  return 0;
}
```


PROBLEMS
OUTPUT
DEBUG CONSOLE
TERMINAL
Code
Windows PowerShell
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PS C:\Users\anmol> cd "e:\study\academics sec-A\semester-3\programming assignments\OOPS\logic_building\" ; if ($?) { g++ logic_programs.cpp -o logic_programs } ; if ($?) { .\logic_programs }
Anmol Baranwal -- 2820208 A3
Call by object of Father class:
I am the Father & my age is: 48
Call by object of Son class:
I am the Son & my age is: 21
Call by object of Daughter class:
I am the Daughter & my age is: 24
Call by pointer with address of son object:
I am the Son & my age is: 21
Call by pointer with address of son object:
I am the Daughter & my age is: 24
PS E:\study\academics sec-A\semester-3\programming assignments\OOPS\logic_building>
0 0
Ln 317, Col 2
Spaces: 4
UTF-8
CRLF
C++
Win32

Question 8

Write a program that creates a binary file by reading the data for the students from the terminal. The data of each student consist of roll no., name (a string of 30 or lesser no. of characters) and marks.

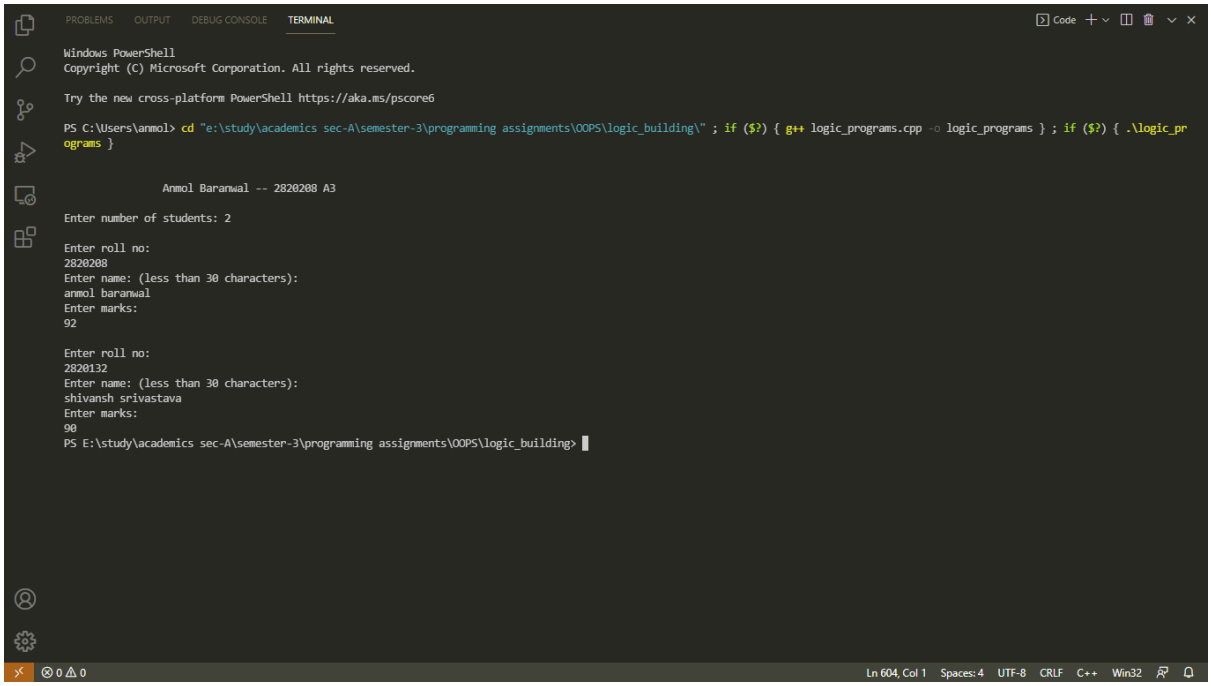
Answer 8

```
#include<bits/stdc++.h>
using namespace std;

class Student
{
   int rollNo,marks;
   string name;
      public:
   void getDetails(){
      cout<<"\nEnter roll no: \n";
      cin>>rollNo;
      cout<<"Enter name: (less than 30 characters): \n";
      getline(cin,name);
      cin.ignore(100,'\n');
      cout<<"Enter marks: \n";
      cin>>marks;
   }
};

int main()
{
   int n;
   fstream f;
   f.open("Student.txt",ios::in | ios::out);
```

```
    cout << "Enter number of students: ";
    cin >> n;
    Student st[n];
    for(int i=0;i<n;i++)
    {
        st[i].getDetails();
        f.write((char *)&st[i], sizeof(st[i]));
    }
    f.close();
    return 0;
}
```


PROBLEMS
OUTPUT
DEBUG CONSOLE
TERMINAL
Code
Windows PowerShell
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PS C:\Users\anmol> cd "e:\study\academics sec-A\semester-3\programming assignments\OOPS\logic_building\" ; if ($?) { g++ logic_programs.cpp -o logic_programs } ; if ($?) { .\logic_programs }
Anmol Baranwal -- 2820208 A3
Enter number of students: 2
Enter roll no:
2820208
Enter name: (less than 30 characters):
anmol baranwal
Enter marks:
92
Enter roll no:
2820132
Enter name: (less than 30 characters):
shivansh srivastava
Enter marks:
90
PS E:\study\academics sec-A\semester-3\programming assignments\OOPS\logic_building>
0 0
Ln 604, Col 1
Spaces: 4
UTF-8
CRLF
C++
Win32

Question 9

A hospital wants to create a database regarding its indoor patients. The information to store include a) Name of the patient b) Date of admission c) Disease d) Date of discharge Create a structure to store the date (year, month and date as its members). Create a base class to store the above information. The member function should include functions to enter information and display a list of all the patients in the database. Create a derived class to store the age of the patients. List the information about all the to store the age of the patients. List the information about all the pediatric patients (less than twelve years in age).

Answer 9

