NAME: CHANDAN KUMAR MAHATO
ROLL NO: 31
GROUP: CE

Lab Work 1

Question 1: Write a program that takes two integers from the user and prints the following:
1. Sum of the two numbers
2. Product of the two numbers.

Source code

```
#include<iostream>
using namespace std;
int main()
{
   int num1, num2, P, S;
   cout<<"\n";

   cout<<"ENTER THE FIRST NUMBER:";
   cin>>num1;

   cout<<"ENTER THE SECOND NUMBER:";
   cin>>num2;

   S=num1+num2;
   P=num1*num2;

   cout<<"\n Sum of the given two number is"<<S;
   cout<<"\n Product of the given two number is"<<P;
   return 0;
}
```

Question 2: Write a function to swap two numbers (using references).

Source code

```
#include <iostream>
using namespace std;

int main()
{
   int a, &b=a, c;

   cout<<"BEFORE SWAP"<<endl;
   cout<<"A=";
   cin>>a;

   cout<<"C=";
   cin>>c;

   cout<<"AFTER SWAP"<<endl;
   b=b+c;
   c=b-c;
   b=b-c;

   cout<<"A="<<a<<endl;
   cout<<"C="<<c;
}
```

Question 3:

Try this out and explain the output

```
#include <iostream>
int main()
{
    int a=10;
    int*ptr=&a;
    std::cout<<"ptr="<<ptr<<std::endl;
    std::cout<<"&ptr="<<&ptr<<std::endl;
    std::cout<<"&a="<<&a<<std::endl;
    std::cout<<"a="<<a<<std::endl;
    std::cout<<"*ptr="<<*ptr<<std::endl;

    *ptr=20;
    std::cout<<"a="<<a<<std::endl;
}
```

Explanation

Output: screen shot uploaded.

↓↓

ptr = 0x6dfeec ⇒ This the address where a=10 is stored. Here, ptr is pointer to a. i.e., ptr is pointing to the address of a.

&ptr = 0x6dfee8 ⇒ This is the address of ptr itself.

&a = 0x6dfeec ⇒ This the address of a or the address where ptr is pointing.

a = 10 ⇒ This the value of a which stored at the address "0x6dfeec"

*ptr = 10 ⇒ This the value of a which equals to *ptr, being *ptr is the pointer variable which shows that ptr is pointing to the address of a.

so, here *ptr = a = 10

and, ptr = 0x6dfeec.

a = 20 ⇒ Now "a" becomes 20 instead of a = 10 because we have assigned value 20 to the address of a i.e, *ptr = 20, where ptr is pointing to address of a.

so, *ptr = 20

∴ a = 20

Explanation complete.

Question 4:

Write a program to input 10 double-precision floating-point numbers from the user, store them in an array, and then compute mean and standard deviation of the array.
Note the standard deviation σ of a collection of number x_j, $j = 1, 2, \ldots, N$ is given by

$$\sigma = \sqrt{\frac{1}{N}\sum_{j=1}^{N}(x_j - \bar{x})^2}$$

where $\bar{x}$ is the mean of the numbers.

Source code

```
#include <iostream>
#include <cmath>
using namespace std;

//function declaration
double findStandardDeviation(double *array, int count,
                             double MN);
double mean(double *array, int count);
```

```
//main function
int main()
{
    int count,i;
double inputArray[10],mn;
count=10;
cout<<"Enter "<<count<<" elements\n";
for(i=0;i<count;i++)
{
    cin>>inputArray[i];
}
mn=mean(inputArray,count);
cout<<"Mean = "<<mn<<endl;
cout<<"Standard Deviation = "<<
        findstandardDeviation(inputArray,count,mn);
    return 0;
}
```

```
//function to find mean
double mean(double *array, int count)
{
 double sum=0.00, mean=0.00;
 int i;
 for(i=0; i<count; i++)
 {
  sum+= array[i];
 }
 Mean =sum/count;
 return (Mean);
}

// function to find standard deviation
double findStandardDeviation(double *array, int count
                             double MN)
{
 double sum= 0.00, sDeviation = 0.00;
 int i;
 for(i=0; i<count; ++i)
 {
  sDeviation += pow(array[i]-MN, 2);
 }
 return sqrt(sDeviation/count);
}
```

Q5:
Write a program to calculate the volume and surface area of a cube, a cylinder and a pyramid using function overloading. Define all the functions related with volume in namespace ns1 and those of surface area in namespace ns2.

