第一章

题目

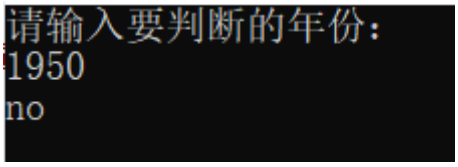
年份

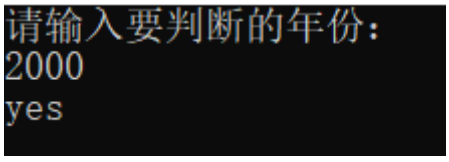
输入年份，判断是否为闰年。如果是，则输出yes，否则输出no

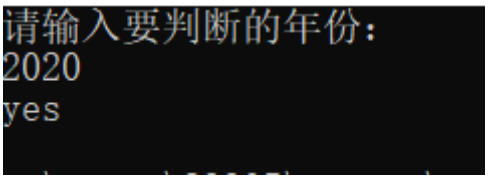
代码

```cpp
#include <iostream>

using namespace std;

int main(){
    int year;

    cout<<"请输入要判断的年份："<<endl;
    cin>>year;

    if((year%4==0&&year%100!=0)||(year%400==0)){
        cout<<"yes"<<endl;
    }else{
        cout<<"no"<<endl;
    }

    return  0;
}

```

运行结果







第二章

题目

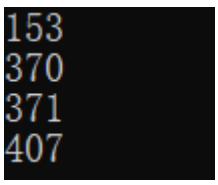
水仙花数

输出100~999中的所有水仙花数。若三位数ABC满足ABC=A^3+B^3+C^3，则称其为水仙花数，例如153=1^3+5^3+3^3，所以153就是水仙花数。

代码

```cpp
#include <iostream>
#include <cmath>

using namespace std;

int main() {
    int a, b, c;

    for (int i = 100; i < 1000; i++) {
        c = i % 10;
        b = (i / 10) % 10;
        a = (i / 100) % 10;

        int tmp = (int)pow(a, 3) + pow(b, 3) + pow(c, 3);

        if (tmp == i) {
            cout << i << endl;
        }
        else {
            continue;
        }
    }

    return 0;
}

```

运行结果



第三章

题目

分子量

给出一个物质的分子式（不带括号），求分子量。本题中的分子式只包含4中原子，分别为C,H,O,N,原子量为12.01,1.008,16.00，14.01（单位：g/mol）。例如，C6H5OH的分子量为94.108g/mol。

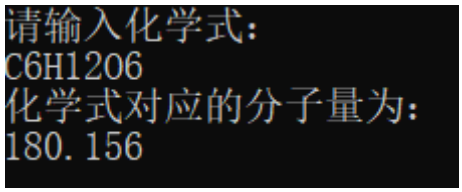
代码

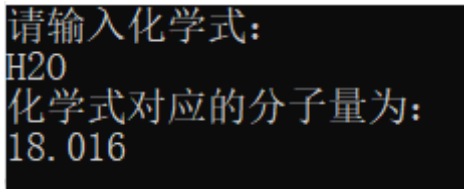
```cpp
#include <iostream>
```

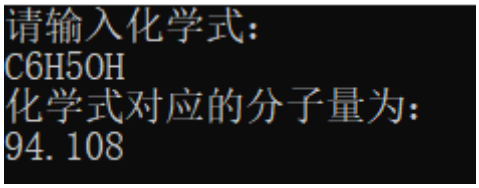
```cpp
#include <string>

using namespace std;

int main()
{
    double arr[] = {12.01, 1.008, 16.00, 14.01};
    string s;

    cout << "请输入化学式：" << endl;
    cin >> s;

    int len = s.size();
    double total = 0.0;
    int i = 0;

        while(s[i]!='\0'){
        int sum = 0;
        char c = s[i];
        i++;

        while (s[i] >= '0' && s[i] <= '9') {
            sum = sum * 10 + s[i] - '0';
            i++;
        }

        if (sum != 0) {
            if (c == 'C') {
                total += sum * arr[0];
            }
            else if (c == 'H') {
                total += sum * arr[1];
            }
            else if (c == 'O') {
                total += sum * arr[2];
            }
            else if (c == 'N') {
                total += sum * arr[3];
            }
        }
        else{
            if (c == 'C') {
                total += arr[0];
            }
            else if (c == 'H') {
                total += arr[1];
            }
            else if (c == 'O') {
                total += arr[2];
            }
            else if (c == 'N') {
                total += arr[3];
            }
        }
    }
```

```
57
58      cout << "化学式对应的分子量为：" << endl;
59      cout << total << endl;
60
61      return 0;
62  }
63
```