```
#include<bits/stdc++.h>
using namespace std;

struct Date
{
   int year, month, date;
};

class Patient
{
   string name;
   Date dateOfAdmission;
   string disease;
   Date dateOfDischarge;

      public:
   void getDetails(){
      cout<<"Enter name of Patient:"<<endl;
      cin.ignore(100,'\n');
      getline(cin, name);
      cout<<"Enter name of disease:"<<endl;
```

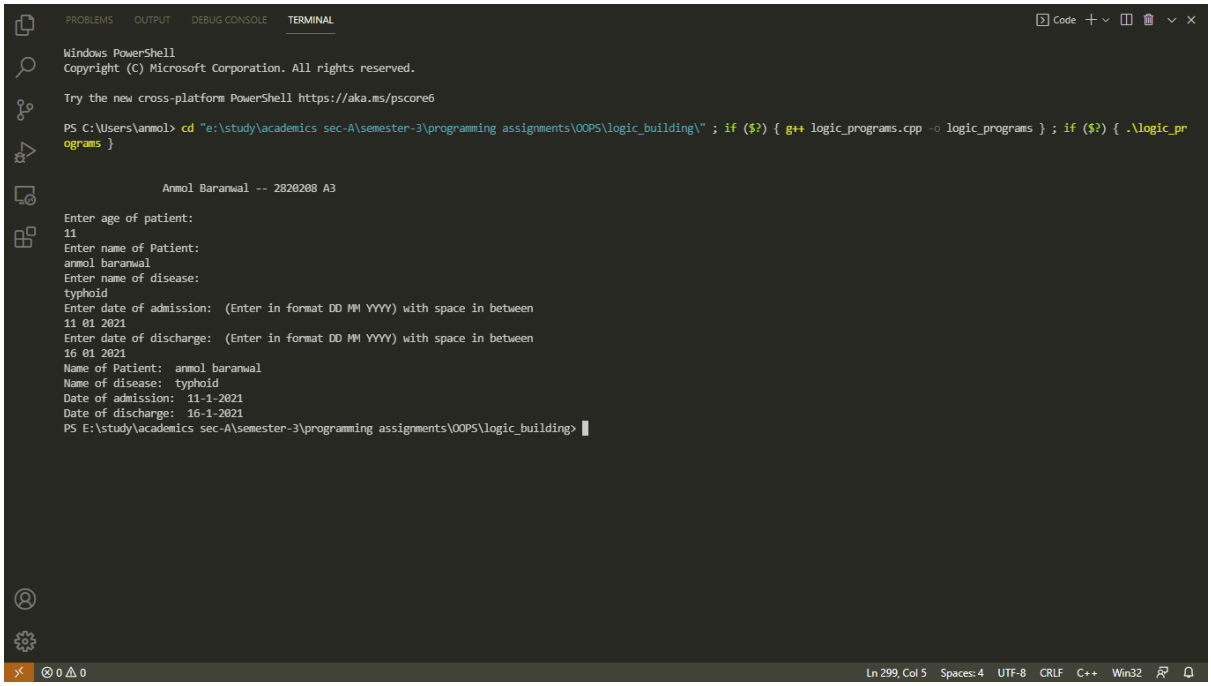
```
        getline(cin, disease);
        // cin.ignore(100,'\n');
        cout<<"Enter date of admission:  (Enter in format DD MM YYYY) with space in between\n";
        cin>>dateOfAdmission.date>>dateOfAdmission.month>>dateOfAdmission.year;
        cout<<"Enter date of discharge:  (Enter in format DD MM YYYY) with space in between\n";
        cin>>dateOfDischarge.date>>dateOfDischarge.month>>dateOfDischarge.year;
    }
    void displayDetails(){
        cout<<"Name of Patient:  "<<name<<"\n";
        cout<<"Name of disease:  "<<disease<<"\n";
        cout<<"Date of admission:  "<<dateOfAdmission.date<<"-"<<dateOfAdmission.month<<"-"<<dateOfAdmission.year<<"\n";
        cout<<"Date of discharge:  "<<dateOfDischarge.date<<"-"<<dateOfDischarge.month<<"-"<<dateOfDischarge.year<<"\n";
    }
};

class Age: public Patient
{
    int age;
        public:
    void getAge(){
        cout<<"Enter age of patient: \n";
        cin>>age;
    }
    int displayAge(){
        return age;
    }
};
```

```
int main()
{
   Patient pt;
   Age ag;

   ag.getAge();
   if(ag.displayAge() < 12){
      pt.getDetails();
      ag.displayAge();
      pt.displayDetails();
   } else {
      cout<<"Only displaying details of patients with age less than 12 years\n";
   }

   return 0;
}
```


PROBLEMS
OUTPUT
DEBUG CONSOLE
TERMINAL
Code
Windows PowerShell
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PS C:\Users\anmol> cd "e:\study\academics sec-A\semester-3\programming assignments\OOPS\logic_building\" ; if ($?) { g++ logic_programs.cpp -o logic_programs } ; if ($?) { .\logic_programs }
Anmol Baranwal -- 2820208 A3
Enter age of patient:
11
Enter name of Patient:
anmol baranwal
Enter name of disease:
typhoid
Enter date of admission: (Enter in format DD MM YYYY) with space in between
11 01 2021
Enter date of discharge: (Enter in format DD MM YYYY) with space in between
16 01 2021
Name of Patient: anmol baranwal
Name of disease: typhoid
Date of admission: 11-1-2021
Date of discharge: 16-1-2021
PS E:\study\academics sec-A\semester-3\programming assignments\OOPS\logic_building>
0 0
Ln 299, Col 5
Spaces: 4
UTF-8
CRLF
C++
Win32

Question 10

Make a class Employee with a name and salary. Make a class Manager inherit from Employee. Add an instance variable, named department, of type string. Supply a method to to String that prints the manager's name, department and salary. Make a class Executive inherits from Manager. Supply a method to String that prints the string "Executive" followed by the information stored in the Manager superclass object. Supply a test program that tests these classes and methods.

Answer 10

