

Program 1




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

//recursive function declaration with 1 parameters
int rev(int x);
//variables declaration
//x = number defined by users
int x;




int main(){
    cout << "Input number to reverse: "; cin >> x; //value assigned to x
    cout << endl << "Reversed number are: " << rev(x); //recall the recursive function

    return 0;
}
//defining recursive function
int rev(int x){
    // % 10 used to inverse the number
    int reverse = x % 10;
    /*if only consist of 1 integer, output those integer itself*/
    if (x <= 9) //base case
        return x;
    //else, itterate and divide by 10 and automatically rounded to nearest int
    else{ //recurrent case
        cout << reverse;
        rev(x/10);
    }
}
```

```
1  #include <iostream>
2  using namespace std;
3
4  //recursive function declaration with 1 parameters
5  int rev(int x);
6  //variables declaration
7  //x = number defined by users
8  int x;
9
10 int main(){
11     cout << "Input number to reverse: "; cin >> x; //value assigned to x
12     cout << endl << "Reversed number are: " << rev(x); //recall the recursive function
13
14     return 0;
15 }
16 //defining recursive function
17 int rev(int x){
18     // % 10 used to inverse the number
19     int reverse = x % 10;
20     /*if only consist of 1 integer, output those integer itself*/
21     if (x <= 9) //base case
22         return x;
23     //else, itterate and divide by 10 and automatically rounded to nearest int
24     else{ //recurrent case
25         cout << reverse;
26         rev(x/10);
27     }
28 }
```



```
Input number to reverse: 12345  
Reversed number are: 54321
```



```
Input number to reverse: 2021  
Reversed number are: 1202
```

Program 2

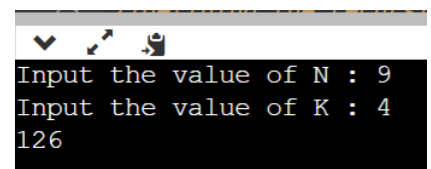
```
#include <iostream>
using namespace std;
//recursive function declaration with 2 parameters
int recursion(int a, int b);

//variables declaration
//a = N
//b = K
int a,b;
int main(){
    cout << "Input the value of N : "; cin >> a; //value assigned to a
    cout << "Input the value of K : "; cin >> b; //value assigned to b

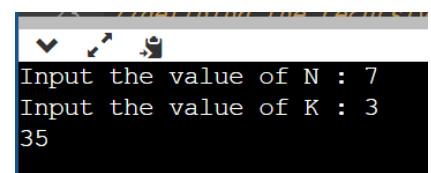
    if (a < b)
        cout << "The value of N has to be greater or equals to the K! ";
    else if (a >= 0 && b >= 0) //set to only receive positive numbers
        cout << recursion(a,b); //recall the recursive function
    else if (a < 0 || b < 0)
        cout << "Binomial Coefficient only exist in positive integers! ";

    return 0;
}
//defining the recursive function
int recursion(int a, int b){
    if(a == 0 || b == 0)
        return 1; //base case, if either a or b are = 0
    else if (a == b)
        return 1; //case, if a are == to b
    else if (a != b)
        return recursion(a-1,b-1) + recursion (a-1, b); //recurrent case
}
```

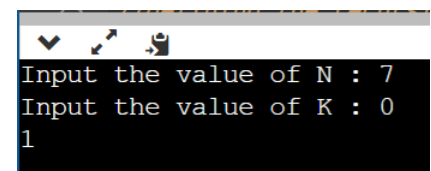
```
1  #include <iostream>
2  using namespace std;
3  //recursive function declaration with 2 parameters
4  int recursion(int a, int b);
5
6  //variables declaration
7  //a = N
8  //b = K
9  int a,b;
10 int main(){
11     cout << "Input the value of N : "; cin >> a; //value assigned to a
12     cout << "Input the value of K : "; cin >> b; //value assigned to b
13
14     if (a < b)
15         cout << "The value of N has to be greater or equals to the K! ";
16     else if (a >= 0 && b >= 0) //set to only receive positive numbers
17         cout << recursion(a,b); //recall the recursive function
18     else if (a < 0 || b < 0)
19         cout << "Binomial Coefficient only exist in positive integers! ";
20
21     return 0;
22 }
23 //defining the recursive function
24 int recursion(int a, int b){
25     if(a == 0 || b == 0)
26         return 1; //base case, if either a or b are = 0
27     else if (a == b)
28         return 1; //case, if a are == to b
29     else if (a != b)
30         return recursion(a-1,b-1) + recursion (a-1, b); //recurrent case
31 }
32
```



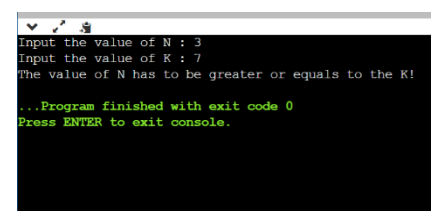
```
Input the value of N : 9
Input the value of K : 4
126
```



```
Input the value of N : 7
Input the value of K : 3
35
```



```
Input the value of N : 7
Input the value of K : 0
1
```



```
Input the value of N : 3
Input the value of K : 7
The value of N has to be greater or equals to the K!
...Program finished with exit code 0
Press ENTER to exit console.
```

Program 3

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

//recursive function declaration with 2 parameters
int ackerman(int m, int n);

int main(){
    //declaration of variables
    int n,m;
    cout << "Input the value of M and N seperated by spaces: ";
    cin >> m >> n; //assign the defined value to m and n

    if (n >= 0 && m >= 0) //set to only receive positive integers
        cout << ackerman(m,n);
    else if (n < 0 || m < 0)
        cout << "Only receive positive integers!";
}

//defining recursive function
int ackerman(int m, int n){
    if (m==0) //base case, if equals to 0
        return n+1;
    else if (m>0 && n==0) //recurrent case with conditions
        return ackerman(m-1,1);
    else if (m>0 && n>0) //recurrent case with conditions
        return ackerman(m-1,ackerman(m,n-1));
}
```

```
1  #include <iostream>
2  using namespace std;
3
4  //recursive function declaration with 2 parameters
5  int ackerman(int m, int n);
6
7  int main(){
8      //declaration of variables
9      int n,m;
10     cout << "Input the value of M and N seperated by spaces: ";
11     cin >> m >> n; //assign the defined value to m and n
12
13     if (n >= 0 && m >= 0) //set to only receive positive integers
14         cout << ackerman(m,n);
15     else if (n < 0 || m < 0)
16         cout << "Only receive positive integers!";
17 }
18 //defining recursive function
19 int ackerman(int m, int n){
20     if (m==0) //base case, if equals to 0
21         return n+1;
22     else if (m>0 && n==0) //recurrent case with conditions
23         return ackerman(m-1,1);
24     else if (m>0 && n>0) //recurrent case with conditions
25         return ackerman(m-1,ackerman(m,n-1));
26
27 }
```



```
Input the value of M and N seperated by spaces: 2 4  
11
```



```
Input the value of M and N seperated by spaces: 1 6  
8
```



```
Input the value of M and N seperated by spaces: 2 8  
19
```

Program 4

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

//recursive function declaration with 3 parameters
string revPalindrome(int a, int b, string x);
//variable declaration
string word; //contain words
int wordLength; //determine the length of a string
int firstAlphabet; //value of the first index
int main(){

    cout << "Enter a word to determine whether palindrome or not: ";
    getline(cin, word); //word defined by user assigned to word

    wordLength = word.length() - 1; //length - 1 will get the last index of a string
    firstAlphabet = 0; //starting index of string

    cout << revPalindrome(firstAlphabet, wordLength, word); //recall the recursive function
}

string revPalindrome(int a, int b, string x){

    if(x[a] == x[b]) //check if each index has the same value respectively
        return "Palindrome!";
    else if(x[a] != x[b])
        return "Not Palindrome!"; //if not, therefore its not palindrome

    revPalindrome(a++, b--, x);

}
```

```
1  #include <iostream>
2  using namespace std;
3
4  //recursive function declaration with 3 parameters
5  string revPalindrome(int a, int b, string x);
6  //variable declaration
7  string word; //contain words
8  int wordLength; //determine the length of a string
9  int firstAlphabet; //value of the first index
10 int main(){
11
12     cout << "Enter a word to determine whether palindrome or not: ";
13     getline(cin, word); //word defined by user assigned to word
14
15     wordLength = word.length() - 1; //length - 1 will get the last index of a string
16     firstAlphabet = 0; //starting index of string
17
18     cout << revPalindrome(firstAlphabet, wordLength, word); //recall the recursive function
19 }
20
21 string revPalindrome(int a, int b, string x){
22
23     if(x[a] == x[b]) //check if each index has the same value respectively
24         return "Palindrome!";
25     else if(x[a] != x[b])
26         return "Not Palindrome!"; //if not, therefore its not palindrome
27
28     revPalindrome(a++, b--, x);
29
30 }
```

