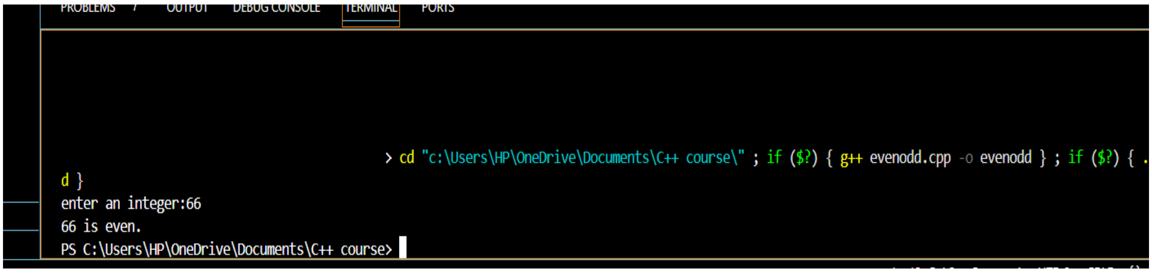
CPP LAB ASSIGNMENT

Ques 1. write a program to find the given number is even or odd

```
#include<iostream>

using namespace std;

int main(){

    int n;

    cout<<"enter an integer:";

    cin>>n;

    if(n%2==0)

    cout<<n<<" is even.";

    else

    cout<<n<<" is odd.";

    return 0;

}
```

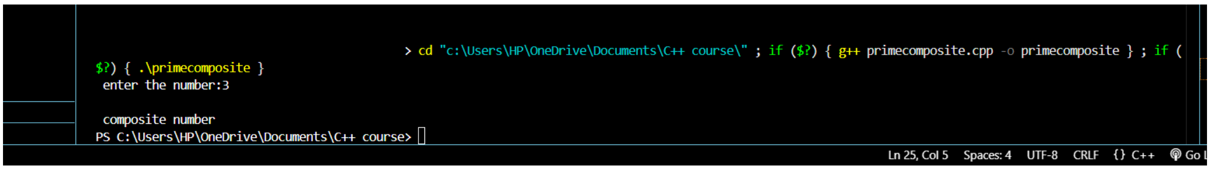
OUTPUT



```
                                       > cd "c:\Users\HP\OneDrive\Documents\C++ course\" ; if ($?) { g++ evenodd.cpp -o evenodd } ; if ($?) { .
d }
enter an integer:66
66 is even.
PS C:\Users\HP\OneDrive\Documents\C++ course>
```

Ques 2. write a program to find whether the given number is prime or composite

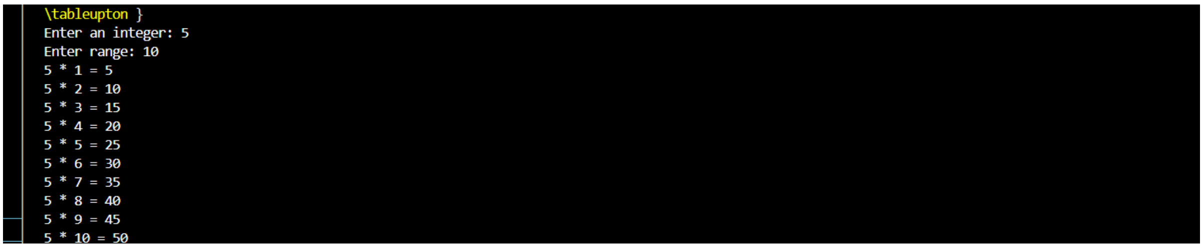
```
#include<iostream>
using namespace std;
int main(){
  int num,i,count=0;
  cout<<" enter the number:";
  cin>>num;
  for(i=2;i<num;i++)
  {
    if(num%i==0)
     count++;

  }

if(count==1)
{
  cout<<"\n prime number";

}
else
{
  cout<<"\n composite number";
}
return 0;
}
```



```
                                        > cd "c:\Users\HP\OneDrive\Documents\C++ course\" ; if ($?) { g++ primecomposite.cpp -o primecomposite } ; if (
$?) { .\primecomposite }
 enter the number:3

 composite number
PS C:\Users\HP\OneDrive\Documents\C++ course> 
```

Ques 3. write a program to print table of a given number up to n number/range

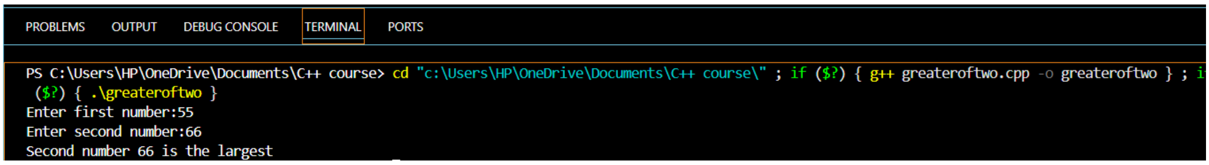
```
#include <iostream>
using namespace std;

int main() {

    int n, range;

    cout << "Enter an integer: ";
    cin >> n;

    cout << "Enter range: ";
    cin >> range;

    for (int i = 1; i <= range; ++i) {
        cout << n << " * " << i << " = " << n * i << endl;
    }

    return 0;
}
```



```
\tableupton }
Enter an integer: 5
Enter range: 10
5 * 1 = 5
5 * 2 = 10
5 * 3 = 15
5 * 4 = 20
5 * 5 = 25
5 * 6 = 30
5 * 7 = 35
5 * 8 = 40
5 * 9 = 45
5 * 10 = 50
```

Ques 4. 1) write a program to find greater of the two numbers

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

int main()
{
    int num1, num2;
    cout<<"Enter first number:";
    cin>>num1;
    cout<<"Enter second number:";
    cin>>num2;
    if(num1>num2)
    {
    cout<<"First number "<<num1<<" is the largest";
    }
    else
    {
    cout<<"Second number "<<num2<<" is the largest";
    }
    return 0;
}
```

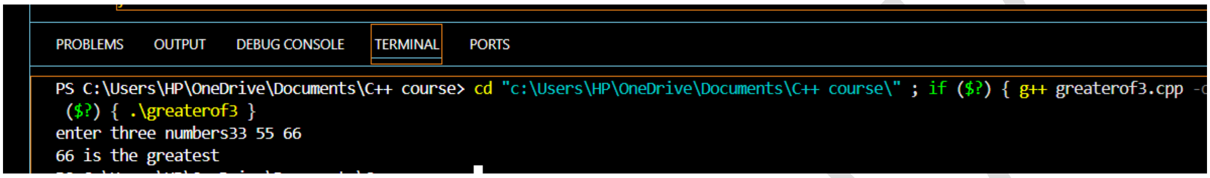


```
PS C:\Users\HP\OneDrive\Documents\C++ course> cd "c:\Users\HP\OneDrive\Documents\C++ course\" ; if ($?) { g++ greateroftwo.cpp -o greateroftwo } ; i
 ($?) { .\greateroftwo }
Enter first number:55
Enter second number:66
Second number 66 is the largest
```

2) wrtie a program to find out greatest of the three numbers

```
#include<iostream>
using namespace std;
int main(){
    int a,b,c;
    cout<<"enter three numbers";
    cin>>a>>b>>c;
    if(a>b){
        if(a>c){
            cout<<a<<" is the greatest";
        }
        else{
            cout<<c<<" is the greatest";
        }
          }
          else {
            if(b>c){
                cout<<b<<" is the greatest";
            }
            else{
```

```
            cout<<c<<" is the greatest";
          }
        }
return 0;
}
```

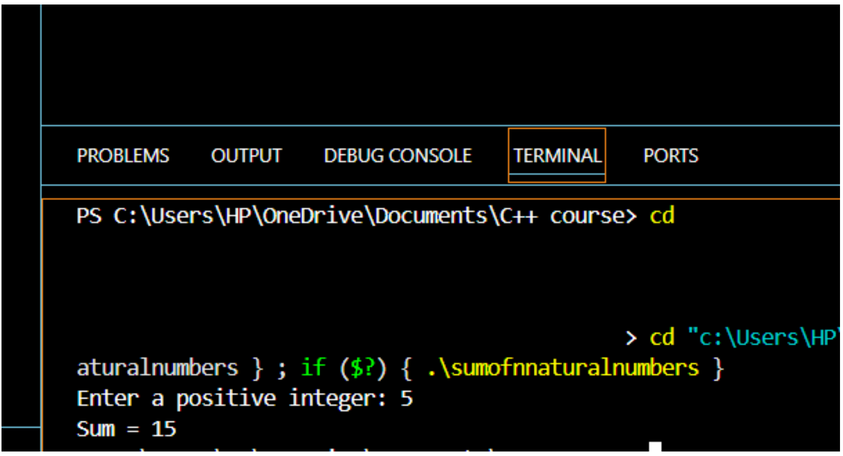


```
PS C:\Users\HP\OneDrive\Documents\C++ course> cd "c:\Users\HP\OneDrive\Documents\C++ course\" ; if ($?) { g++ greaterof3.cpp -c
 ($?) { .\greaterof3 }
enter three numbers33 55 66
66 is the greatest
```

Ques 5. write a program to find sum of n natural numbers

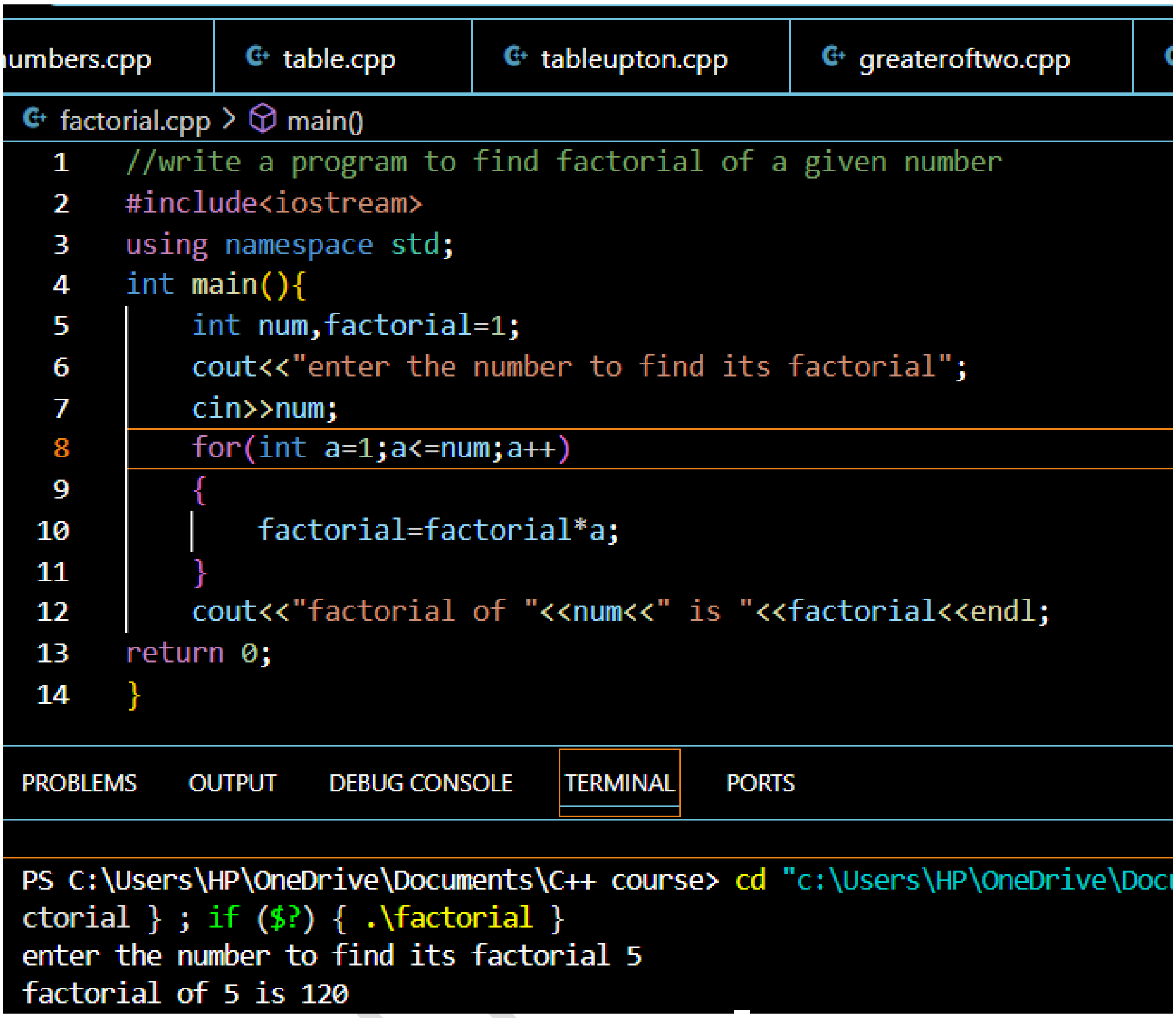
```
#include <iostream>
using namespace std;

int main() {
   int n, sum = 0;

   cout << "Enter a positive integer: ";
   cin >> n;

   for (int i = 1; i <= n; ++i) {
       sum += i;
   }

   cout << "Sum = " << sum;
   return 0;
```

}



```
PS C:\Users\HP\OneDrive\Documents\C++ course> cd



                                        > cd "c:\Users\HP
aturalnumbers } ; if ($?) { .\sumofnnaturalnumbers }
Enter a positive integer: 5
Sum = 15
```

Ques6.