```
#include<bits/stdc++.h>
using namespace std;

class Employee
{
      protected:
   string name;
   int salary;

      public:

};
class Manager: public Employee
{
   string department;
      public:

   void getDetails(){
      cout<<"Enter name of Employee:\n";
      getline(cin,name);
      cout<<"Enter department of Employee:\n";
```

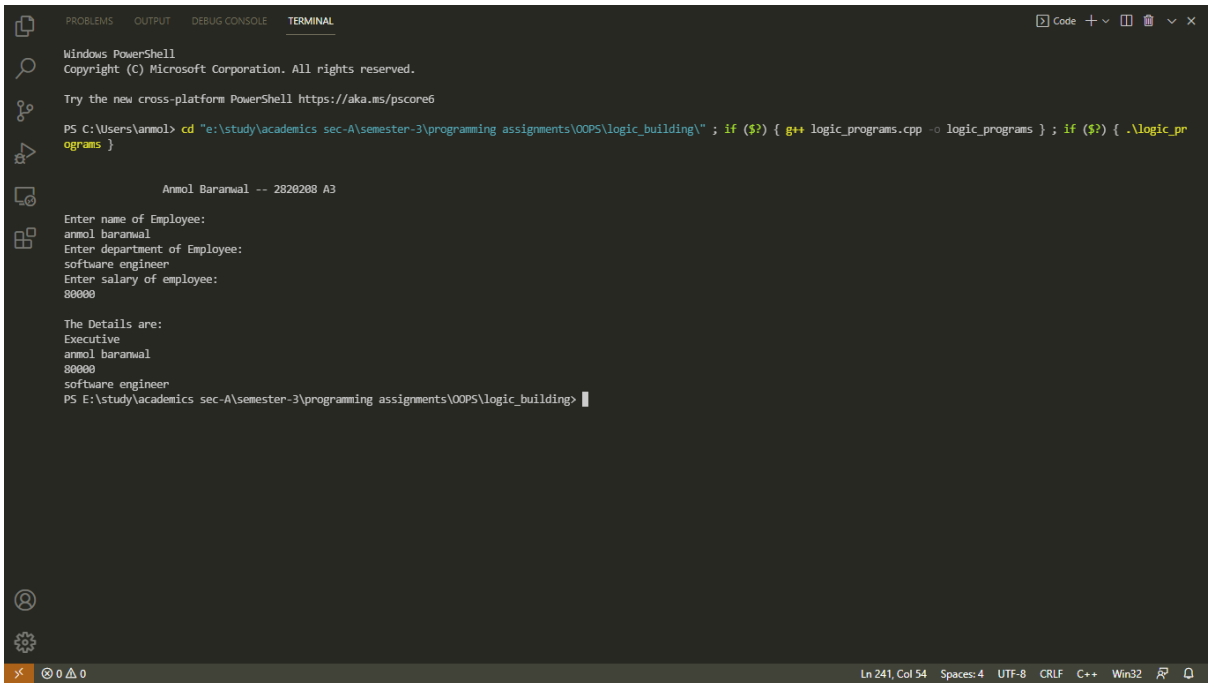
```
        getline(cin,department);
        cout<<"Enter salary of employee:\n";
        cin>>salary;
    }

    void toString(){
        cout<<name<<endl;
        cout<<salary<<endl;
        cout<<department<<endl;
    }

};

class Executive: public Manager
{
    string nameExecutive = "Executive";
        public:
    void print(){
        cout<<"\nThe Details are:\n"<<nameExecutive<<endl;
    }
};

