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Problem 1

```cpp
major.cpp > findMajorityElement(const vector<int>&)
1    #include <iostream>
2    #include <vector>
3
4    using namespace std;
5
6    int findMajorityElement(const vector<int>& nums) {
7        int count = 0;
8        int candidate = 0;
9
10       for (int num : nums) {
11           if (count == 0) {
12               candidate = num;
13           }
14           count += (num == candidate) ? 1 : -1;
15       }
16
17       count = 0;
18       for (int num : nums) {
19           if (num == candidate) {
20               count++;
21           }
22       }
23
24       return candidate;
25   }
26
27   int main() {
28       int n;
29       cout << "Enter the number of elements in the array: ";
30       cin >> n;
31
32       vector<int> nums(n);
33       cout << "Enter the elements of the array: ";
34       for (int i = 0; i < n; ++i) {
35           cin >> nums[i];
36       }
```

Problem 2

```cpp
major.cpp    shape.cpp ×    container.cpp    happymods.cpp    minimumjobs.cpp
shape.cpp > generatePascalsTriangle(int)
1    #include <iostream>
2    #include <vector>
3
4    using namespace std;
5
6    vector<vector<int>> generatePascalsTriangle(int numRows) {
7        vector<vector<int>> triangle;
8
9        for (int i = 0; i < numRows; ++i) {
10           vector<int> row(i + 1, 1);
11
12           for (int j = 1; j < i; ++j) {
13               row[j] = triangle[i - 1][j - 1] + triangle[i - 1][j];
14           }
15
16           triangle.push_back(row);
17       }
18
19       return triangle;
20   }
21
22   int main() {
23       int numRows;
24       cout << "Enter the number of rows for Pascal's Triangle: ";
25       cin >> numRows;
26
27       vector<vector<int>> pascalsTriangle = generatePascalsTriangle(numRows);
28
29       cout << "Pascal's Triangle with " << numRows << " rows:" << endl;
30       for (const auto& row : pascalsTriangle) {
31           for (int num : row) {
32               cout << num << " ";
33           }
34           cout << endl;
35       }
36
37       return 0;
```

Problem 3

```cpp
container.cpp > maxArea(const vector<int>&)
1    #include <bits/stdc++.h>
2
3    using namespace std;
4
5    int maxArea(const vector<int>& height) {
6        int maxWater = 0;
7        int left = 0, right = height.size() - 1;
8
9        while (left < right) {
10           int width = right - left;
11           int currentHeight = min(height[left], height[right]);
12           maxWater = max(maxWater, width * currentHeight);
13
14           if (height[left] < height[right]) {
15               ++left;
16           } else {
17               --right;
18           }
19       }
20
21       return maxWater;
22   }
23
24   int main() {
25       int n;
26       cout << "Enter the number of lines: ";
27       cin >> n;
28
29       vector<int> height(n);
30       cout << "Enter the heights of the lines: ";
31       for (int i = 0; i < n; ++i) {
32           cin >> height[i];
33       }
34
35       int result = maxArea(height);
36       cout << "The maximum amount of water a container can store is: " << result << endl;
37
38       return 0;
39   }
```

Problem 4

```cpp
#include <bits/stdc++.h>

using namespace std;

int maxHappyGroups(int batchSize, vector<int>& groups) {
    vector<int> remainderCount(batchSize, 0);
    int happyGroups = 0;

    for (int group : groups) {
        int remainder = group % batchSize;
        if (remainder == 0) {
            happyGroups++;
        } else if (remainderCount[batchSize - remainder] > 0) {
            happyGroups++;
            remainderCount[batchSize - remainder]--;
        } else {
            remainderCount[remainder]++;
        }
    }

    int remainingGroups = 0;
    for (int i = 1; i < batchSize; ++i) {
        remainingGroups += remainderCount[i];
    }

    happyGroups += remainingGroups / batchSize;

    return happyGroups;
}

int main() {
    int batchSize, n;
    cout << "Enter the batch size: ";
    cin >> batchSize;

    cout << "Enter the number of groups: ";
    cin >> n;

    vector<int> groups(n);
    cout << "Enter the size of each group: ";
    for (int i = 0; i < n; ++i) {
        cin >> groups[i];
    }

    int result = maxHappyGroups(batchSize, groups);
    cout << "The maximum number of happy groups is: " << result << endl;

    return 0;
}
```

PROBLEMS   OUTPUT   DEBUG CONSOLE   TERMINAL   PORTS

PS C:\Users\ISHAM\OneDrive\Documents\coding> cd "c:\Users\ISHAM\OneDrive\Documents\coding\" ;
Enter the batch size: 4
Enter the number of groups: 4
Enter the size of each group: 3 3 2 4
The maximum number of happy groups is: 1
PS C:\Users\ISHAM\OneDrive\Documents\coding>

Problem 5

```cpp
#include <bits/stdc++.h>

using namespace std;

bool isFeasible(vector<int>& jobs, vector<int>& workers, int idx, int maxTime) {
    if (idx == jobs.size()) return true;

    for (int i = 0; i < workers.size(); ++i) {
        if (workers[i] + jobs[idx] <= maxTime) {
            workers[i] += jobs[idx];
            if (isFeasible(jobs, workers, idx + 1, maxTime)) return true;
            workers[i] -= jobs[idx];
        }

        if (workers[i] == 0) break;
    }

    return false;
}

int findMinimumTime(vector<int>& jobs, int k) {
    sort(jobs.rbegin(), jobs.rend());

    int left = jobs[0], right = accumulate(jobs.begin(), jobs.end(), 0), result = right;

    while (left <= right) {
        int mid = left + (right - left) / 2;
        vector<int> workers(k, 0);

        if (isFeasible(jobs, workers, 0, mid)) {
            result = mid;
            right = mid - 1;
        } else {
            left = mid + 1;
        }
    }

    return result;
}

int main() {
    int n, k;
    cout << "Enter the number of jobs: ";
    cin >> n;

    vector<int> jobs(n);
    cout << "Enter the time required for each job: ";
    for (int i = 0; i < n; ++i) {
        cin >> jobs[i];
    }

    cout << "Enter the number of workers: ";
    cin >> k;

    int result = findMinimumTime(jobs, k);
    cout << "The minimum possible maximum working time is: " << result << endl;

    return 0;
}
```

PROBLEMS   OUTPUT   DEBUG CONSOLE   TERMINAL   PORTS

PS C:\Users\ISHAM\OneDrive\Documents\coding> cd "c:\Users\ISHAM\OneDrive\Documents\coding\" ;
 }
Enter the number of jobs: 4
Enter the time required for each job: 8
3
5
6
Enter the number of workers: 4
The minimum possible maximum working time is: 8
PS C:\Users\ISHAM\OneDrive\Documents\coding>