```cpp
//write a program to find factorial of a given number
#include<iostream>
using namespace std;
int main(){
    int num,factorial=1;
    cout<<"enter the number to find its factorial";
    cin>>num;
    for(int a=1;a<=num;a++)
    {
        factorial=factorial*a;
    }
    cout<<"factorial of "<<num<<" is "<<factorial<<endl;
return 0;
}
```

```
PS C:\Users\HP\OneDrive\Documents\C++ course> cd "c:\Users\HP\OneDrive\Doc
ctorial } ; if ($?) { .\factorial }
enter the number to find its factorial 5
factorial of 5 is 120
```

Ques 7. write a program to find sum of digits of n digit number

#include<iostream>

using namespace std;

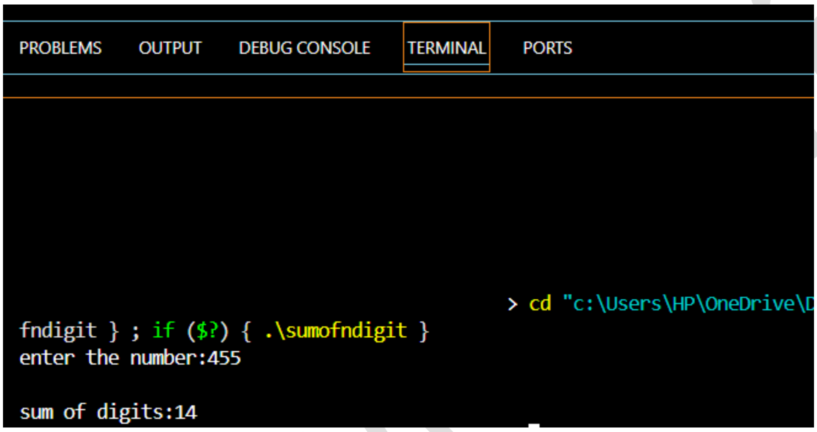
int main(){

int num,sum=0;

cout<<"enter the number:";

cin>>num;

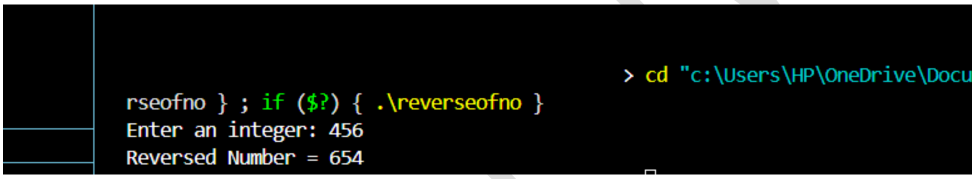
```
    while(num!=0){
        sum+=num%10;
        num=num/10;
    }
    cout<<"\nsum of digits:"<<sum;
  return 0;
}
```



```
                                                > cd "c:\Users\HP\OneDrive\D
fndigit } ; if ($?) { .\sumofndigit }
enter the number:455

sum of digits:14
```

Ques 8. write a program to find reverse of a number

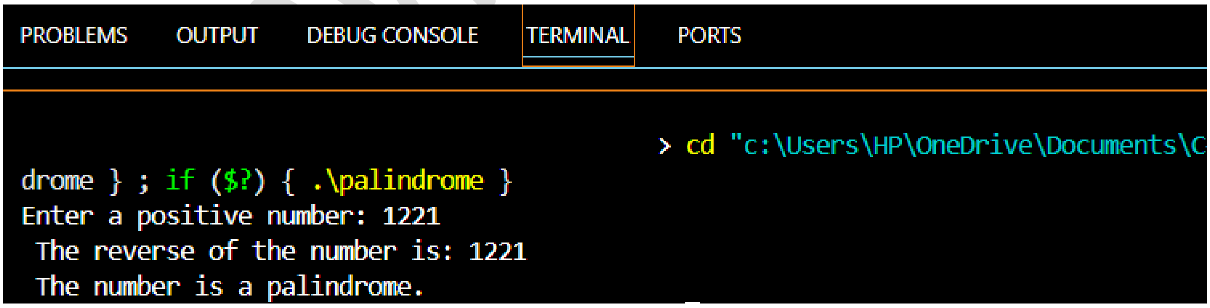
```
#include <iostream>
using namespace std;

int main() {

  int n, reversed_number = 0, remainder;

  cout << "Enter an integer: ";
  cin >> n;

  while(n != 0) {
    remainder = n % 10;
    reversed_number = reversed_number * 10 + remainder;
    n=n/10;
  }

  cout << "Reversed Number = " << reversed_number;

  return 0;
}
```



```
                                                > cd "c:\Users\HP\OneDrive\Docu
rseofno } ; if ($?) { .\reverseofno }
Enter an integer: 456
Reversed Number = 654
```

Ques 9. write a program to check whether a number is palindrome or not

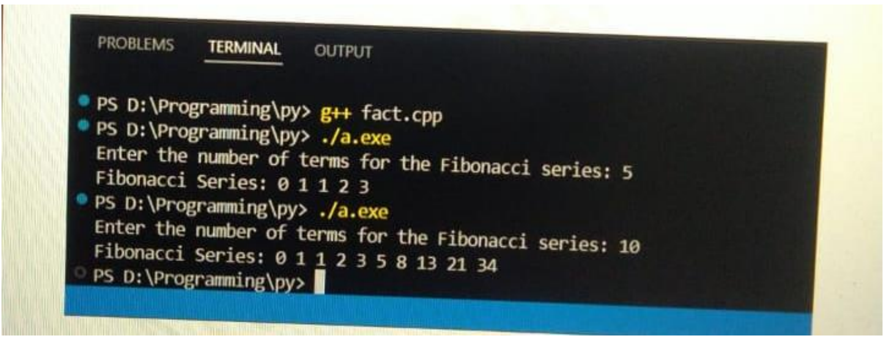
```
#include <iostream>
using namespace std;

int main()
{
    int n, num, digit, rev = 0;

    cout << "Enter a positive number: ";
    cin >> num;

    n = num;
    do
    {
       digit = num % 10;
       rev = (rev * 10) + digit;
       num = num / 10;
    } while (num != 0);

    cout << " The reverse of the number is: " << rev << endl;

    if (n == rev and n > 0)  // Negative numbers are not palindromic
       cout << " The number is a palindrome.";
    else
       cout << " The number is not a palindrome.";

   return 0;
}
```



```
                                                > cd "c:\Users\HP\OneDrive\Documents\C
drome } ; if ($?) { .\palindrome }
Enter a positive number: 1221
 The reverse of the number is: 1221
 The number is a palindrome.
```

Ques 10.Program to print Fibonacci series up to n numbers.

```
#include <iostream>
using namespace std;
int main() {
    int n;
    cout << "Enter the number of terms for the Fibonacci series: ";
    cin >> n;
    int n1 = 0, n2 = 1, next;
    cout << "Fibonacci Series: ";
    for (int i = 1; i <= n; i++) {
        if (i == 1) {
            cout << n1 << " ";
            continue;
        }
        if (i == 2) {
            cout << n2 << " ";
            continue;
        }
        next = n1 + n2;
        cout << next << " ";
        n1 = n2;
        n2 = next;
    } cout << endl;
    return 0; }
```

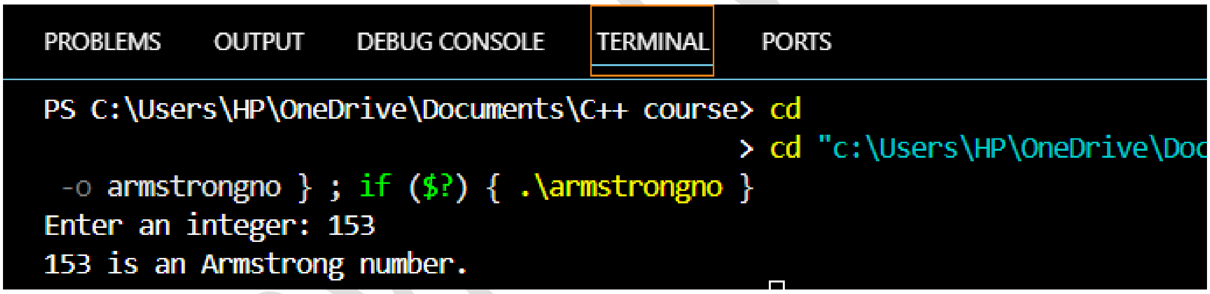


```
PS D:\Programming\py> g++ fact.cpp
PS D:\Programming\py> ./a.exe
Enter the number of terms for the Fibonacci series: 5
Fibonacci Series: 0 1 1 2 3
PS D:\Programming\py> ./a.exe
Enter the number of terms for the Fibonacci series: 10
Fibonacci Series: 0 1 1 2 3 5 8 13 21 34
PS D:\Programming\py>
```

```
}
```

Ques 11. Determine n digit number is Armstrong or not.

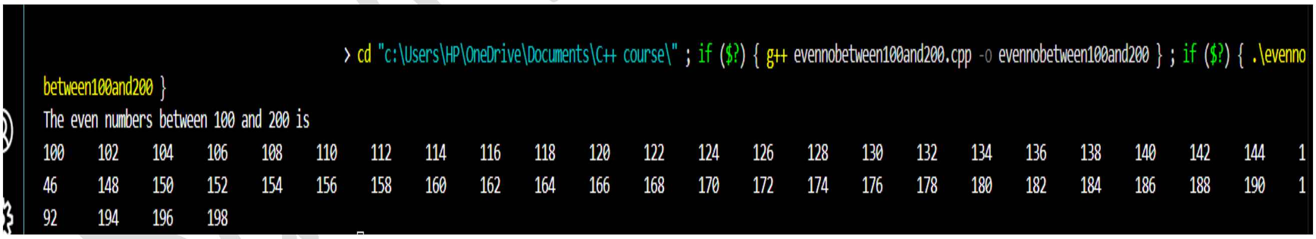
```
#include <iostream>
using namespace std;

int main() {
    int number, original, sum = 0, n = 0;
    cout << "Enter the number: ";
    cin >> number;

    original = number; // Store the original number

    // Count the number of digits
    int temp = number;
    while (temp != 0) {
        temp /= 10;
        n++;
    }

    // Calculate the sum of the n-th power of each digit without using the math library
    temp = number;
    for (; temp != 0; temp /= 10) {
        int digit = temp % 10; // Extract the last digit
        int power = 1; // To calculate digit raised to the power n
        for (int i = 0; i < n; i++) {
            power *= digit;
        }
        sum += power; // Add the n-th power of the digit to the sum
    }

    // Check if the original number equals the sum
    if (original == sum) {
        cout << "The number is an Armstrong number." << endl;
    } else {
        cout << "The number is not an Armstrong number." << endl;
    }

    return 0;
}
```



```
PS C:\Users\HP\OneDrive\Documents\C++ course> cd
                                              > cd "c:\Users\HP\OneDrive\Doc
 -o armstrongno } ; if ($?) { .\armstrongno }
Enter an integer: 153
153 is an Armstrong number.
```

Ques 12 . write a program to print even number between 100 and 200