int main()
{
    Executive obj;
    obj.getDetails();
    obj.print();
    obj.toString();
 return 0;
}
```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PS C:\Users\anmol> cd "e:\study\academics sec-A\semester-3\programming assignments\OOPS\logic_building\" ; if ($?) { g++ logic_programs.cpp -o logic_programs } ; if ($?) { .\logic_programs }
Anmol Baranwal -- 2820208 A3
Enter name of Employee:
anmol baranwal
Enter department of Employee:
software engineer
Enter salary of employee:
80000
The Details are:
Executive
anmol baranwal
80000
software engineer
PS E:\study\academics sec-A\semester-3\programming assignments\OOPS\logic_building>
0 0
Ln 241, Col 54
Spaces: 4
UTF-8
CRLF
C++
Win32

Question 11

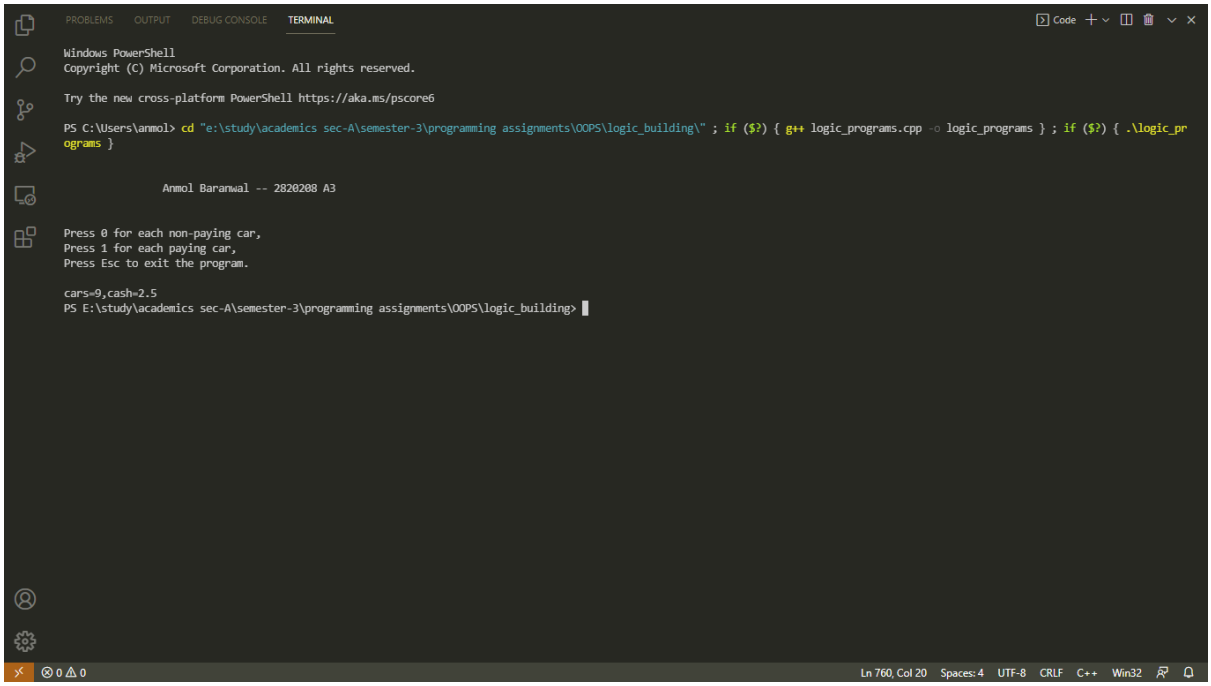
Imagine a tollbooth with a class called toll Booth. The two data items are a type unsigned int to hold the total number of cars, and a type double to hold the total amount of money collected. A constructor initializes both these to 0. A member function called payingCar ( ) increments the car total and adds 0.50 to the cash total. Another function, called nopayCar ( ), increments the car total but adds nothing to the cash total. Finally, a member function called displays the two totals. Include a program to test this class. This program should allow the user to push one key to count a paying car, and another to count a nonpaying car. Pushing the ESC kay should cause the program to print out the total cars and total cash and then exit.

Answer 11

```
#include<bits/stdc++.h>
#include<conio.h>
using namespace std;

   const char ESC=27;
   const double Toll=0.5;
class tollbooth
{
      private:
   unsigned int totalcars;
   double totalcash;
      public:
   tollbooth()
   {
      totalcars=0;
      totalcash=0;
   }

   void payingcar()
   {
      totalcars+=1;
      totalcash+=Toll;
```

```
    }

    void nopaycar()
    {
        totalcars+=1;
    }

    void display()
    {
        cout<<"\ncars="<<totalcars<<",cash="<<totalcash;
    }
};

int main()
{
    tollbooth booth_obj;
    char ch;

    cout<<"\nPress 0 for each non-paying car,"
        <<"\nPress 1 for each paying car,"
        <<"\nPress Esc to exit the program.\n";
    do{
        ch=getch();
        if(ch=='0')
        booth_obj.nopaycar();
        else if(ch=='1')
        booth_obj.payingcar();
    }while(ch!=ESC);

    booth_obj.display();
```

```
    return 0;
}
```


PROBLEMS
OUTPUT
DEBUG CONSOLE
TERMINAL
Code
Windows PowerShell
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PS C:\Users\anmol> cd "e:\study\academics sec-A\semester-3\programming assignments\OOPS\logic_building\" ; if ($?) { g++ logic_programs.cpp -o logic_programs } ; if ($?) { .\logic_programs }
Anmol Baranwal -- 2820208 A3
Press 0 for each non-paying car,
Press 1 for each paying car,
Press Esc to exit the program.
cars=9,cash=2.5
PS E:\study\academics sec-A\semester-3\programming assignments\OOPS\logic_building>
0 0
Ln 760, Col 20
Spaces: 4
UTF-8
CRLF
C++
Win32

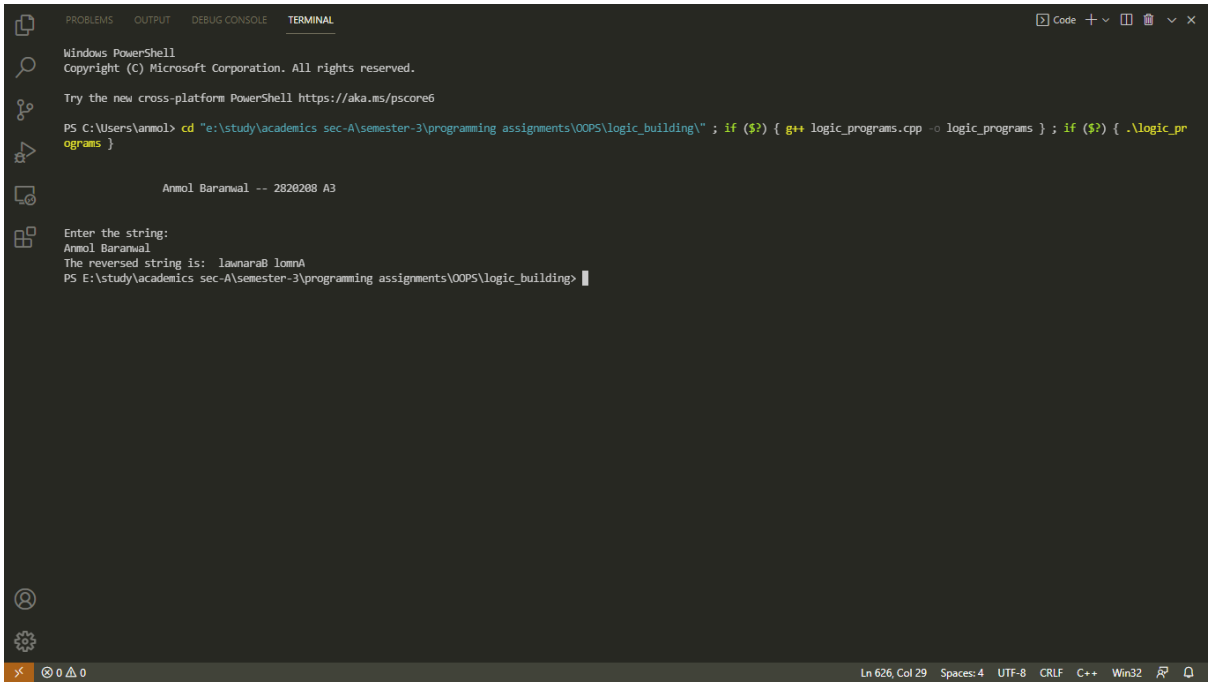
Question 12

Write a function called reversit ( ) that reverses a string (an array of char). Use a for loop that swaps the first and last characters, then the second and next to last characters and so on. The string should be passed to reversit ( ) as an argument. Write a program to exercise reversit ( ). The program should get a string from the user, call reversit ( ), and print out the result. Use an input method that allows embedded blanks. Test the program with Napoleon's famous phrase, "Able was I ere I saw Elba)".

Answer 12