运行结果







第四章

题目

洪水

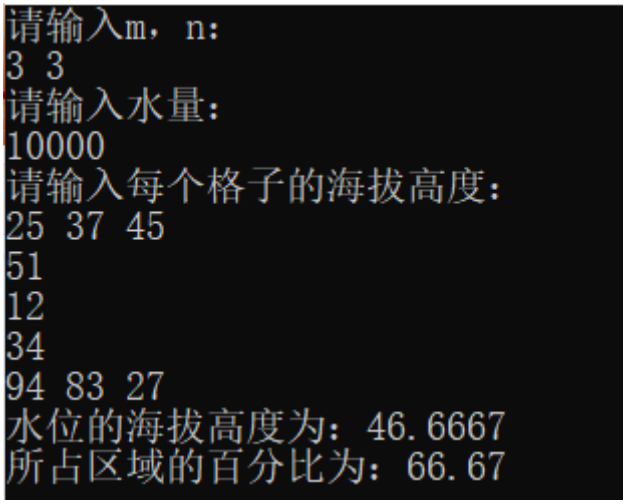
有一个n*m(1<=m,n<30)的网格，每个格子是变长10米的正方形，网格四周是无限大的墙壁。输入每个格子的海拔高度，以及网格内雨水的总体积，输出水位的海拔高度以及有多少百分比的区域有水（即高度严格小于水平面）。

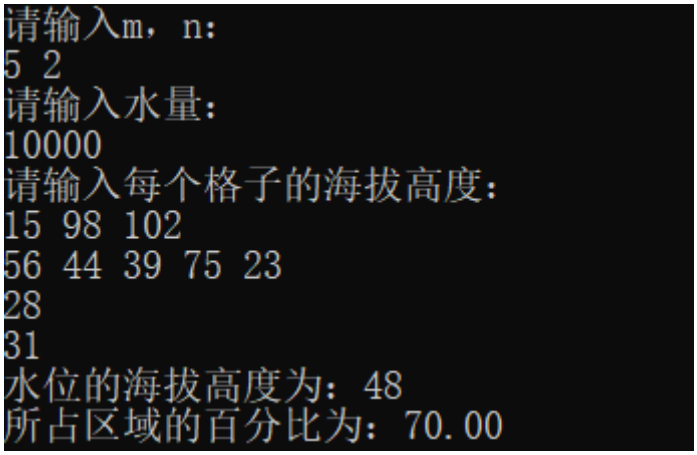
代码

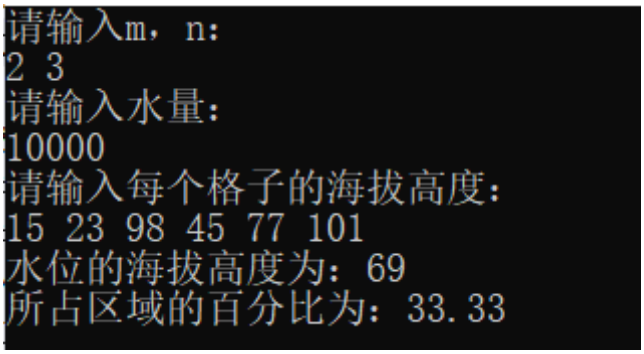
```
1   #include <iostream>
2   #include <vector>
3   #include <iomanip>
4   #include <algorithm>
5
6   using namespace std;
7
8   int main() {
9       int m, n;
10      int sum[1000] = { 0 };
11      double water, rate, high;
12      double avg[1000] = { 0.0 };
13      vector<int> height;
14      height.push_back(0);
15
```

```
    cout << "请输入m，n：" << endl;
    cin >> m >> n;
    cout << "请输入水量：" << endl;
    cin >> water;
    cout << "请输入每个格子的海拔高度：" << endl;
    for (int i = 0; i < m * n; i++) {
        int h;
        cin >> h;
        height.push_back(h);
    }

    sort(height.begin(), height.end());

    sum[0] = 0;
    int i = 1;
    for (i = 1; i <= m * n; i++) {
        sum[i] = sum[i - 1] + height[i];
        avg[i] = (double)sum[i] / i;

        if (((double)height[i+1] - avg[i]) * n * 100 > water) {
            break;
        }
    }

    rate = ((double)(i - 1)) / ((double)(m * n));
    high = (double)(water / 100 / (i - 1)) + avg[i - 1];

    cout << "水位的海拔高度为：" << high << endl;
    cout << "所占区域的百分比为：" << setiosflags(ios::fixed) <<
setprecision(2) << rate * 100 << endl;

    return 0;
}

```

运行结果







第五章

题目

对称轴

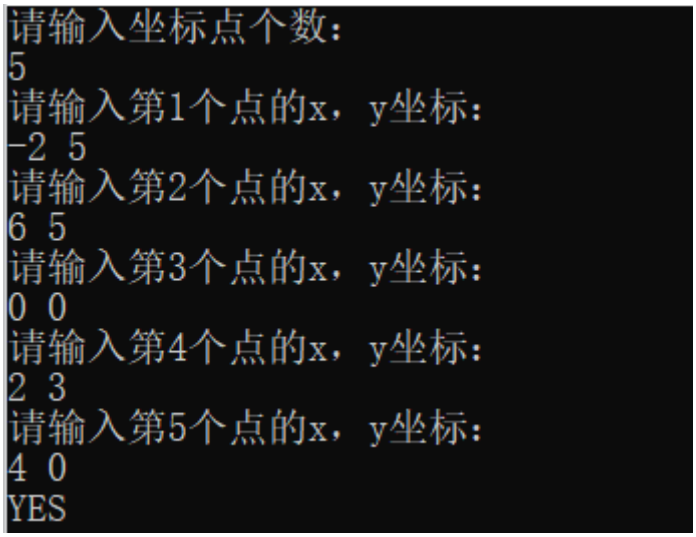
给出平面上N（N<=1000）个点，问是否可以找到一条竖线，使得所有点左右对称。