```
#include <iostream>

using namespace std;

int main()
{
    int start = 100, end = 200;
    cout << "The even numbers between " << start << " and " << end
        << " is "<<endl;

    for (int i = start; i <end; i++)
      if (i % 2 == 0)
        cout << i << "\t";

    return 0;
}
```

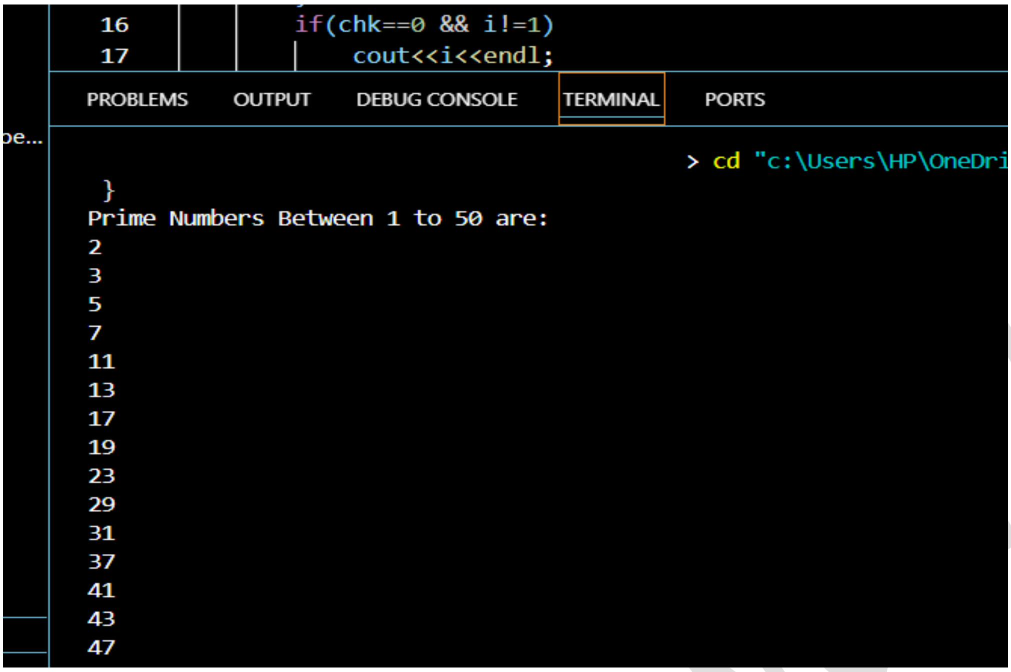


```
                                    > cd "c:\Users\HP\OneDrive\Documents\C++ course\" ; if ($?) { g++ evennobetween100and200.cpp -o evennobetween100and200 } ; if ($?) { .\evenno
between100and200 }
The even numbers between 100 and 200 is
100     102     104     106     108     110     112     114     116     118     120     122     124     126     128     130     132     134     136     138     140     142     144     1
46      148     150     152     154     156     158     160     162     164     166     168     170     172     174     176     178     180     182     184     186     188     190     1
92      194     196     198
```

Ques 13. Write a program to print first 50 prime numbers

```
#include<iostream>
using namespace std;
int main(){
int i, chk=0, j;
```

```
    cout<<"Prime Numbers Between 1 to 50 are:\n";
    for(i=1; i<=50; i++)
    {
        for(j=2; j<i; j++)
        {
           if(i%j==0)
           {
               chk++;
               break;
           }
        }
        if(chk==0 && i!=1)
            cout<<i<<endl;
        chk = 0;
    }
    cout<<endl;
    return 0;
}
```



```
    if(chk==0 && i!=1)
    |   cout<<i<<endl;
```

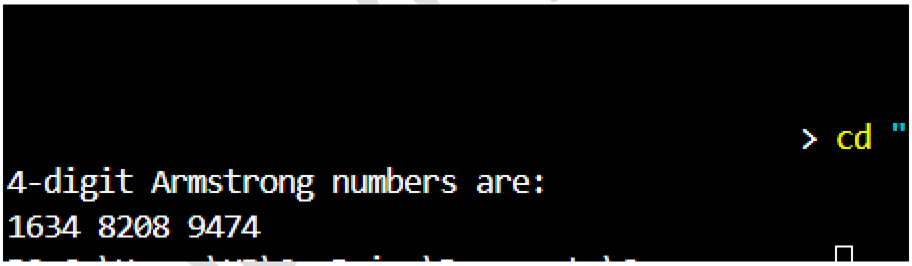
```
                                                > cd "c:\Users\HP\OneDri
  }
Prime Numbers Between 1 to 50 are:
2
3
5
7
11
13
17
19
23
29
31
37
41
43
47
```

Question 14. Write program to print all 4 digit Armstrong number.

```
#include <iostream>
using namespace std;
int main()
{
   int counter,sum=0;
   cout << "4-digit Armstrong numbers are:" << endl;
   for (int num = 1000; num < 10000; num++) {
      counter = num;
```

```
        sum=0;
        while (counter != 0) {
            int digit = counter % 10;
            int power = 1;
            for (int i = 0; i < 4; i++) {
                power *= digit;
            }
            sum += power;
            counter /= 10;
        }
        if (sum == num) {
            cout << num << " ";
        }
    }
    cout << endl;
    return 0;
}
```

OUTPUT:



```
                                                    > cd "
4-digit Armstrong numbers are:
1634 8208 9474
```

Ques 15. 1) right half pyramid pattern program

```
#include<iostream>
using namespace std;
int main(){
int rows=5;
// first loop for printing rows
for (int i = 0; i < rows; i++) {

    // second loop for printing character in each rows
    for (int j = 0; j <= i; j++){
        cout<<"* ";
    }
    cout<<"\n";
}
return 0;
}
```

2)program to print inverted right half pyramid

```
#include<iostream>
using namespace std;
int main(){
   int rows = 5;

    // first loop to print all rows
    for (int i = 0; i < rows; i++) {

        // first inner loop to print the * in each row
        for (int j = 0; j < rows - i; j++) {
            cout<<"* ";
        }
        cout<<"\n";
}
return 0;
}
```

3)

```
#include <iostream>
   using namespace std;
   void main(){
    for(int i = 1 ; i <= 3 ; i++){
        for(int j = 5-i ; j > 0 ; j--){
            cout << " ";
        }
        for(int k = 1 ; k <= (2*i)- 1 ; k++){
            cout << "*";
        }
        cout << "\n";
    }

}
```

4)

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

int main() {
    for (int i = 1; i <= 4; i++) {   // Loop for 4 rows
```

```
        for (int j = 1; j <= i; j++) {  // Loop for printing the numbers in each row
            cout << i;  // Print the number i
        }
        cout << endl;
    }
    return 0;
}
```

5) Pascal's triangle

```
#include<iostream>
using namespace std;
int fact(int x){
    int f=1;
    for(int i=1;i<=x;i++){
        f*=i;
    }
    return f;
}
int combi(int n,int r){
    int c;
    c= fact(n) /(fact(r) * fact(n-r) );
    return c;
}
int main() {
    int n;
    cout<<"Enter a number: ";
    cin>>n;
    for(int i=0;i<=n;i++){
        for(int k=0;k<n-i;k++){
            cout<<" ";
        }
        for(int j=0;j<=i;j++){
            cout<<combi(i,j)<<" ";
        }
        cout<<endl;
    }
    return 0;
}
```

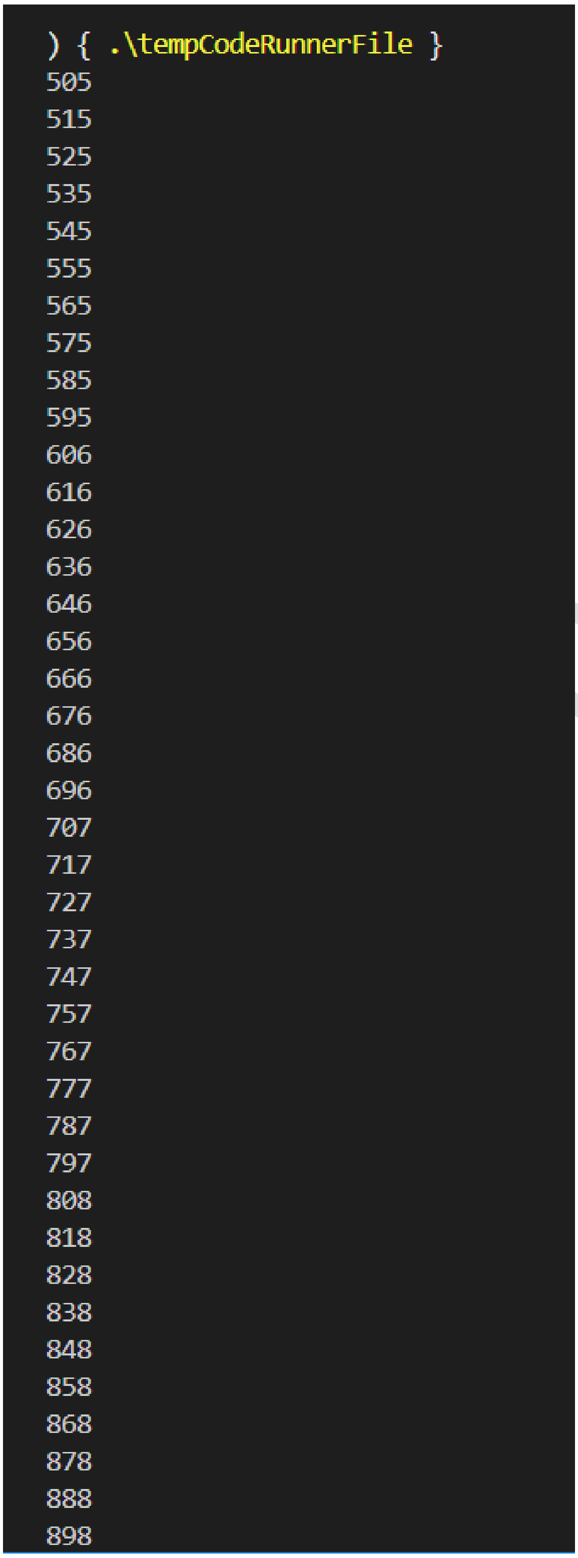
6)Floyd's triangle

```
#include <iostream>
using namespace std;
int main()
{
    int n, i,  c, a = 1;

    cout << "Enter the number of rows of Floyd's triangle to print: "; cin >> n;

    for (i = 1; i <= n; i++)
    {
        for (c = 1; c <= i; c++)
        {
            cout << a;
            a++;
        }
        cout << endl;
    }
    return 0;
}
```

Q16. Using functions write following c++ programs.

1.To print palindrome numbers from range 500 to 1000

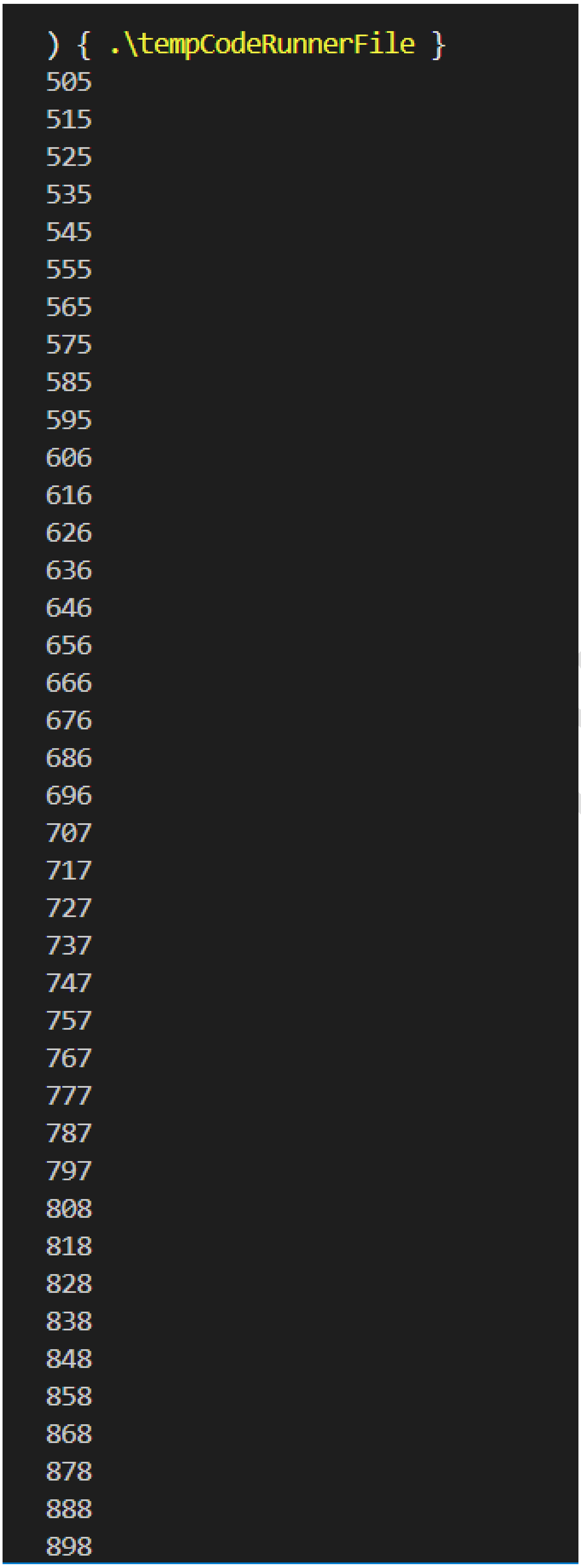
```
#include <iostream>
using namespace std;
void Palindrome()
{
    for (int i = 500; i <= 1000; i++)
    {
        int num = i;
        int rev = 0;
        while (num != 0)
       {
            int digit = num % 10;
            rev = rev * 10 + digit;
            num /= 10;
        }
        if (rev == i)
      {
            cout << i << endl;
        }
    }
}
int main() {
  Palindrome ();
return0;
}
```



```
) { .\tempCodeRunnerFile }
505
515
525
535
545
555
565
575
585
595
606
616
626
636
646
656
666
676
686
696
707
717
727
737
747
757
767
777
787
797
808
818
828
838
848
858
868
878
888
898
```

ii) To print first 100 odd numbers.

```
#include <iostream>
using namespace std;
void Odd()
{
   int n;
  for (n=1; n<=200;n++)
   {
      if (n%2!=0)
       {
           cout << "\n"<<n;
        }
   }
}
int main()
{
   Odd();
   return0;
}
```