```
#include<bits/stdc++.h>
using namespace std;

void reversit(string &str) {
   size_t length = str.length()-1;

   for (size_t i = 0; i < str.length() / 2; i++) {
      char temp = str.at(i);

      str.at(i) = str.at(length);

      str.at(length) = temp;

      length--;
   }
}

int main(int argc, char *argv[]) {
   string str;

   cout<<"\nEnter the string: \n";
   getline(cin, str);
```

```
    reversit(str);

    cout<<"The reversed string is:  "<< str << endl;

    return 0;
}
```


PROBLEMS
OUTPUT
DEBUG CONSOLE
TERMINAL
Code
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PS C:\Users\anmol> cd "e:\study\academics sec-A\semester-3\programming assignments\OOPS\logic_building\" ; if ($?) { g++ logic_programs.cpp -o logic_programs } ; if ($?) { .\logic_programs }
Anmol Baranwal -- 2820208 A3
Enter the string:
Anmol Baranwal
The reversed string is: lawnaraB lomnA
PS E:\study\academics sec-A\semester-3\programming assignments\OOPS\logic_building>
Ln 626, Col 29
Spaces: 4
UTF-8
CRLF
C++
Win32

Question 13

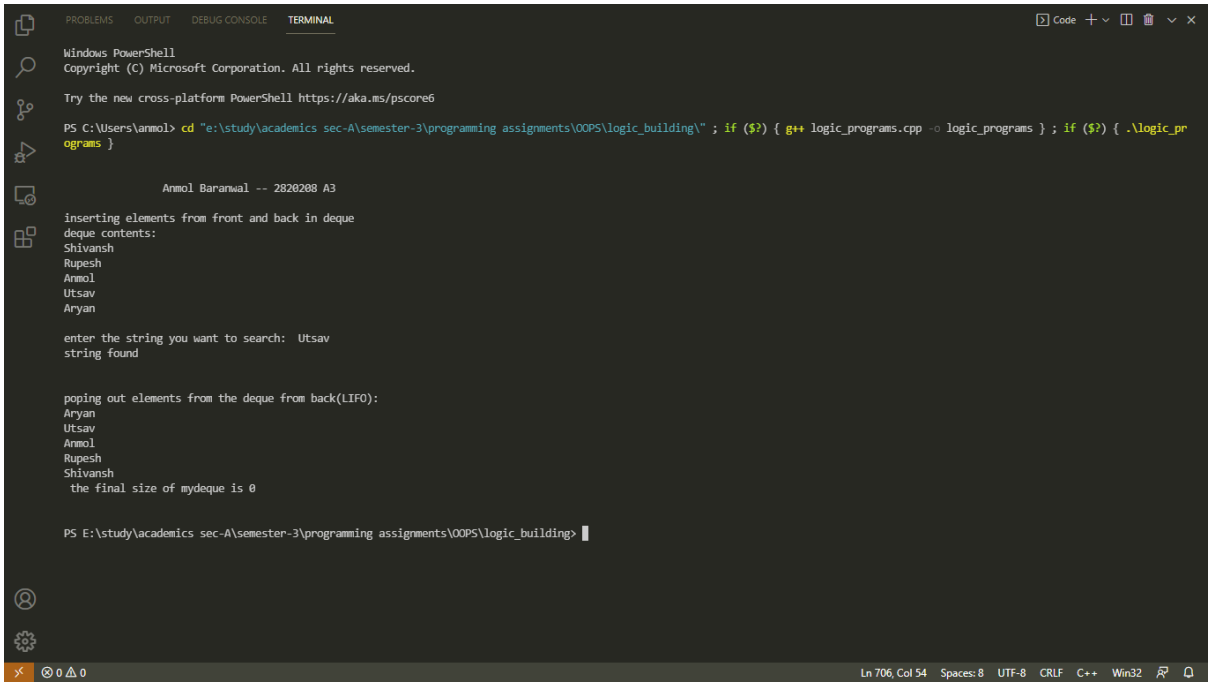
Create some objects of the string class, and put them in a Deque-some at the head of the Deque and some at the tail. Display the contents of the Deque using the forEach ( ) function and a user written display function. Then search the Deque for a particular string, using the first That ( ) function and display any strings that match. Finally remove all the items from the Deque using the getLeft ( ) function and display each item. Notice the order in which the items are displayed: Using getLeft ( ), those inserted on the left (head) of the Deque are removed in “last in first ou

Answer 13

