1) Given an array arr[] of integers. Find a peak element i.e. an element that is not smaller than its neighbors.

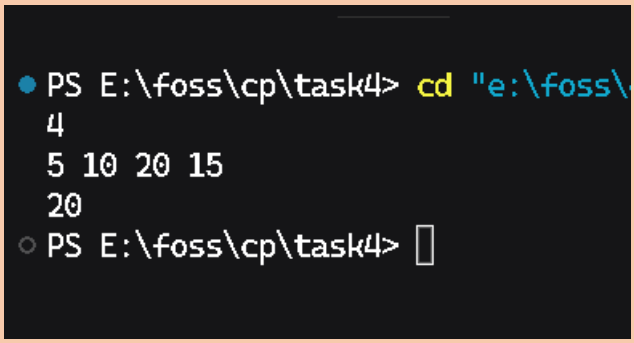
Sample Input: arr[] = { 5, 10,20,15}
Sample Output: 20
Explanation: The element 20 has neighbours 10 and 15, both of them are less than 20.
Note: For corner elements, we need to consider only one neighbour. If all elements of the input array are the same, every element is a peak element.

Code:

```
//21161 Shaik Nazeer CSE-B

#include<bits/stdc++.h>

#define ll long long

#define loop(i,n) for(int i = 0; i < n; i++)

#define loop1(i,n) for(int i = 1; i <= n; i++)

using namespace std;

int main()

{

   int n,i=0;

   cin>>n;

   int a[n];

   loop(i,n){

      cin>>a[i];

   }

   int ans=a[0];

   if(n==1) {

      cout<<a[0]<<endl;

   }
```

```
    else if(a[0]>a[1]){
        cout<<a[1]<<endl;
    }
    else if(a[n-1]>a[n-2]){
        cout<<a[n-1]<<endl;
    }
    else{
        for(i = 1; i < n-1; i++){
            if(a[i]>a[i-1]  && a[i]>a[i+1]){
                cout<<a[i]<<endl;
                return 0;
            }
        }
    }
    return 0;
}
```

Screenshot:



2) Given an array A[] consisting of only 0s, 1s, and 2s. The task is to write a function that sorts the given array. The functions should put all 0s first, then all 1s and all 2s in last.

Sample Input: A[] = {0, 1, 1, 0, 1, 2, 1, 2, 0, 0, 0, 1}.

Sample Output: {0, 0, 0, 0, 0, 1, 1, 1, 1, 1, 2, 2}.

Constraints: The expected time complexity is O(N). You can't use any inbuilt sorting functions.

Code:

```
//21161 Shaik Nazeer CSE-B
#include<bits/stdc++.h>
#define ll long long
#define loop(i,n) for(int i = 0; i < n; i++)
#define loop1(i,n) for(int i = 1; i <= n; i++)
using namespace std;
int main()
{
   int n;
   cin>>n;
   int a[n];
   loop(i,n) cin>>a[i];
   int i = 0, j = n-1,k = 0;
   while(j>0 && a[j]==2) j--;
   while(i<n && a[i]==0) i++;
   while(i<j && k< n) {
      if(a[k]==0 && i<k){
         swap(a[i],a[k]);
         i++;
      }else if(a[k]==2 && k<j){
         swap(a[j],a[k]);
         j--;
      }else k++;
   }
   loop(i,n) cout<<a[i]<<" ";
   return 0;
}
```

Screenshot:

```
PS E:\foss\cp\task4> cd "e:\foss\cp\task4\" ; if ($?) { g++ p2.cpp
12
0 1 1 0 1 2 1 2 0 0 0 1
0 0 0 0 0 1 1 1 1 1 2 2
PS E:\foss\cp\task4>
```

3) Find the majority element in the array. A majority element in an array A[] of size n is an element that appears more than n/2 times.

Input : A[]={3, 3, 4, 2, 4, 4, 2, 4,4}

Output : 4

Explanation: The frequency of 4 is 5 which is greater than the half of the size of the array.