Source Code

```
#include <iostream>
#include <cmath>

//namespace defining volume

namespace ns1
{
  void volume(double a)
  {
    std::cout<<"The volume of cube is "<<pow(a,3)
    <<std::endl;
  }
void volume(doble r, double h>
{
 std::cout<<"The volume of cylinde is "<<
   3.141*pow(r,2)*h<<std::endl;
}
```

```
void volume(double l, double w, double h)
{
    std::cout<<"The volume of cylinder,rectangular
                pyramid is"<<(l*w*h)/3<<std::endl;
}
};
namespace ns2
{
    void surface_area(double a)
    {
        std::cout<<"The surface area is"<<6*pow(a,2)<<
        std::endl;
    }
    void surface_area(double r, double h)
    {
        double x,y;
        x=2*3.141*r*h;
        y=2*3.141*pow(r,2);
        std::cout<<"The surface area of cylinder is
        "<<x+y<<std::endl;
    }
```

```
void surface_area(double l,double w,double h)
{
    double x,y,z;
    x=l*w;
    y=pow((w/2),2)+pow(h,2);
    z=pow((l/2),2)+pow(h,2);
    std::cout<<"The surface area of rectangular
    pyramid is:"<<x+l*sqrt(y)+w*sqrt(z)<<std::endl;
}
};

int main()
{
    double a,l,h,w,h1,r;
    int choice;
    std::cout<<"Enter the choice 1 for cube\n
        Enter the choice 2 For cylinder \n
        Enter the choice 3 For rectangular pyramid\n";
    std::cout<<"CHOICE=";
    std::cin>>choice;
```

```
if(choice == 1)
{
   std::cout<<"Enter the side of the cube a=";
   std::cin>>a;

   ns1 ::volume(a);
   ns2 :: surface_area(a);
}
```

```
else if(choice==2.
{
   std::cout<<"Enter the radius of cylinder r=";
   std::cin>>r;
   std::cout<<"Enter the height of cylinder h=";
   std::cin>>h;

   ns1 :: volume(r,h);
   ns2 :: surface_area(r,h);
}
```

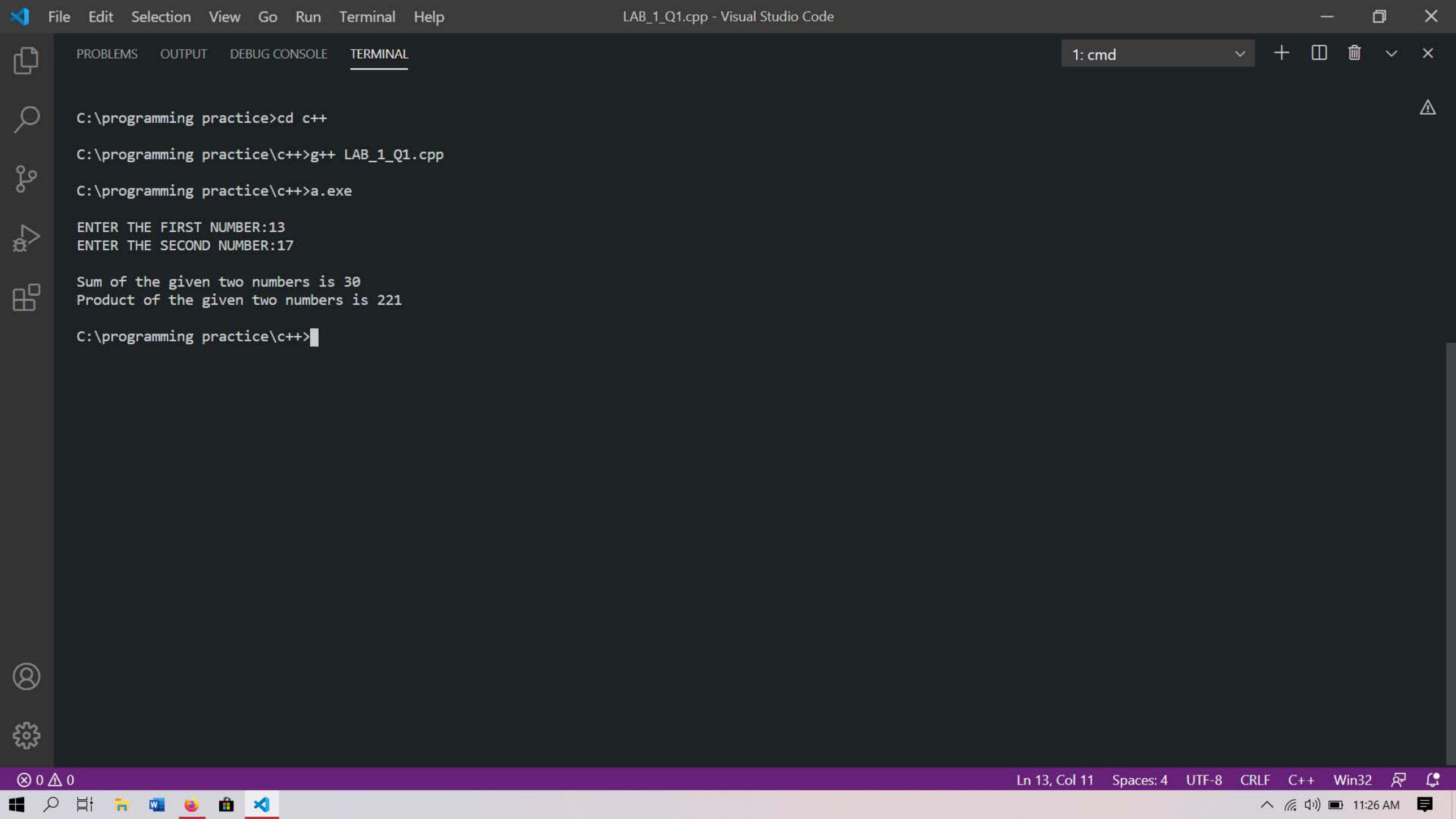
```
else if (choice==3)
{
  std::cout<<"Enter the length of reactangular
      pyramid l=";
  std::cin>>l;

  std::cout<<"Enter the width of rectangular
      pyramid w=";
  std::cin>>w;

  std::cout<<"Enter the height of rectangular
      pyramid h=";
  std::cin>>h1;

  ns1::volume(l,w,h1);
  ns2::surface_circa(l,w,h1);
}
}
```

THE END


File Edit Selection View Go Run Terminal Help
LAB_1_Q1.cpp - Visual Studio Code
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL
1: cmd
C:\programming practice>cd c++
C:\programming practice\c++>g++ LAB_1_Q1.cpp
C:\programming practice\c++>a.exe
ENTER THE FIRST NUMBER:13
ENTER THE SECOND NUMBER:17
Sum of the given two numbers is 30
Product of the given two numbers is 221
C:\programming practice\c++>
0 0
Ln 13, Col 11 Spaces: 4 UTF-8 CRLF C++ Win32
11:26 AM

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL

1: cmd

```
C:\programming practice\c++>g++ LAB_1_Q2_method.cpp
g++: error: LAB_1_Q2_method.cpp: No such file or directory

C:\programming practice\c++>g++ LAB_1_Q2_method2.cpp

C:\programming practice\c++>a.exe
BEFORE SWAP
A=12
C=7
AFTER SWAP
A=7
C=12
C:\programming practice\c++>
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL

1: cmd

```
A=7
C=12
C:\programming practice\c++>g++ LAB_1_Q3.cpp

C:\programming practice\c++>a.exe
ptr = 0x6dfeec
&ptr=0x6dfee8
&a=0x6dfeec
a= 10
*ptr= 10
a=20

C:\programming practice\c++>
```

File Edit Selection View Go Run Terminal Help LAB_1_Q4.cpp - Visual Studio Code

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL 1: cmd

```
C:\programming practice>cd c++

C:\programming practice\c++>g++ LAB_1_Q4.cpp

C:\programming practice\c++>a.exe
Enter 10 elements
1
2
3
4
5
6
7
8
9
10
Mean=5.5
Standard Deviation = 2.87228
C:\programming practice\c++>
```

0 0 Ln 1, Col 3 Spaces: 4 UTF-8 CRLF C++ Win32 11:53 AM

File Edit Selection View Go Run Terminal Help LAB_1_Q5.cpp - Visual Studio Code

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL 1: cmd

```
C:\programming practice\c++>a.exe
Enter the choice 1 For cube
 Enter the choice 2 For cylinder
 Enter the choice 3 For rectangular pyramid
CHOICE=1
Enter the side of the cube a=3
The volume of cube is 27
The surface area is54

C:\programming practice\c++>a.exe
Enter the choice 1 For cube
 Enter the choice 2 For cylinder
 Enter the choice 3 For rectangular pyramid
CHOICE=2
Enter the radius of cylinder r=3
Enter the height of cylinder h=7
The volume of cylinder is 197.883
The surface area of cylinder is 188.46

C:\programming practice\c++>a.exe
Enter the choice 1 For cube
 Enter the choice 2 For cylinder
 Enter the choice 3 For rectangular pyramid
CHOICE=3
Enter the length of rectangular pyramid l=5
Enter the width of rectangular pyramid w=8
Enter the height of rectangular pyramid h=10
The volume of cylinder rectangular pyramid is 133.333
The surface area of rectangular pyramid is: 176.314

C:\programming practice\c++>
```