```
#include<bits/stdc++.h>
using namespace std;

deque<string> elem;

void display(string str)
{
    cout<< '\n'<<str;
}

string firstThat(deque<string>elem, string str)
{
    for(int i= 0; i < elem.size(); i++){
        if (elem[i] == str)
        return "string found";
    }
    return "string not found";
}

void getright(deque<string>elem)
{
```

```
    cout<<"poping out elements from the deque from back(LIFO):";
    while(!elem.empty())
    {
        cout<< '\n' << elem.back(); elem.pop_back();
    }

    cout<<"\n the final size of mydeque is " << int(elem.size()) << '\n'; cout<<'\n';




}

int main()
{
    cout<<"\n\n\t\tAnmol Baranwal -- 2820208 A3\n\n";

    string s1 ="Anmol";
    string s2 = "Utsav";
    string s3 = "Rupesh";
    string s4 = "Aryan";
    string s5 = "Shivansh";

    int i;

    cout<<"inserting elements from front and back in deque"<<endl;
    elem.push_front(s1);
    elem.push_back(s2);
    elem.push_front(s3);
    elem.push_back(s4);
    elem.push_front(s5);
```

```
    cout<<"deque contents:";  for_each(elem.begin(),elem.end(),display);
    cout<<"\n";
    cout<<"\n";
    cout<<"enter the string you want to search:  ";

    string search;
    cin>>search;

    string status=firstThat(elem,search);
    cout<<status<<endl;
    cout<<"\n";
    cout<<'\n'; getright(elem);
    cout<<endl;
}
```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OUTPUT
DEBUG CONSOLE
TERMINAL
Code
Windows PowerShell
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PS C:\Users\anmol> cd "e:\study\academics sec-A\semester-3\programming assignments\OOPS\logic_building\" ; if ($?) { g++ logic_programs.cpp -o logic_programs } ; if ($?) { .\logic_programs }
Anmol Baranwal -- 2820208 A3
inserting elements from front and back in deque
deque contents:
Shivansh
Rupesh
Anmol
Utsav
Aryan
enter the string you want to search: Utsav
string found
poping out elements from the deque from back(LIFO):
Aryan
Utsav
Anmol
Rupesh
Shivansh
the final size of mydeque is 0
PS E:\study\academics sec-A\semester-3\programming assignments\OOPS\logic_building>
0 0
Ln 706, Col 54
Spaces: 8
UTF-8
CRLF
C++
Win32

Question 14

Assume that a bank maintains two kinds of accounts for customers, one called as savings account and the other as current account. The savings account provides compound interest and withdrawal facilities but no cheque book facility. The current account provides cheque book facility but no interest. Current account holders should also maintain a minimum balance and if the balance falls below this level, a service charge is imposed. Create a class account that stores customer name, account number and type of account. From this derive the classes cur_acct and sav_acct to make them more specific to their requirements. Include necessary member functions in order to achieve the following tasks: a) Accept deposit from a customer and update the balance. b) Display the balance. c) Compute and deposit interest. d) Permit withdrawal and update the balance. e) Check for the minimum balance, impose penalty, necessary and update the balance. f) Do not use any constructors. Use member functions to initialize the class members.

Answer 14

```
#include<bits/stdc++.h>
using namespace std;

const int rate=2;
class Account
{
      protected:
   string name;
   int accountNumber;
   int accountType;
   double balance;
      public:

   void setData(){
      cout<<"\nEnter the name of customer: \n";
      // cin.ignore(100,'\n');
```

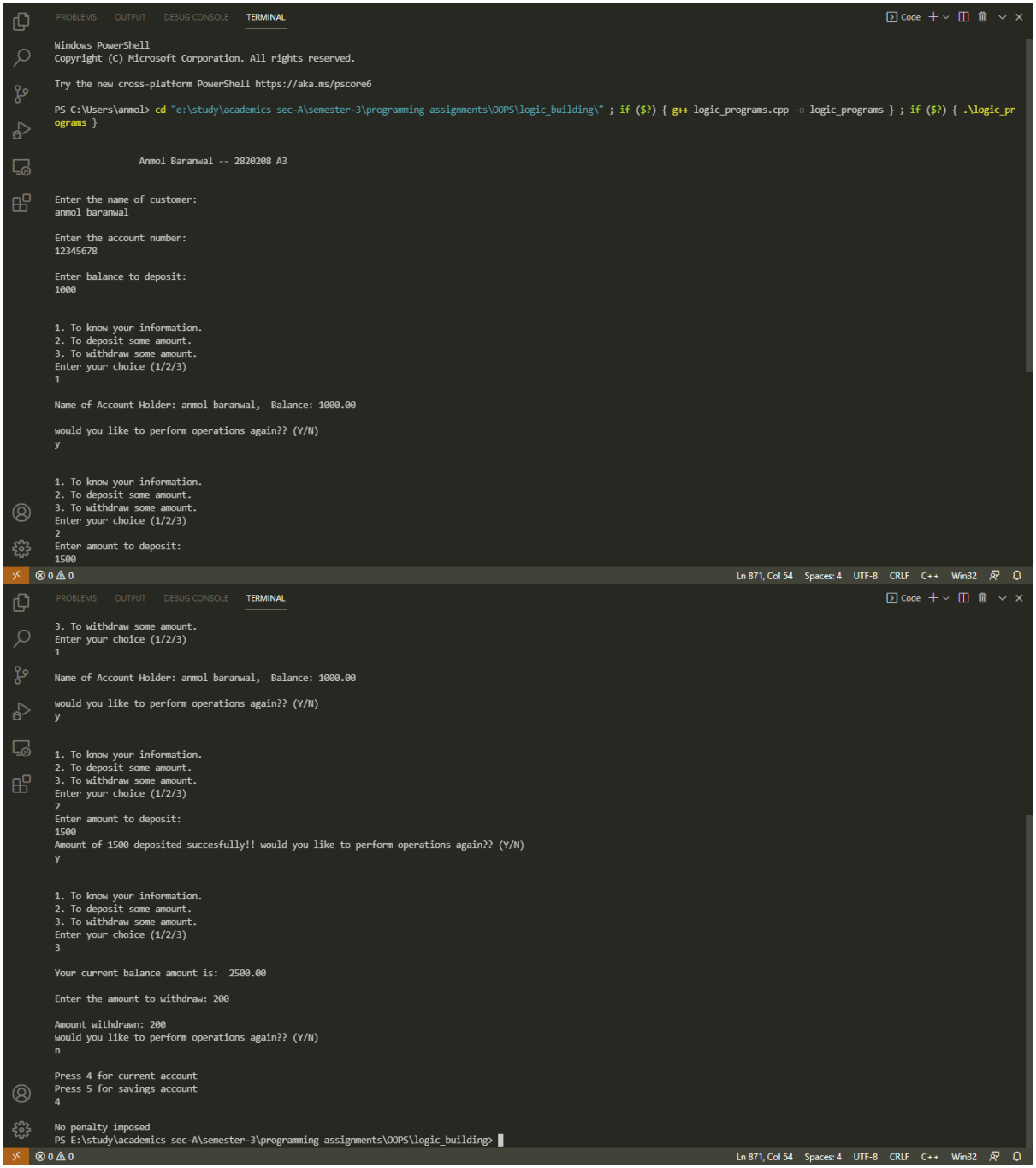
```
    getline(cin, name);
    cout<<"\nEnter the account number: \n";
    cin>>accountNumber;
    cout<<"\nEnter balance to deposit: \n";
    cin>>balance;
}

int deposit(){
    int amount;
    cout<<"Enter amount to deposit: \n";
    cin>>amount;
    if(amount<0.0){
        cout<<"Not enough amount for deposit"<<endl;
        return 0;
    }else {
        balance+=amount;
        cout<<"Amount of "<<amount<<" deposited succesfully!! ";
    }
}

int withdraw(){
    int amount;
    // cout<<"\nYour balance is: "<<balance;
    displayBal();
    cout<<"\nEnter the amount to withdraw: ";
    cin>>amount;
    if(amount<=balance){
        balance-=amount;
        cout<<"\nAmount withdrawn: "<<amount<<endl;
    } else {
```

```
            cout<<"Amount is incorrect for withdrawal: \n\n";
            return 0;
        }
    }

    void displayBal(){
        cout<<"\nYour current balance amount is:  "<<balance<<endl;
    }

    void displayInfo(){
            cout<<"\nName of Account Holder: "<<name<<",  Balance: " << fixed << 
setprecision(2) << balance << "\n\n";
    }
};

class cur_acct: public Account
{
        public:
    void penalty(){
        if(balance<200 && accountType==2){
            balance-=20;
            cout<<"\n20 Rs deducted as penalty";
            displayBal();
        }
        else{
            cout<<"\nNo penalty imposed";
        }
    }

};
```

```
class sav_acct: public Account
{
   int finalInterest;
      public:
   void compoundInterest(){
      int time;
      cout<<"\nEnter the interval of time in year:\n";
      cin>>time;
      finalInterest=(balance*(pow(1+rate/100.0,time)-1));
      balance+= finalInterest;
      displayBal();
   }

};

void displayChoice(){
   cout<<"\n\n1. To know your information.\n";
   cout<<"2. To deposit some amount.\n";
   cout<<"3. To withdraw some amount.\n";
   cout<<"Enter your choice (1/2/3)\n";
}

int main()
{
   Account acc;
   acc.setData();
   char ans;

   do{
      int choice;
```

```
    displayChoice();
    cin>>choice;

  switch(choice)
  {
    case 1:
      acc.displayInfo();
      break;
    case 2:
      acc.deposit();
      break;
    case 3:
      acc.withdraw();
      break;
    default:
      cout<<"Option incorrect: ";
      break;
  }

    cout<<"would you like to perform operations again?? (Y/N)\n";
    cin>>ans;
    ans=tolower(ans);
  }while(ans == 'y');

  cur_acct cur;
  sav_acct sav;
  int choice1;
  cout<<"\nPress 4 for current account\n"
    <<"Press 5 for savings account\n";
  cin>>choice1;
```

```
    if(choice1==4){
        cur.penalty();
    }else if(choice1==5){
        sav.compoundInterest();
    }else{
        cout<<"\nIncorrect number";
    }