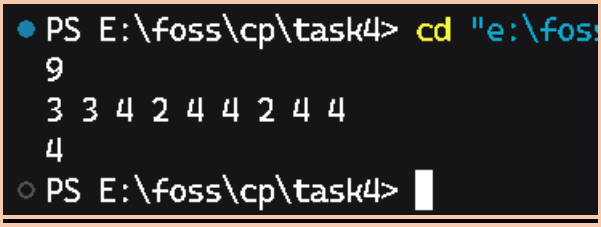
Constraints: The expected time complexity is O(N).

Code:

```
//21161 Shaik Nazeer CSE-B
#include<bits/stdc++.h>
#define ll long long
#define loop(i,n) for(int i = 0; i < n; i++)
#define loop1(i,n) for(int i = 1; i <= n; i++)
using namespace std;
int main()
{
    int n,cnt=1;
    cin>>n;
    int a[n];
    loop(i,n) cin>>a[i];
    sort(a,a+n);
    loop(i,n-1) {
        if(a[i]==a[i+1]){
            cnt++;
        }else {
            if(cnt>n/2){
                cout<<a[i-1]<<endl;
                return 0;
```

```
            }
            cnt=1;
        }
    }
    cout<<a[n-1]<<endl;
    return 0;
}
```

Screenshot:



4) Given an array arr[] of size N, the task is to sort this array in descending order.

Input: arr[] = {0, 23, 14, 12, 9}

Output: {23, 14, 12, 9, 0}

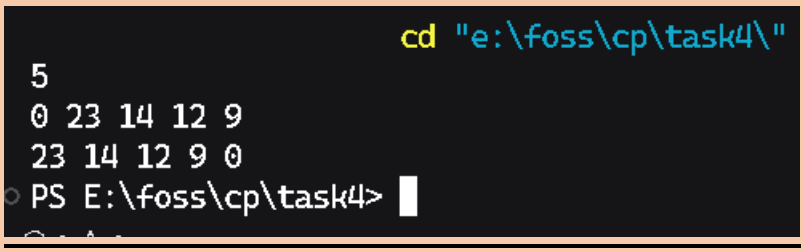
Constraints: Don't use any inbuilt functions.

Code:

```
//21161 Shaik Nazeer CSE-B
#include<bits/stdc++.h>
#define ll long long
#define loop(i,n) for(int i = 0; i < n; i++)
#define loop1(i,n) for(int i = 1; i <= n; i++)
using namespace std;
int main()
{
    int n,i=0,j=0;
    cin>>n;
    int a[n];
    loop(i,n) {
        cin>>a[i];
    }
    for(; i < n; i++) {
        for(j = i+1; j < n; j++){
            if(a[i]<a[j]){
```

```
            a[i] = a[i] + a[j];
            a[j] = a[i] - a[j];
            a[i] = a[i] - a[j];
        }
    }
  }
  loop(i,n) {
    cout<<a[i]<<"  ";
  }
  return 0;
}
```

Screenshot:



5) Find the factorial of a large number. A factorial of a number like 100 has 158 digits. It is not possible to store these many digits even if we use long int. So try using array to solve the problem.

Input: 100

Output:

93326215443944152681699238856266700490715968264381621468592963895217599993229915608941463976156518286253697920827223758251185210916864000000000000000000000000.

Code:

```
//21161 Shaik Nazeer CSE-B
#include<bits/stdc++.h>
#define ll long long
#define loop(i,n) for(int i = 0; i < n; i++)
#define loop1(i,n) for(int i = 1; i <= n; i++)
using namespace std;
void fact(int i,vector<int> &ans){
```

```
    int j = 0,carry=0,temp=0,len  = ans.size();
    for(; j < len; j++){
        temp  = ans[j]*i + carry;
        ans[j] = temp%10;
        carry= temp/10;
    }
    while(carry){
        ans.push_back(carry%10);
        carry = temp%10;
    }
}
int main()
{
    int n,i;
    cin>>n;
    vector<int>  ans;
    ans.push_back(1);
    for(i = 2; i <=n; i++) {
        fact(i,ans);
    }
    reverse(ans.begin(),ans.end());
    int len = ans.size();
    for(i = 0; i < len; i++){
        cout<<ans[i];
    }
    return 0;
}
```

Screenshot: