19) FIND THE KTH PERMUTATION OF THE FIRST N NATURAL NUMBERS

METHOD 1:
This is the naive approach for the solution. We find all the possible permutations for the natural numbers and store them in a vector.
We sort that vector and the 1d vector at the k-1 index is the answer to the problem.

METHOD 2:(VERY IMPORTANT METHOD)
LINK FOR EXPLANATION: ▶ Permutation Sequence | Leetcode #60

CODE FOR METHOD 1:

```cpp
#include<iostream>
#include<vector>
#include<algorithm>
using namespace std;

void fun(int value,int n,int & count,int k,vector<int> & answer,vector<vector<int>> & ans){
    if(value>n){
        ans.push_back(answer);
        return;
    }
    else{
        for(int i=0;i<n;i++){
            if(answer[i]==0){
                answer[i]=value;
                fun(value+1,n,count,k,answer,ans);
                answer[i]=0;
            }
        }
    }
}

int main(){
    int n,k;
    cout<<"\n Enter the value of n:";
    cin>>n;
    cout<<"\n Enter the value of k:";
    cin>>k;
    vector<vector<int>> ans;
    vector<int>answer(n);
    bool status=false;
    int count=0;
    fun(1,n,count,k,answer,ans);
    sort(ans.begin(),ans.end());
    cout<<"\n The kth permutation:";
    for(int i=0;i<n;i++){
        cout<<ans[k-1][i];
    }
}
```

```cpp
    return 0;
}
```

```cpp
#include<iostream>
#include<vector>
#include<algorithm>
using namespace std;

int fact(int n){
    if(n==0){
        return 1;
    }
    else{
        return n*fact(n-1);
    }
}

void fun(vector<int> &answer,int n,int k,vector<int> &values){
    if(n==1){
        answer.push_back(values.back());
        return;
    }
    int f=fact(n-1);

    int index=k/f;
    if(k%f==0){
        index=index-1;
    }
    answer.push_back(values[index]);
    values.erase(values.begin()+index);
    k=k-f*index;
    fun(answer,n-1,k,values);
}

int main(){
    int n,k;
    cout<<"\n Enter the value of n:";
    cin>>n;
    cout<<"\n Enter the value of k:";
    cin>>k;
    vector<int> values(n);
    for(int i=0;i<n;i++){
        values[i]=i+1;
    }
    vector<int> answer;
    fun(answer,n,k,values);
```

```cpp
    cout<<"\n The Kth permutation:";
    for(int i=0;i<n;i++){
        cout<<answer[i];
    }
    return 0;
}
```