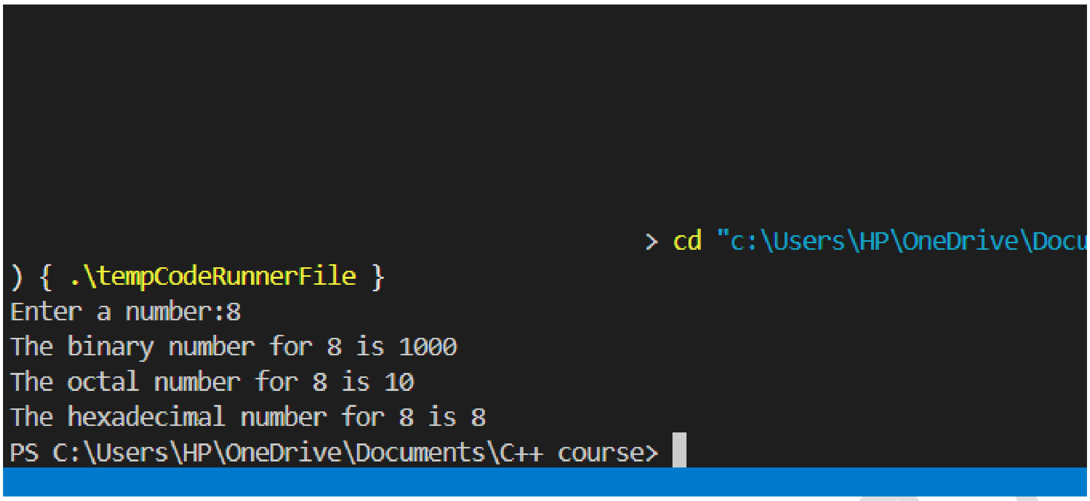


```
) { .\tempCodeRunnerFile }
505
515
525
535
545
555
565
575
585
595
606
616
626
636
646
656
666
676
686
696
707
717
727
737
747
757
767
777
787
797
808
818
828
838
848
858
868
878
888
898
```

iii) To find binary, octal, hexadecimal equivalent of a given decimal number.

```
#include <iostream>
using namespace std;
void binary(int n)
{
   int org_num = n;
   int factor = 1;
   int bin = 0;
   while (n != 0)
   {
      bin = bin + (n % 2) * factor;
      n = n / 2;
      factor = factor * 10;
   }
   cout << "The binary number for " << org_num << " is " << bin << "\n";
}
void octal(int n)
{
   int org_num = n;
   int factor = 1;
   int oct = 0;
```

```
    while (n != 0)
    {
        oct = oct + (n % 8) * factor;
        n = n / 8;
        factor = factor * 10;
    }
    cout << "The octal number for " << org_num << " is " << oct << "\n";
}
void hexadecimal(int n)
{
    int org_num = n;
    int factor = 1;
    int hexa = 0;
    while (n != 0)
    {
        hexa = hexa + (n % 16) * factor;
        n = n / 16;
        factor = factor * 10;
    }
    cout << "The hexadecimal number for " << org_num << " is " << hexa << "\n";
}
int main()
{
    int num;
    cout << "Enter a number:";
    cin >> num;
    binary(num);
    octal(num);
    hexadecimal(num);
    return 0;
}
```

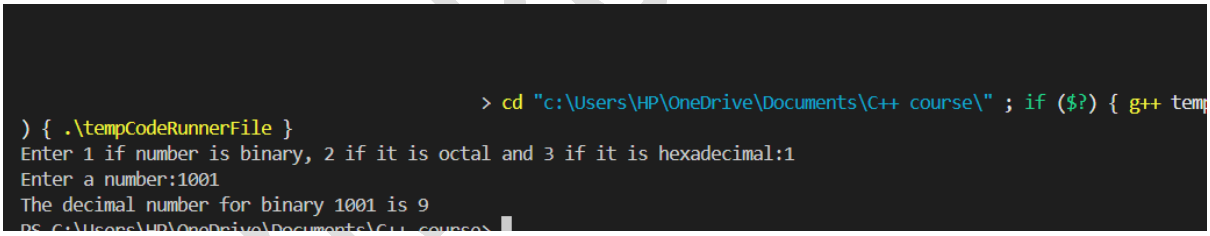


```
                                            > cd "c:\Users\HP\OneDrive\Docu
) { .\tempCodeRunnerFile }
Enter a number:8
The binary number for 8 is 1000
The octal number for 8 is 10
The hexadecimal number for 8 is 8
PS C:\Users\HP\OneDrive\Documents\C++ course>
```

iv) To find decimal equivalents for given binary, hexadecimal and octal numbers.

```
#include <iostream>

#include <cmath>

using namespace std;

void bin(int n)

{

   int org_num = n;

   int deci = 0;

   int power = 0;

   while (n != 0)

   {

      deci = deci + (n % 10) * pow(2, power);

      n = n / 10;

      power++;

   }

   cout << "The decimal number for binary " << org_num << " is " << deci << "\n";

}

void oct(int n)

{

   int org_num = n;
```

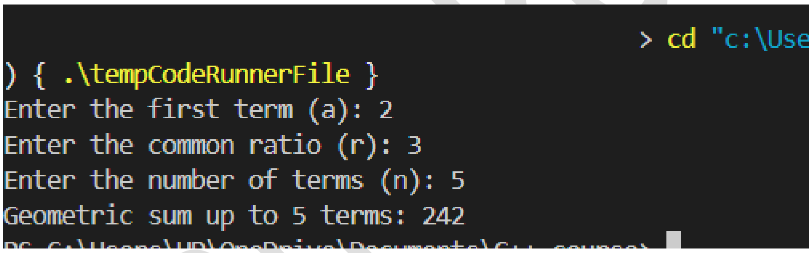
```
    int deci = 0;
    int power = 0;
    while (n != 0)
    {
        deci = deci + (n % 10) * pow(8, power);
        n = n / 10;
        power++;
    }
    cout << "The decimal number for octal " << org_num << " is " << deci << "\n";
}
void hex(int n)
{
    int org_num = n;
    int deci = 0;
    int power = 0;
    while (n != 0)
    {
        deci = deci + (n % 10) * pow(16, power);
        n = n / 10;
        power++;
    }
    cout << "The decimal number for hexadecimal " << org_num << " is " << deci << "\n";
}
int main()
{
    int num, choice = 0;
    cout << "Enter 1 if number is binary, 2 if it is octal and 3 if it is hexadecimal:";
    cin >> choice;
    cout << "Enter a number:";
    cin >> num;
    if (choice == 1)
    {
        bin(num);
    }
    else if (choice == 2)
    {
        oct(num);
    }
    else if (choice == 3)
    {
        hex(num);
    }
    else
    {
        cout << "Invalid choice.";
    }
    return 0;
}
```



```
                                               > cd "c:\Users\HP\OneDrive\Documents\C++ course\" ; if ($?) { g++ temp
) { .\tempCodeRunnerFile }
Enter 1 if number is binary, 2 if it is octal and 3 if it is hexadecimal:1
Enter a number:1001
The decimal number for binary 1001 is 9
PS C:\Users\HP\OneDrive\Documents\C++ course>
```

v) To calculate geometric sum upto n terms.

```
#include <iostream>
using namespace std;
double geometricSum(double a, double r, int n) {
    double sum = 0;
    double term = a;
    for (int i = 0; i < n; i++) {
        sum += term;
        term *= r;
    }
    return sum;
}
int main() {
    double a, r;
    int n;
    cout << "Enter the first term (a): ";
    cin >> a;
    cout << "Enter the common ratio (r): ";
    cin >> r;
    cout << "Enter the number of terms (n): ";
    cin >> n;
    double sum = geometricSum(a, r, n);
    cout << "Geometric sum up to " << n << " terms: " << sum << endl;
    return 0;
}
```



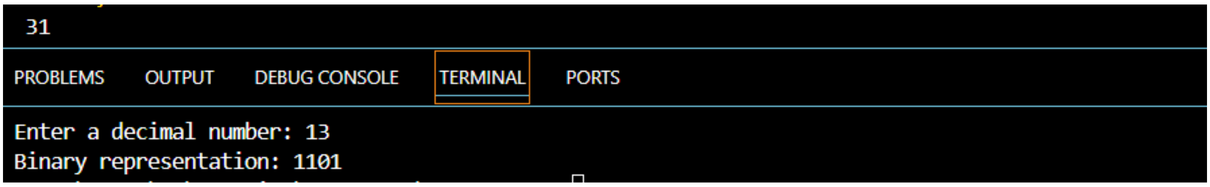
```
                                                          > cd "c:\Use
) { .\tempCodeRunnerFile }
Enter the first term (a): 2
Enter the common ratio (r): 3
Enter the number of terms (n): 5
Geometric sum up to 5 terms: 242
PS C:\Users\HP\OneDrive\Documents\C++ course>
```

Ques 17

1) Print binary for decimal using recursion

```
#include <iostream>
using namespace std;
// Function to convert decimal to binary using recursion
void decimalToBinary(int n) {
   // Base case: if the number is 0 or 1, print the number
   if (n <= 1) {
      cout << n;
      return;
   }
   // Recursive case: divide the number by 2 and call the function recursively
   decimalToBinary(n / 2);
   // Print the remainder (either 0 or 1)
   cout << n % 2;
}
int main() {
   int num;

   cout << "Enter a decimal number: ";
   cin >> num;

   cout << "Binary representation: ";
   if (num == 0) {
      cout << 0; // Special case for zero
   } else {
      decimalToBinary(num);
   }
   cout << endl;
```

```
    return 0;
}
```



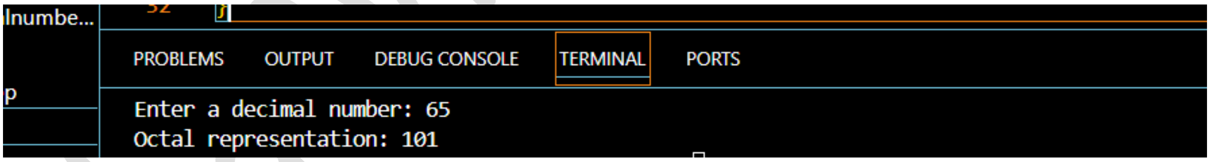
```
 31
```

```
Enter a decimal number: 13
Binary representation: 1101
```

2) print octal for a decimal using recursion

```
#include <iostream>
using namespace std;
// Function to convert decimal to octal using recursion
void decimalToOctal(int n) {
    // Base case: if the number is less than 8, print the number
    if (n < 8) {
        cout << n;
        return;
    }
 // Recursive case: divide the number by 8 and call the function recursively
    decimalToOctal(n / 8);

// Print the remainder (either a digit between 0 and 7)
```

```
    cout << n % 8;
}

int main() {
    int num;

    cout << "Enter a decimal number: ";
    cin >> num;

    cout << "Octal representation: ";
    if (num == 0) {
        cout << 0; // Special case for zero
    } else {
        decimalToOctal(num);
    }
    cout << endl;

    return 0;
}
```

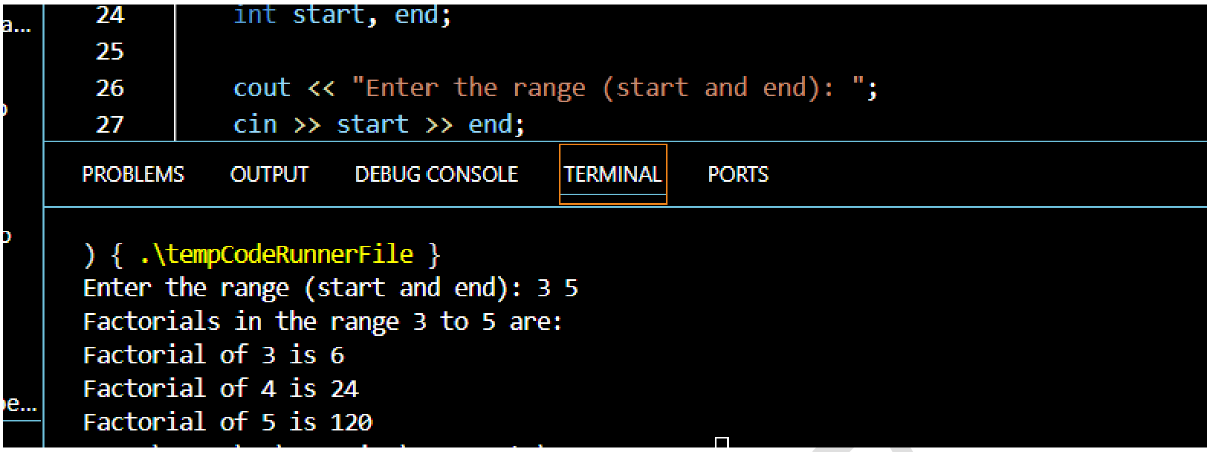


```
Enter a decimal number: 65
Octal representation: 101
```

3) print factorial for a given range using recursion

```
#include <iostream>
using namespace std;
// Function to calculate factorial recursively
```

```
long long factorial(int n) {
    if (n <= 1) {
        return 1; // Base case: factorial of 0 or 1 is 1
    } else {
        return n * factorial(n - 1); // Recursive case
    }
}
// Function to print factorials for numbers in the given range
void printFactorialsInRange(int start, int end) {
    // Base case: if start is greater than end, stop the recursion
    if (start > end) {
        return;
    }
    // Print the factorial for the current number
    cout << "Factorial of " << start << " is " << factorial(start) << endl;
    // Recursively call the function for the next number
    printFactorialsInRange(start + 1, end);
}

int main() {
    int start, end;

    cout << "Enter the range (start and end): ";
    cin >> start >> end;

    cout << "Factorials in the range " << start << " to " << end << " are:\n";
    printFactorialsInRange(start, end);

    return 0;
}
```

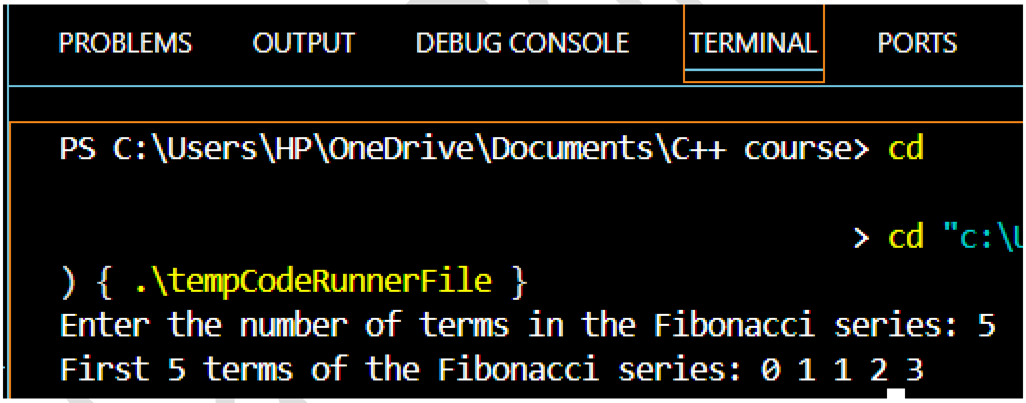


```
    int start, end;

    cout << "Enter the range (start and end): ";
    cin >> start >> end;
```

```
) { .\tempCodeRunnerFile }
Enter the range (start and end): 3 5
Factorials in the range 3 to 5 are:
Factorial of 3 is 6
Factorial of 4 is 24
Factorial of 5 is 120
```

4) print first n terms of Fibonacci series.

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

// Function to calculate Fibonacci number recursively
int fibonacci(int n) {
  if (n <= 1) {
    return n; // Base case: fibonacci(0) = 0, fibonacci(1) = 1
  }
  return fibonacci(n - 1) + fibonacci(n - 2); // Recursive case
}

// Function to print first n Fibonacci numbers
void printFibonacciSeries(int n) {
  for (int i = 0; i < n; ++i) {
    cout << fibonacci(i) << " "; // Print the ith Fibonacci number
  }
  cout << endl;
}

int main() {
  int n;

  cout << "Enter the number of terms in the Fibonacci series: ";
  cin >> n;

  cout << "First " << n << " terms of the Fibonacci series: ";
  printFibonacciSeries(n);

  return 0;
}
```

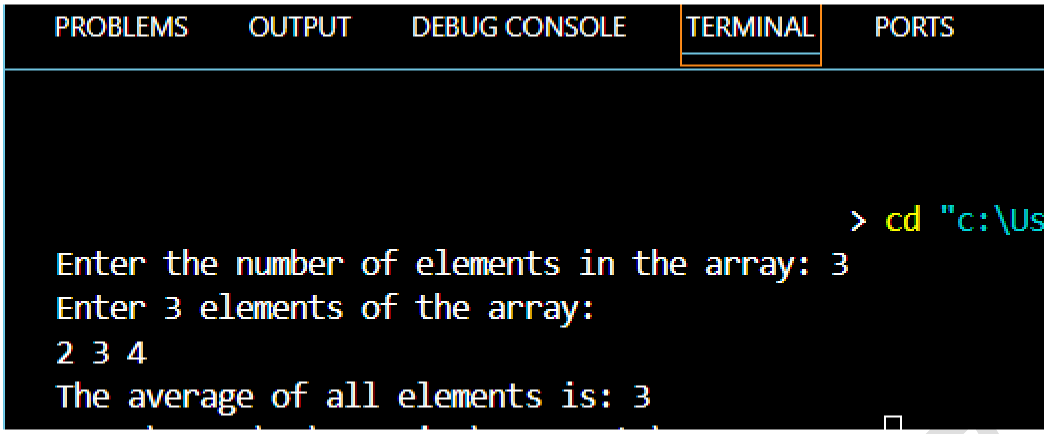


```
PS C:\Users\HP\OneDrive\Documents\C++ course> cd

                                              > cd "c:\
) { .\tempCodeRunnerFile }
Enter the number of terms in the Fibonacci series: 5
First 5 terms of the Fibonacci series: 0 1 1 2 3
```

Ques 18. Calculate avg of all elements of array

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

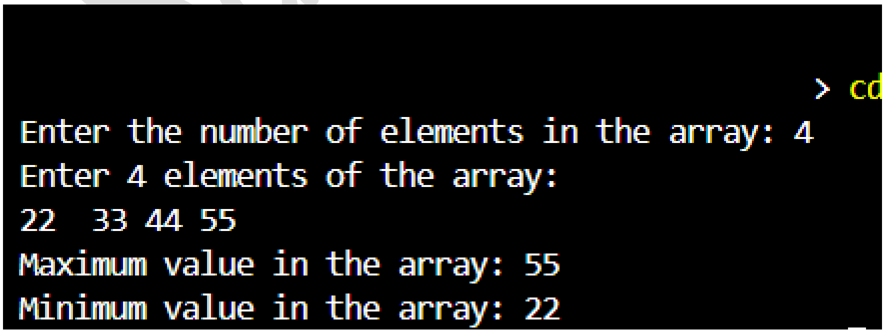
```
int main() {
    int n;

    // Input: size of the array
    cout << "Enter the number of elements in the array: ";
    cin >> n;

    int arr[n];  // Declare array of size 'n'
    int sum = 0;

    // Input: elements of the array
    cout << "Enter " << n << " elements of the array:\n";
    for (int i = 0; i < n; ++i) {
        cin >> arr[i];  // Take each element as input
        sum += arr[i];  // Add the element to the sum
    }

    // Calculate the average
    double average = static_cast<double>(sum) / n;

    // Output: the average
    cout << "The average of all elements is: " << average << endl;

    return 0;
}
```



```
                                                        > cd "c:\Us
Enter the number of elements in the array: 3
Enter 3 elements of the array:
2 3 4
The average of all elements is: 3
```

Ques 19. Find maximum minimum value of 1d array

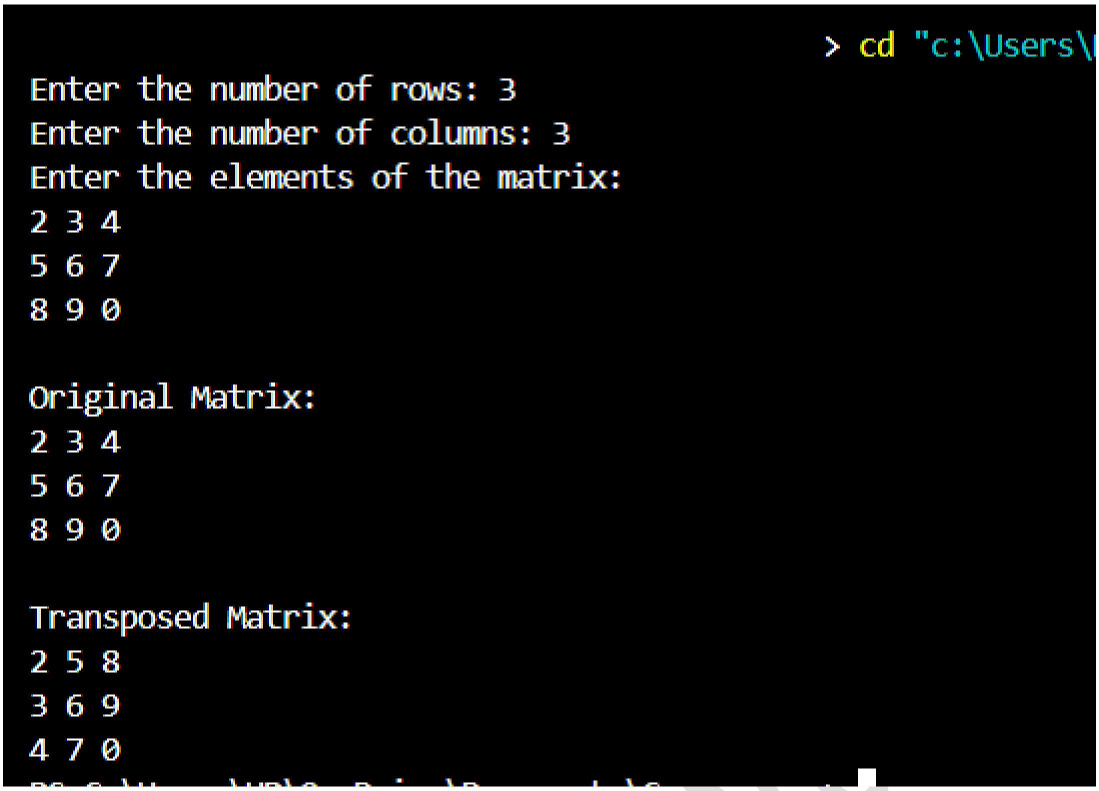
```
#include <iostream>
using namespace std;
int main() {
    int n;
 // Input: size of the array
    cout << "Enter the number of elements in the array: ";
    cin >> n;

    int arr[n];  // Declare the array with size 'n'
// Input: elements of the array
    cout << "Enter " << n << " elements of the array:\n";
    for (int i = 0; i < n; ++i) {
        cin >> arr[i];  // Input each element into the array
    }

   // Initialize max and min values with the first element of the array
    int maxVal = arr[0];
    int minVal = arr[0];

    // Traverse the array to find the max and min values
    for (int i = 1; i < n; ++i) {
        if (arr[i] > maxVal) {
            maxVal = arr[i];  // Update max value
        }
        if (arr[i] < minVal) {
            minVal = arr[i];  // Update min value
        }
    }

    // Output: maximum and minimum values
    cout << "Maximum value in the array: " << maxVal << endl;
    cout << "Minimum value in the array: " << minVal << endl;

    return 0;
}
```



```
                                                  > cd
Enter the number of elements in the array: 4
Enter 4 elements of the array:
22  33 44 55
Maximum value in the array: 55
Minimum value in the array: 22
```

Ques 20. Print transpose of 2D matrix

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

int main() {
    int rows, cols;

    // Input: dimensions of the matrix
    cout << "Enter the number of rows: ";
    cin >> rows;
    cout << "Enter the number of columns: ";
    cin >> cols;

    // Declare the matrix
    int matrix[rows][cols];

    // Input: elements of the matrix
    cout << "Enter the elements of the matrix:\n";
    for (int i = 0; i < rows; ++i) {
        for (int j = 0; j < cols; ++j) {
            cin >> matrix[i][j];
        }
    }

    // Create a matrix for the transpose
    int transpose[cols][rows];

    // Compute the transpose
    for (int i = 0; i < rows; ++i) {
        for (int j = 0; j < cols; ++j) {
            transpose[j][i] = matrix[i][j];
        }
    }

    // Output: the original matrix
    cout << "\nOriginal Matrix:\n";
    for (int i = 0; i < rows; ++i) {
        for (int j = 0; j < cols; ++j) {
            cout << matrix[i][j] << " ";
        }
        cout << endl;
    }

    // Output: the transposed matrix
    cout << "\nTransposed Matrix:\n";
    for (int i = 0; i < cols; ++i) {
        for (int j = 0; j < rows; ++j) {
            cout << transpose[i][j] << " ";
        }
        cout << endl;
    }

    return 0;
}
```



