46. Permutations

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Total Accepted: **142717** Total Submissions: **350690** Difficulty: **Medium** Contributors: **Admin**

Given a collection of **distinct** numbers, return all possible permutations.

For example,

`[1,2,3]` have the following permutations:

```
[
  [1,2,3],
  [1,3,2],
  [2,1,3],
  [2,3,1],
  [3,1,2],
  [3,2,1]
]
```

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C++

```cpp
class Solution {
    // lexicographic algorithms could handle same elements
public:
    vector<vector<int>> permute(vector<int>& nums) {
        sort(nums.begin(),nums.end());
        vector<vector<int>> res;
        res.push_back(nums);
        int n = nums.size();
        if(n==1) return res;
        int j,l,k;
        while(true){
            //step 1a: set j to 2nd last
            j = n-2;
            //step 1b: search for first j satisify n_j < n_j+1
            while(j>=0&&nums[j]>=nums[j+1]) j--;
            //step 1c: if j<0 terminate algorithm;
            if(j<0) break;
            //step 2a: set l to last one
            l = n-1;
            //step 2b: find first l which n_l > n_j
            while(nums[j]>=nums[l]) l--;
            //step 3: swap n_j and n_l;
            swap(nums[j],nums[l]);
            //step 4: start from j+1 reverse subarray j+1 to n-1;
            for(k=j+1,l=n-1;k<l;k++,l--){
                swap(nums[k],nums[l]);
            }
            res.push_back(nums);
        }
        return res;
    }
};
```

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