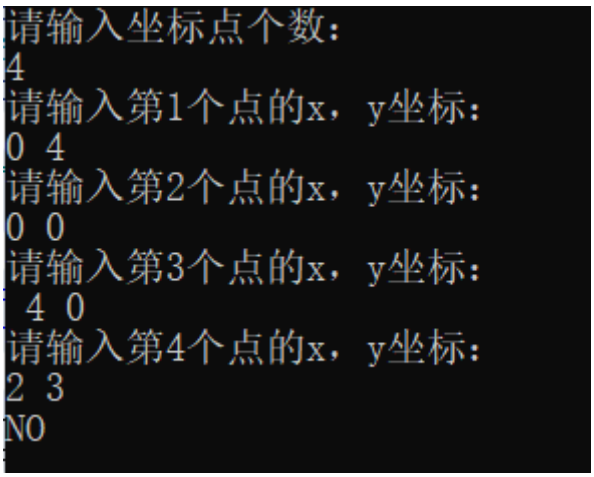
代码

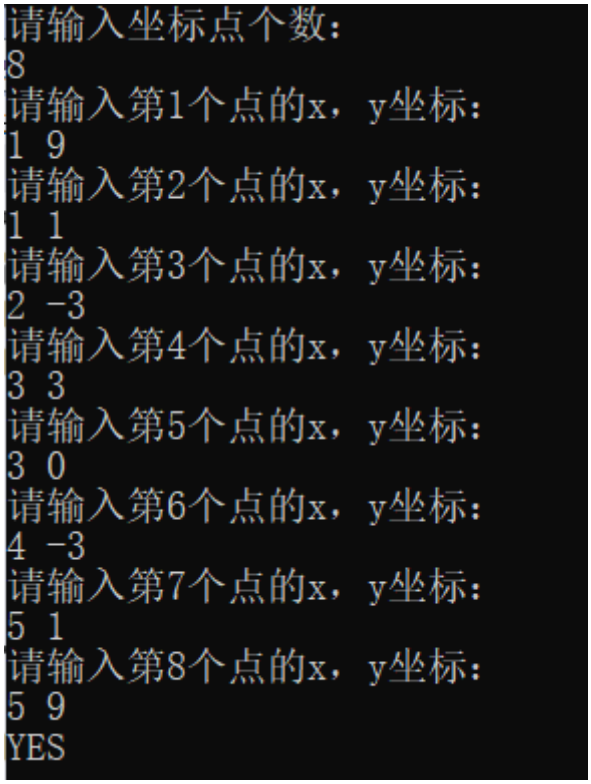
```cpp
#include <iostream>
#include <set>

using namespace std;

int main() {
    int n;
    int sum = 0;
    set<pair<int, int>> point;
    bool flag = true;

    cout << "请输入坐标点个数：" << endl;
    cin >> n;

    for (int i = 0; i < n; i++) {
        int x, y;

        cout << "请输入第" << i + 1 << "个点的x，y坐标：" << endl;
        cin >> x >> y;

```

```
        sum += x;

        point.insert(pair<int, int>(n * x, y));
    }

    for (set<pair<int, int>>::iterator i = point.begin(); i != point.end();
i++) {
        pair<int, int> p = *i;

        if (point.find(pair<int,int> (2 * sum - p.first,p.second)) ==
point.end()) {
            flag = false;
            break;
        }
    }

    if (flag) {
        cout << "YES" << endl;
    }
    else {
        cout << "NO" << endl;
    }

    return 0;
}

```

运行结果







第六章

题目

二叉树重建

输入一棵二叉树的先序遍历和中序遍历序列，输出后序遍历序列

代码

```
#include <iostream>
#include <string>

using namespace std;

string preorder, inorder;

void get_postorder(int s1,int s2,int length) {
    if (length == 0) {
        return;
```

```
    }

    int len = inorder.find(preorder[s1]) - s2;

    get_postorder(s1 + 1, s2, len);//左子树
    get_postorder(s1 + len + 1, s2 + len + 1, length - len - 1);//右子树

    cout << preorder[s1];
}

int main(){
    int len;

    cout << "二叉树的先序遍历结果为：" << endl;
    cin >> preorder;
    cout << "二叉树的中序遍历结果为：" << endl;
    cin >> inorder;

    len = inorder.size();

    cout << "二叉树的后序遍历结果为：" << endl;
    get_postorder(0, 0, len);

    return 0;
}

```

运行结果