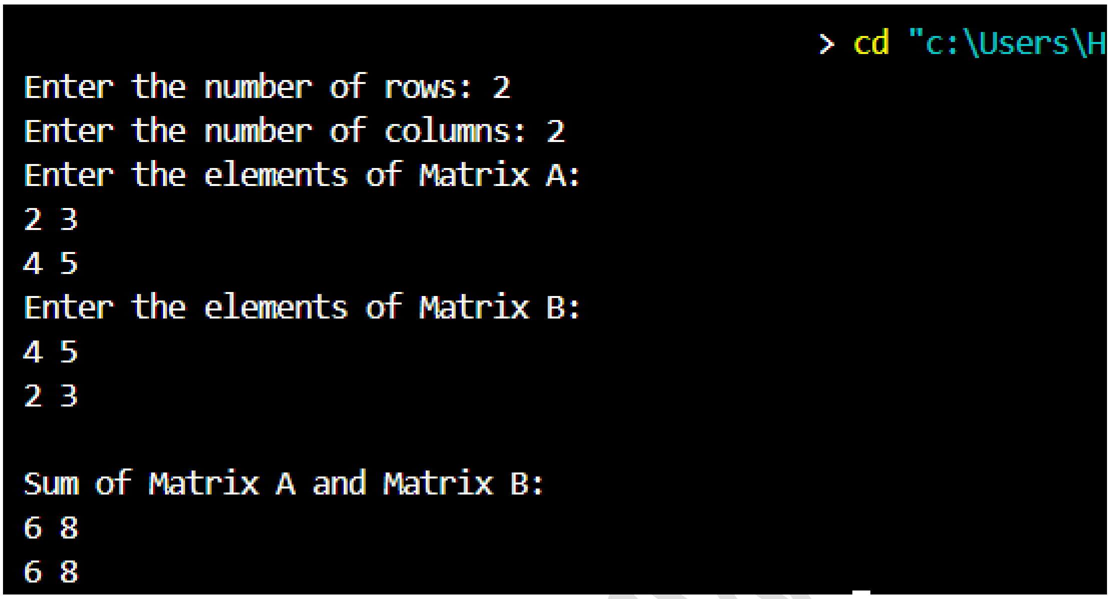
```
                                        > cd "c:\Users\
Enter the number of rows: 3
Enter the number of columns: 3
Enter the elements of the matrix:
2 3 4
5 6 7
8 9 0

Original Matrix:
2 3 4
5 6 7
8 9 0

Transposed Matrix:
2 5 8
3 6 9
4 7 0
```

Ques 21. Program to add 2D MATRIX

```
#include <iostream>

using namespace std;


int main() {

    int rows, cols;


    // Input: dimensions of the matrices

    cout << "Enter the number of rows: ";

    cin >> rows;

    cout << "Enter the number of columns: ";

    cin >> cols;


    // Declare two matrices (Matrix A and Matrix B) and a result matrix

    int matrixA[rows][cols], matrixB[rows][cols], result[rows][cols];
```

```
// Input: elements of Matrix A
cout << "Enter the elements of Matrix A:\n";
for (int i = 0; i < rows; ++i) {
    for (int j = 0; j < cols; ++j) {
        cin >> matrixA[i][j];
    }
}

// Input: elements of Matrix B
cout << "Enter the elements of Matrix B:\n";
for (int i = 0; i < rows; ++i) {
    for (int j = 0; j < cols; ++j) {
        cin >> matrixB[i][j];
    }
}

// Add Matrix A and Matrix B and store the result in the result matrix
for (int i = 0; i < rows; ++i) {
    for (int j = 0; j < cols; ++j) {
        result[i][j] = matrixA[i][j] + matrixB[i][j];
    }
}

// Output: the sum of Matrix A and Matrix B
cout << "\nSum of Matrix A and Matrix B:\n";
for (int i = 0; i < rows; ++i) {
    for (int j = 0; j < cols; ++j) {
        cout << result[i][j] << " ";
    }
    cout << endl;
}
```

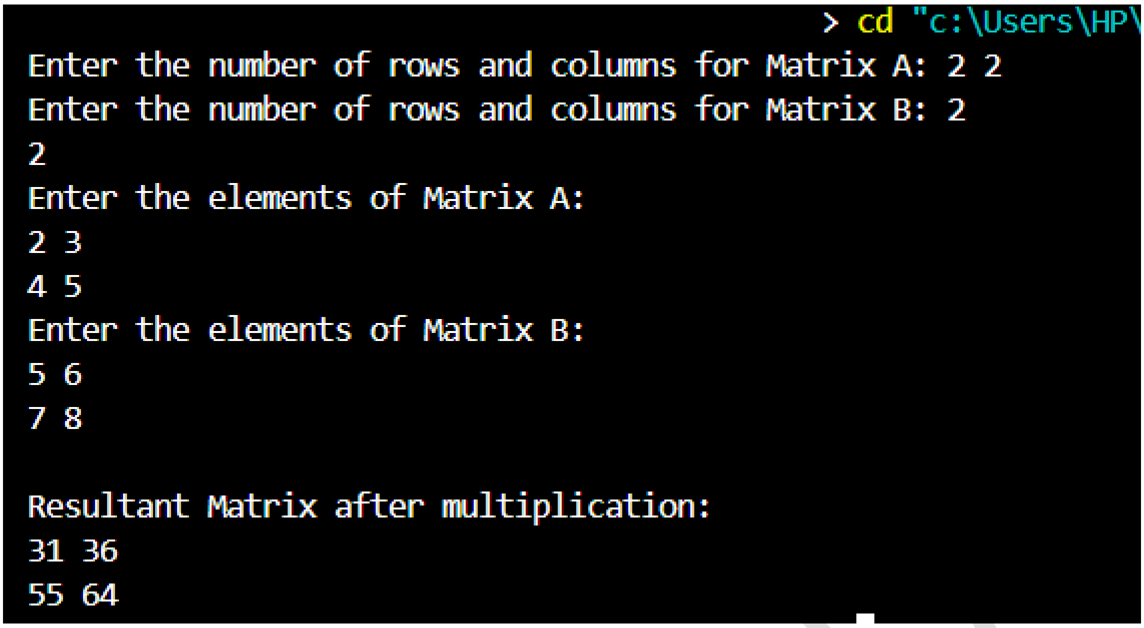
```
    return 0;
}
```



```
                                                        > cd "c:\Users\H
Enter the number of rows: 2
Enter the number of columns: 2
Enter the elements of Matrix A:
2 3
4 5
Enter the elements of Matrix B:
4 5
2 3

Sum of Matrix A and Matrix B:
6 8
6 8
```

Ques 22. Multiply 2D matrix

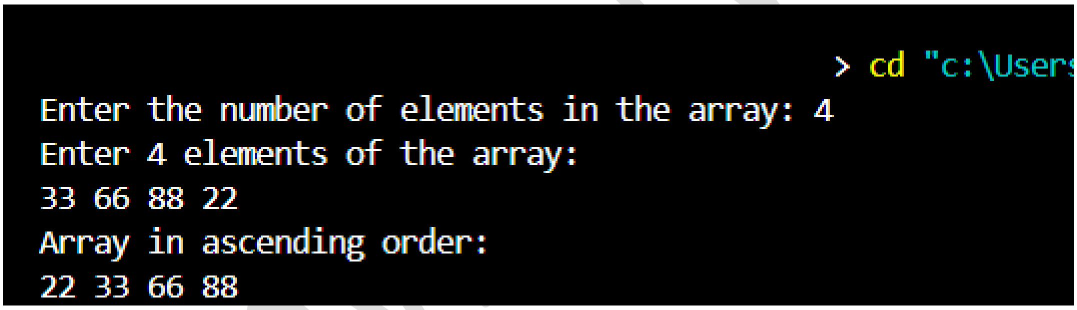
```
#include <iostream>
using namespace std;

int main() {
    int rowsA, colsA, rowsB, colsB;

    // Input: dimensions of the first matrix
    cout << "Enter the number of rows and columns for Matrix A: ";
    cin >> rowsA >> colsA;

    // Input: dimensions of the second matrix
    cout << "Enter the number of rows and columns for Matrix B: ";
    cin >> rowsB >> colsB;

    // Matrix multiplication is only possible if colsA == rowsB
    if (colsA != rowsB) {
        cout << "Matrix multiplication is not possible. The number of columns of Matrix A must be equal to the number of rows of Matrix B." << endl;
        return 0;
    }

    // Declare the matrices
    int matrixA[rowsA][colsA], matrixB[rowsB][colsB], result[rowsA][colsB];

    // Input: elements of Matrix A
    cout << "Enter the elements of Matrix A:\n";
    for (int i = 0; i < rowsA; ++i) {
        for (int j = 0; j < colsA; ++j) {
            cin >> matrixA[i][j];
        }
    }

    // Input: elements of Matrix B
    cout << "Enter the elements of Matrix B:\n";
    for (int i = 0; i < rowsB; ++i) {
        for (int j = 0; j < colsB; ++j) {
            cin >> matrixB[i][j];
        }
    }

    // Initialize the result matrix with zeros
    for (int i = 0; i < rowsA; ++i) {
        for (int j = 0; j < colsB; ++j) {
            result[i][j] = 0;
        }
    }

    // Matrix multiplication
    for (int i = 0; i < rowsA; ++i) {
        for (int j = 0; j < colsB; ++j) {
            for (int k = 0; k < colsA; ++k) {
                result[i][j] += matrixA[i][k] * matrixB[k][j];
            }
        }
    }

    // Output: the resulting matrix after multiplication
    cout << "\nResultant Matrix after multiplication:\n";
    for (int i = 0; i < rowsA; ++i) {
        for (int j = 0; j < colsB; ++j) {
            cout << result[i][j] << " ";
        }
        cout << endl;
    }

    return 0;
}
```



```
                                                   > cd "c:\Users\HP\
Enter the number of rows and columns for Matrix A: 2 2
Enter the number of rows and columns for Matrix B: 2
2
Enter the elements of Matrix A:
2 3
4 5
Enter the elements of Matrix B:
5 6
7 8

Resultant Matrix after multiplication:
31 36
55 64
```

Ques 23. Sort an array In ascending order

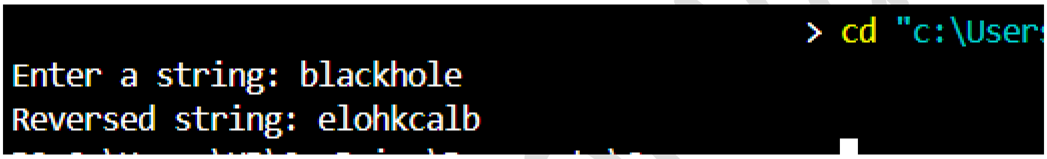
```
#include <iostream>
#include <algorithm>  // For the sort function
using namespace std;

int main() {
    int n;

    // Input: size of the array
    cout << "Enter the number of elements in the array: ";
    cin >> n;

    int arr[n];  // Declare array of size 'n'

    // Input: elements of the array
    cout << "Enter " << n << " elements of the array:\n";
    for (int i = 0; i < n; ++i) {
        cin >> arr[i];  // Input each element into the array
    }

    // Sorting the array in ascending order
    sort(arr, arr + n);  // This function from <algorithm> sorts the array

    // Output: sorted array
    cout << "Array in ascending order:\n";
    for (int i = 0; i < n; ++i) {
        cout << arr[i] << " ";
    }
    cout << endl;

    return 0;
}
```



```
                                   > cd "c:\Users
Enter the number of elements in the array: 4
Enter 4 elements of the array:
33 66 88 22
Array in ascending order:
22 33 66 88
```