 return 0;
}
```


PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL
Code
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.
Try the new cross-platform PowerShell https://aka.ms/pscore6
PS C:\Users\anmol> cd "e:\study\academics sec-A\semester-3\programming assignments\OOPS\logic_building\" ; if ($?) { g++ logic_programs.cpp -o logic_programs } ; if ($?) { .\logic_programs }
Anmol Baranwal -- 2820208 A3
Enter the name of customer:
anmol baranwal
Enter the account number:
12345678
Enter balance to deposit:
1000
1. To know your information.
2. To deposit some amount.
3. To withdraw some amount.
Enter your choice (1/2/3)
1
Name of Account Holder: anmol baranwal, Balance: 1000.00
would you like to perform operations again?? (Y/N)
y
1. To know your information.
2. To deposit some amount.
3. To withdraw some amount.
Enter your choice (1/2/3)
2
Enter amount to deposit:
1500
Ln 871, Col 54 Spaces: 4 UTF-8 CRLF C++ Win32

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL
Code
3. To withdraw some amount.
Enter your choice (1/2/3)
1
Name of Account Holder: anmol baranwal, Balance: 1000.00
would you like to perform operations again?? (Y/N)
y
1. To know your information.
2. To deposit some amount.
3. To withdraw some amount.
Enter your choice (1/2/3)
2
Enter amount to deposit:
1500
Amount of 1500 deposited succesfully!! would you like to perform operations again?? (Y/N)
y
1. To know your information.
2. To deposit some amount.
3. To withdraw some amount.
Enter your choice (1/2/3)
3
Your current balance amount is: 2500.00
Enter the amount to withdraw: 200
Amount withdrawn: 200
would you like to perform operations again?? (Y/N)
n
Press 4 for current account
Press 5 for savings account
4
No penalty imposed
PS E:\study\academics sec-A\semester-3\programming assignments\OOPS\logic_building>
Ln 871, Col 54 Spaces: 4 UTF-8 CRLF C++ Win32

Question 15

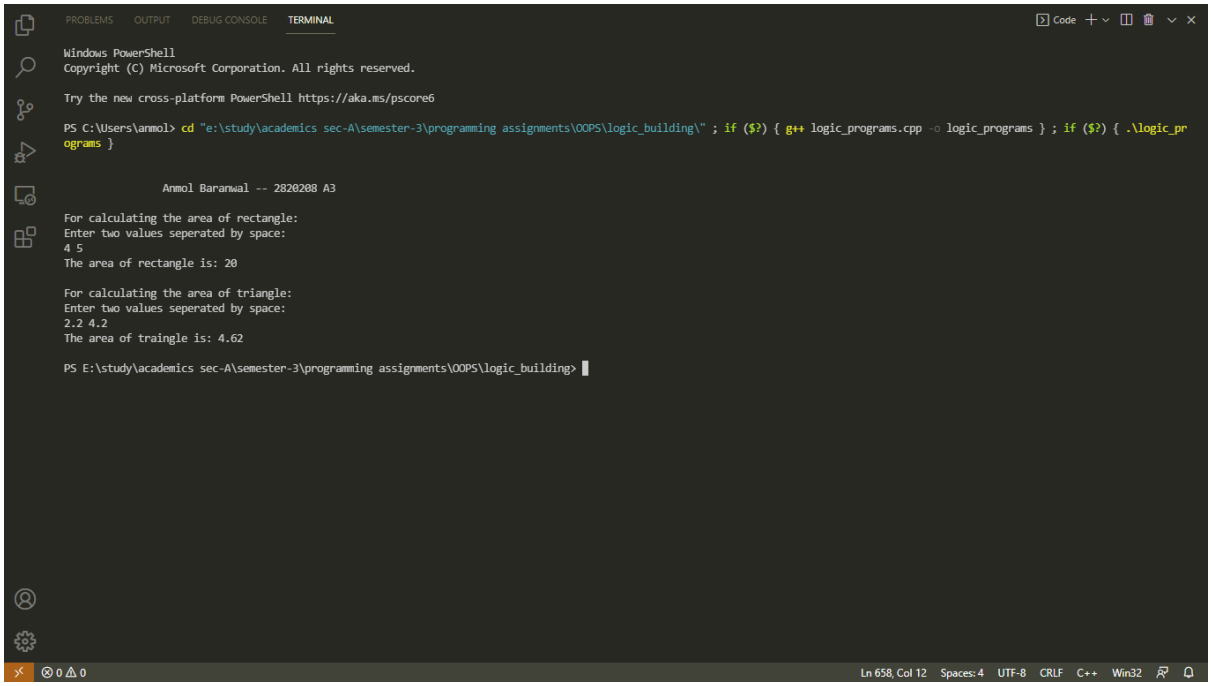
Create a base class called shape. Use this class to store two double type values that could be used to compute the area of figures. Derive two specific classes called triangle and rectangle from the base shape. Add to the base class, a member function get_data( ) to initialize baseclass data members and another member function display_area( ) to compute and display the area of figures. Make display_area ( ) as a virtual function and redefine this function in the derived classes to suit their requirements. Using these three classes, design a program that will accept dimensions of a triangle or a rectangle interactively and display the area. Remember the two values given as input will be treated as lengths of two sides in the case of rectangles and as base and height in the case of triangles and used as follows: Area of rectangle = x * y Area of triangle = ½ * x * y

Answer 15

```
#include<bits/stdc++.h>
using namespace std;

class shape
{
      protected:
   double a;
  double b;

      public:
   shape(){
   a = 0;
   b = 0;
  }

  void get_data(){
   cout << "Enter two values seperated by space:" << endl;
   cin >> a >> b;
  }
  virtual void display_area(){
```

```
        cout<<"This function is within base class."<<"\n\n";
    };
};

class Rectangle:public shape
{
        public:
  void display_area(){
    cout << "The area of rectangle is: " << (a * b) << "\n\n";
  }
};

class Triangle:public shape
{
        public:
  void display_area(){
    cout << "The area of traingle is: " << (0.5 * a * b) << "\n\n";
  }
};

int main()
{
  shape obj_shape;
  shape *obj_pointer_shape = &obj_shape;
  // obj_pointer_shape->getData();
  // obj_pointer_shape->displayArea();

  Rectangle obj_of_rectangle;
  obj_pointer_shape = &obj_of_rectangle;
  cout<<"For calculating the area of rectangle:\n";
```

```
  obj_pointer_shape->get_data();        // this should be ignored for calling base class of displayArea
  obj_pointer_shape->display_area();


  Triangle obj_of_triangle;
  shape *obj_pointer_shape1 = &obj_of_triangle;
  cout<<"For calculating the area of triangle:\n";
  obj_pointer_shape1->get_data();
  obj_pointer_shape1->display_area();
  return 0;
}
```


PROBLEMS
OUTPUT
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Anmol Baranwal -- 2820208 A3
For calculating the area of rectangle:
Enter two values seperated by space:
4 5
The area of rectangle is: 20
For calculating the area of triangle:
Enter two values seperated by space:
2.2 4.2
The area of traingle is: 4.62
PS E:\study\academics sec-A\semester-3\programming assignments\OOPS\logic_building>
0 0
Ln 658, Col 12
Spaces: 4
UTF-8
CRLF
C++
Win32