Ques 24. WAP to reverse a given string

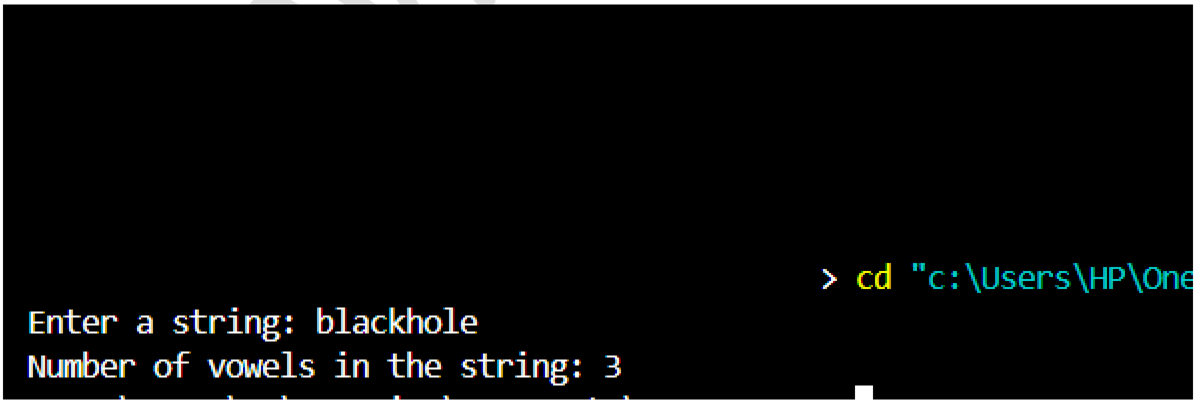
```
#include <iostream>
#include <string>  // For using the string class
#include <algorithm>  // For using the reverse function

using namespace std;

int main() {
    string str;
    // Input: Enter a string
    cout << "Enter a string: ";
    cin >> str;  // Read a string from the user

    // Reverse the string using the reverse function
    reverse(str.begin(), str.end());

    // Output: The reversed string
    cout << "Reversed string: " << str << endl;

    return 0;
}
```



```
                                                    > cd "c:\User
Enter a string: blackhole
Reversed string: elohkcalb
```

Ques 25. WAP to count all vowels in a given string

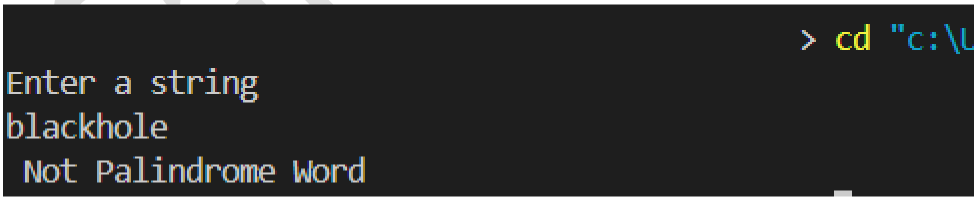
```
#include <iostream>
#include <string>
using namespace std;

int main() {
    string str;
    int vowelCount = 0;

    // Input: Enter a string
    cout << "Enter a string: ";
    getline(cin, str);  // Read the entire line including spaces

    // Loop through the string and count vowels
    for (char c : str) {
        // Check if the character is a vowel (both uppercase and lowercase)
        if (c == 'a' || c == 'e' || c == 'i' || c == 'o' || c == 'u' ||
            c == 'A' || c == 'E' || c == 'I' || c == 'O' || c == 'U') {
            vowelCount++;
        }
    }

    // Output: The number of vowels
    cout << "Number of vowels in the string: " << vowelCount << endl;

    return 0;
}
```



```
                                          > cd "c:\Users\HP\One
Enter a string: blackhole
Number of vowels in the string: 3
```

Q26. WAP to check if a given string is palindrome or not.

```
#include<iostream>
using namespace std;
int main()
string st:
cout<<"Enter a string \n";
cin>>st:
int flag=0;
int len=st.size();
for (int i=0;i<len/2;i++)
if(st[i]! = st[len-1-i])
{
flag=1;
}
if(flag==0)
cout<<"Palindrome Word":
else
cout<<" Not Palindrome Word":
return 0;
}
```

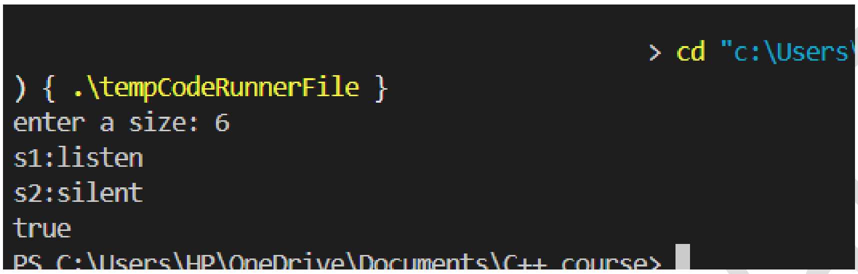


```
                                          > cd "c:\U
Enter a string
blackhole
 Not Palindrome Word
```

Q27. WAP to check if a given string is anagram or not.

```
#include<iostream>
```

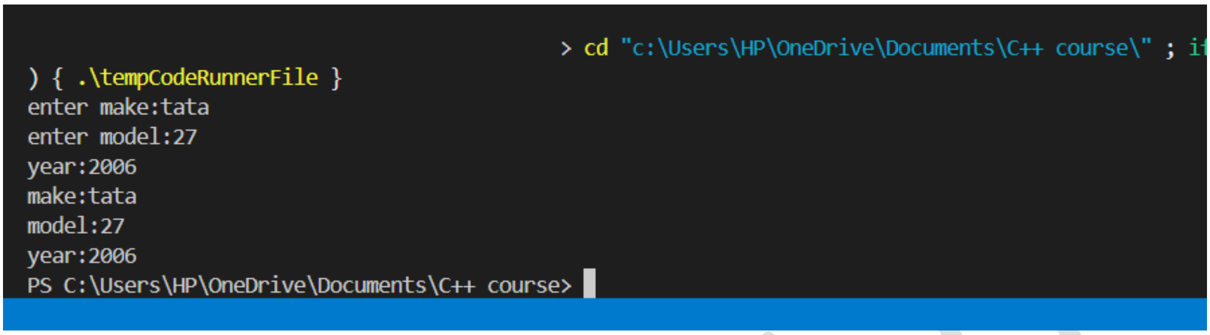
```
using namespace std;

int main(){
    int arr[26]={0};
    cout << "enter a size:";
    int size;
    cin >> size;
    cout << "s1:";
    char s1[size];
    for(int i=0;i<size;i++){
        cin >> s1[i];
    }
    char s2[size];
    cout << "s2:";
    for(int i=0;i<size;i++){
        cin >> s2[i];

    }
    for(int i=0;i<size;i++){
        int a = s1[i]-'a';
        arr[a]=arr[a]+1;
    }
    for(int i=0;i<size;i++){
        int a = s2[i]-'a';
        arr[a]=arr[a]-1;;
        // cout << a << endl;
    }
    int flag=0;
    for(int i=0;i<26;i++){
        if(arr[i]!=0){
            flag=1;
            break;
        }
    }

    (flag==0)? cout << "true" : cout << "false";
    return 0;
}
```



```
                                              > cd "c:\Users\
) { .\tempCodeRunnerFile }
enter a size: 6
s1:listen
s2:silent
true
PS C:\Users\HP\OneDrive\Documents\C++ course>
```

Q28. Define a class called Car with attributes such as make, model, and year. Include member functions to set and get these attributes. Create an object of the Car class and demonstrate the use of its member functions.

```
#include<iostream>

using namespace std;

class car{
    string make;
    string model;
    int year;
    public:
    void setData(){
        cout << "enter make:";
        cin >> make;
        cout << "enter model:";
        cin >> model;
        cout << "year:";
        cin >> year;
    }

    void getData(){
        cout << "make:" << make << endl;
        cout << "model:" << model << endl;
        cout << "year:" << year << endl;
    }
};

int main(){
    car c1;
    c1.setData();
    c1.getData();
    return 0;
}
```



```
                                        > cd "c:\Users\HP\OneDrive\Documents\C++ course\" ; if
) { .\tempCodeRunnerFile }
enter make:tata
enter model:27
year:2006
make:tata
model:27
year:2006
PS C:\Users\HP\OneDrive\Documents\C++ course>
```

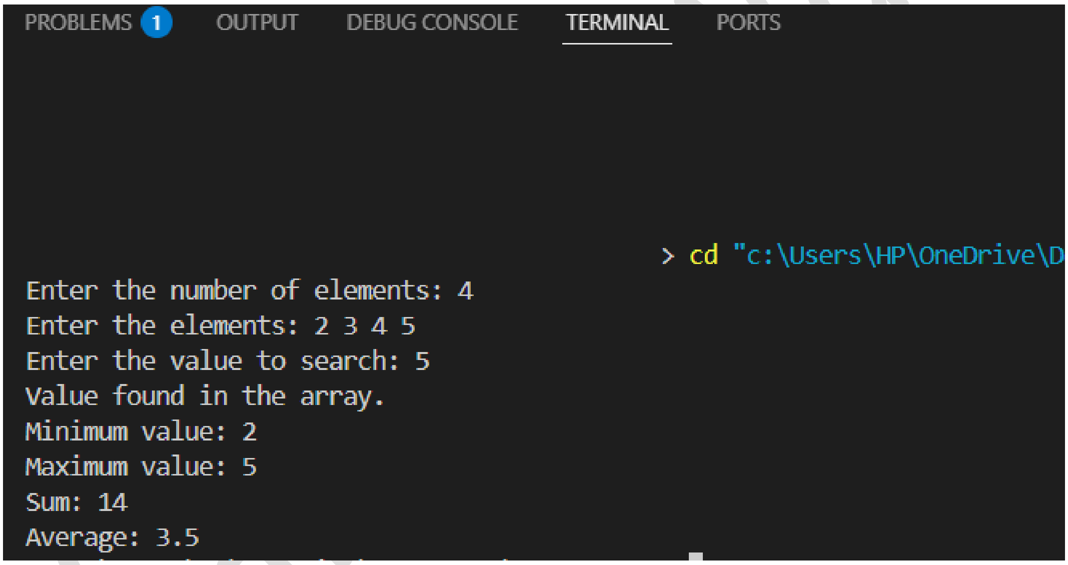
Q29. Define a class called Address with attributes such as street, city, and zipCode. Create a class called Person that has an Address object as a member variable. Demonstrate composition by creating a Person object and accessing its Address attributes.

```
#include <iostream>
#include <string>
using namespace std;
class Address {
public:
    string street;
    string city;
    string zipCode;
    Address(string s, string c, string z)
  {
        street = s;
        city = c;
        zipCode = z;
    }
};
class Person {
public:
    string name;
    Address address;

    Person(string n, string s, string c, string z) {

        name = n;

        address = Address(s, c, z); // Initialize Address object

    }


    // Function to display Person details

    void displayDetails() {

        cout << "Name: " << name << endl;

        cout << "Address: " << address.street << ", " << address.city << " " << address.zipCode << 
endl;

    }

};

int main() {

    Person person("John Doe", "123 Main St", "Anytown", "12345");

    person.displayDetails();

    return 0;
```

Q30. Write a program to display the minimum, maximum, sum, search and average of elements of an array.

```
#include <iostream>

using namespace std;

int main() {

    int n;

    cout << "Enter the number of elements: ";

    cin >> n;

    int arr[n];

    cout << "Enter the elements: ";

    for (int i = 0; i < n; i++) {

        cin >> arr[i];

    }

    // Find minimum
```

```
int minVal = arr[0];
for (int i = 1; i < n; i++) {
    if (arr[i] < minVal) {
        minVal = arr[i];
    }
}
// Find maximum
int maxVal = arr[0];
for (int i = 1; i < n; i++) {
    if (arr[i] > maxVal) {
        maxVal = arr[i];
    }
}
// Calculate sum
int sum = 0;
for (int i = 0; i < n; i++) {
    sum += arr[i];
}
// Search for an element
int searchVal;
cout << "Enter the value to search: ";
cin >> searchVal;
bool found = false;
for (int i = 0; i < n; i++) {
    if (arr[i] == searchVal) {
        found = true;
        break;
    }
}
if (found) {
    cout << "Value found in the array." << endl;
    } else {
        cout << "Value not found in the array." << endl;
    }
    // Calculate average
    double average = (double)sum / n;

    // Display results
    cout << "Minimum value: " << minVal << endl;
    cout << "Maximum value: " << maxVal << endl;
    cout << "Sum: " << sum << endl;
    cout << "Average: " << average << endl;
    return 0;
}
```



```
                                                > cd "c:\Users\HP\OneDrive\D
Enter the number of elements: 4
Enter the elements: 2 3 4 5
Enter the value to search: 5
Value found in the array.
Minimum value: 2
Maximum value: 5
Sum: 14
Average: 3.5
```

Q31. Define a class student with the following specification

Private members of class student

admno	integer
sname	20 character
eng. math, science	float
total	float

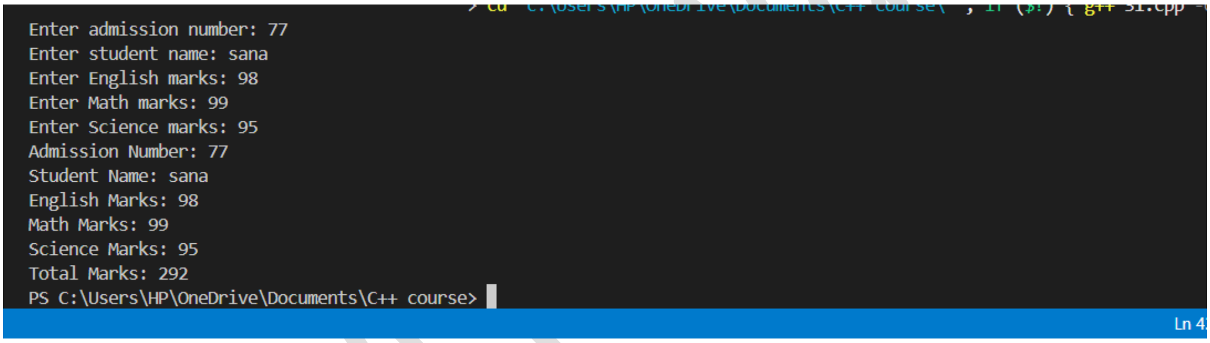
Public member function of class student

ctotal()   a function to calculate eng + math + science with float return type.

Takedata()   Function to accept values for admno, sname, eng, science Showdata() Function to display all the data members on the screen

```
#include <iostream>

using namespace std;

class Student {

private:

   int admno;

   char sname[20];

   float eng, math, science;

   float total;

public:

   // Function to calculate total

   float ctotal() {

      total = eng + math + science;

      return total;

   }


   void takeData() {

      cout << "Enter admission number: ";

      cin >> admno;

      cout << "Enter student name: ";

      cin >> sname;

      cout << "Enter English marks: ";

      cin >> eng;

      cout << "Enter Math marks: ";

      cin >> math;

      cout << "Enter Science marks: ";

      cin >> science;

   }

   void showData() {

      cout << "Admission Number: " << admno << endl;
```

```
        cout << "Student Name: " << sname << endl;
        cout << "English Marks: " << eng << endl;
        cout << "Math Marks: " << math << endl;
        cout << "Science Marks: " << science << endl;
        cout << "Total Marks: " << ctotal() << endl;
    }
};
int main() {
    Student student;
    student.takeData();
    student.showData();
    return 0;
}
```



```
Enter admission number: 77
Enter student name: sana
Enter English marks: 98
Enter Math marks: 99
Enter Science marks: 95
Admission Number: 77
Student Name: sana
English Marks: 98
Math Marks: 99
Science Marks: 95
Total Marks: 292
PS C:\Users\HP\OneDrive\Documents\C++ course>
```

Q32. Define a class in C++ with following description:

Private Members

A data member Flight number of type integer

A data member Destination of type string

A data member Distance of type float

A data member Fuel of type float

A member function CALFUEL() to calculate the value of Fuel as per the following criteria

Distance	Fuel
<=1000	500
more than 1000 and <=2000	1100

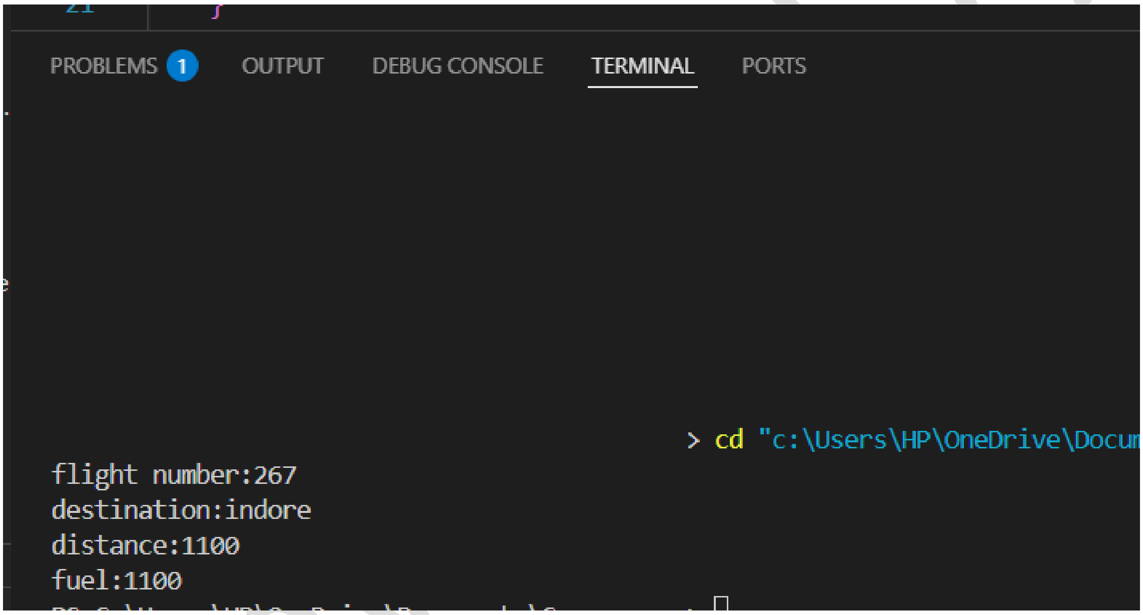
more than 2000	2200

Public Members

A function FEEDINFO() to allow user to enter values for Flight Number, Destination, Distance & call function CALFUEL() to calculate the quantity of Fuel.

A function SHOWINFO() to allow user to view the content of all the data members.

```
#include<iostream>


using namespace std;


class travel{
    int flightNumber;
    string destination;
    int distance;
    float fuel;
    void calFuel(){
        if(distance<=1000) fuel=500;
        else if(distance>1000 && distance<=2000) fuel=1100;
        else fuel=2200;
    }
    public :
    void feedInfo(int fn,string des,int dist){
        flightNumber=fn;
        destination=des;
        distance=dist;
        calFuel();
    }
    void showInfo(){
        cout << "flight number:" << flightNumber << endl;
        cout << "destination:" << destination << endl;
        cout << "distance:" << distance << endl;
        cout << "fuel:" << fuel << endl;
    }
};

int main(){
     travel t1;
    t1.feedInfo(267,"indore",1100);
    t1.showInfo();
    return 0;
}
}
```



```
                                                  > cd "c:\Users\HP\OneDrive\Docum
flight number:267
destination:indore
distance:1100
fuel:1100
```

Q33. Write a menu driven program to perform following:

a)Input a matrix

b)Display matrix

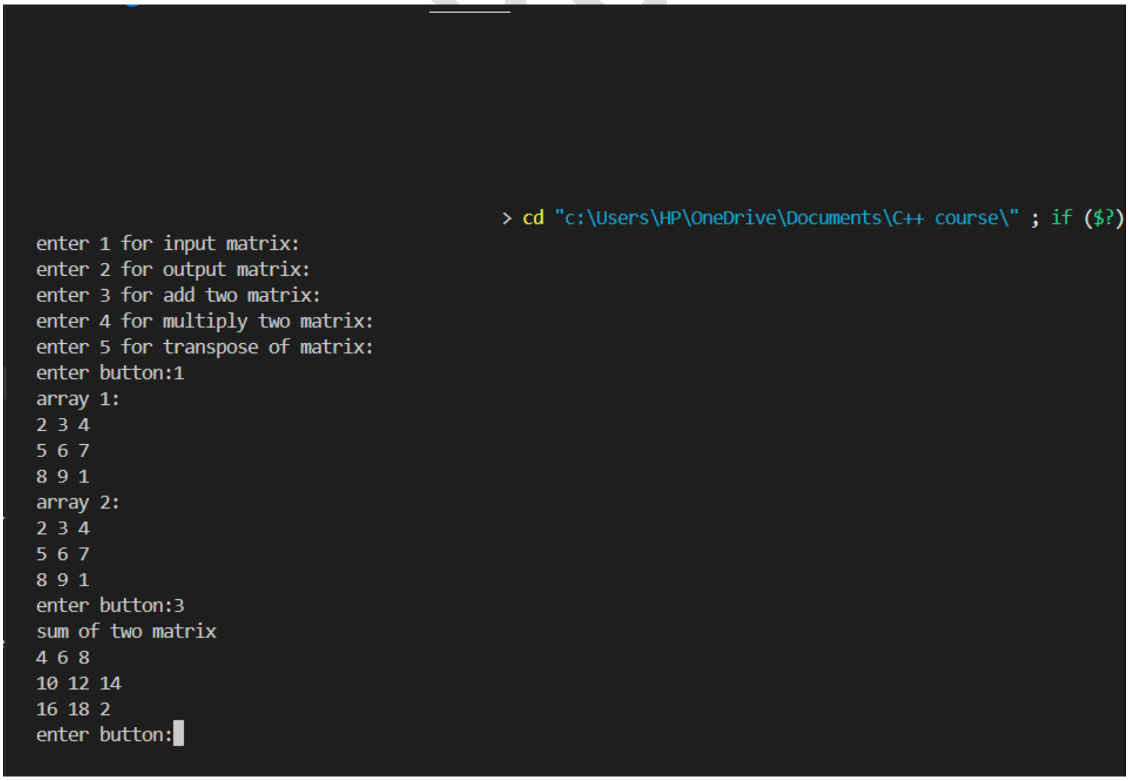
c)Add two matrix

d)Multiply two matrix

e)Transpose a matrix

```
#include<iostream>
using namespace std;
class matrix{
    int arr1[3][3];
    int arr2[3][3];
    public :
    void Switch(int button){
        switch (button){
            case 1 :
                inputdata();
                break;
            case 2 :
                displaydata();
                break;
            case 3 :
                add();
                break;
            case 4:
                multiply();
                break;
            case 5:
                transpose();
                break;
            default:
```

```
            printf("Default case is Matched.");
            break;
    }
}
void inputdata(){
    cout << "array 1:";
    for(int i=0;i<3;i++){
        for(int j=0;j<3;j++) {
            cin >> arr1[i][j];
        }
    }
    cout << "array 2:";
    for(int i=0;i<3;i++){
        for(int j=0;j<3;j++){
         cin >> arr2[i][j];
        }
    }
}
void displaydata(){
    cout << "array 1:";
    for(int i=0;i<3;i++){
        for(int j=0;j<3;j++) {
            cout << arr1[i][j] << " ";
        }
        cout << endl;
    }
    cout << "array 2:";
    for(int i=0;i<3;i++){
        for(int j=0;j<3;j++) {
            cout << arr2[i][j] << " ";
        }
        cout << endl;
    }
}

void add(){
    cout << "sum of two matrix";
    for(int i=0;i<3;i++){
        for(int j=0;j<3;j++){
            int r= arr1[i][j]+arr2[i][j];
            cout << r << " ";
        }
        cout << endl;
    }
}

void multiply(){
    printf("the resultant matrix\n");
    for(int i=0;i<3;i++){
        int d=0;
        for(int j=0;j<i;j++){
            d=arr2[i][j];
            arr2[i][j]=arr2[j][i];
            arr2[j][i]=d;

        }
    }
    int r=0;
    for(int i=0;i<3;i++){
        for(int j=0;j<3;j++){
            for(int k=0;k<3;k++){
                r=arr1[i][k]*arr2[j][k]+r;
                }
                cout << r << " ";
            }
            cout << endl;
        }
    }
    void transpose(){
        cout << "transpose of both matrix:";
        for(int i=0;i<3;i++){
            int d=0;
            for(int j=0;j<i;j++){
                d=arr1[i][j];
                arr1[i][j]=arr1[j][i];
                arr1[j][i]=d;
            }
        }
        for(int i=0;i<3;i++){
            int d=0;
            for(int j=0;j<i;j++){
                d=arr2[i][j];
                arr2[i][j]=arr2[j][i];
                arr2[j][i]=d;
            }
        }
        displaydata();
    }
};

int main(){
    matrix m1;
    cout << "enter 1 for input matrix:" << endl;
    cout << "enter 2 for output matrix:" << endl;
    cout << "enter 3 for add two matrix:" << endl;
    cout << "enter 4 for multiply two matrix:" << endl;
    cout << "enter 5 for transpose of matrix:" << endl;
    int button;
    cout << "enter button:";
    cin >> button;
    m1.Switch(button);
    cout << "enter button:";
    cin >> button;
    m1.Switch(button);
    cout << "enter button:";
    cin >> button;
    m1.Switch(button);
    return 0;
}
```



```
                                        > cd "c:\Users\HP\OneDrive\Documents\C++ course\" ; if ($?)
enter 1 for input matrix:
enter 2 for output matrix:
enter 3 for add two matrix:
enter 4 for multiply two matrix:
enter 5 for transpose of matrix:
enter button:1
array 1:
2 3 4
5 6 7
8 9 1
array 2:
2 3 4
5 6 7
8 9 1
enter button:3
sum of two matrix
4 6 8
10 12 14
16 18 2
enter button:
```