

Олимпиада СПбГУ по информатике 2018/19 учебного года

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A	B	C	D	E	F	Sum
100	100	100	0	35	72	407

Task A (100)

```
#include <iostream>
#include <vector>
#include <queue>
#include <iomanip>
#include <string>
#include <cstdlib>
#include <algorithm>
#include <set>
#include <map>
#include <list>
#include <deque>
#include <stack>

using namespace std;
typedef long long ll;

int main() {
    ll n, m, i, j, k;
    cin >> n >> m;
    bool ans = false;
    while (n < m) {
        n *= 2;
    }
    if (n == m) {
        cout << "Yes";
    }
    else {
        cout << "No";
    }

    //system("pause");
    return 0;
}
```

Task B (100)

```
#include <iostream>
#include <vector>
#include <queue>
#include <iomanip>
#include <string>
#include <cstdlib>
#include <algorithm>
#include <set>
#include <map>
#include <list>
#include <deque>
#include <stack>

using namespace std;
typedef long long ll;

int main() {
    string s;
    string s1;
    ll n;
    cin >> n;
    cin >> s;
    bool ans = false;
    if (s.size() < 2) {
        cout << "No";
    }
    else {
        if (s.size() == 2) {
            if (s == "or" || s == "ro") {
                cout << "Yes";
            }
            else {
                cout << "No";
            }
        }
        else {
            for (ll i = 1; i < s.size() - 1; i++) {
                if (s[i] == 'o') {
                    if (s[i - 1] == 'r' || s[i + 1] == 'r') {
                        ans = true;
                    }
                }
                if (s[i] == 'r') {
                    if (s[i - 1] == 'o' || s[i + 1] == 'o') {
                        ans = true;
                    }
                }
            }
            for (ll i = 0; i < s.size() - 2; i++) {
                if (s[i] == 'o') {
                    if (s[i + 2] == 'r') {
                        ans = true;
                    }
                }
            }
            for (ll i = 2; i < s.size(); i++) {
                if (s[i] == 'r') {
                    if (s[i - 2] == 'o') {
                        ans = true;
                    }
                }
            }
            if (ans) {
                cout << "Yes";
            }
        }
    }
}
```

```
        }  
        else {  
            cout << "No";  
        }  
    }  
}  
  
//system("pause");  
return 0;  
}
```

Task C (100)

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

using namespace std;

#define int long long

int const MAX_N = 1e5 + 1;

int n;
vector<int> g[MAX_N];
vector<int> w(MAX_N, -1);
vector<int> par(MAX_N);

int dfs(int v, int p){
    par[v] = p;
    if (w[v] != -1) {
        return w[v];
    }
    int res = 1;
    for (int u : g[v]) {
        if (u != p) {
            res += dfs(u, v);
        }
    }
    w[v] = res;
    return w[v];
}

#undef int
int main() {
#define int long long
    cin >> n;
    for (int i = 0; i < n - 1; ++i) {
        int u, v;
        cin >> u >> v;
        g[v].push_back(u);
        g[u].push_back(v);
    }
    dfs(1, 0);

    //for (int i = 1; i <= n; ++i) {
    //    cerr << w[i] << " ";
    //}

    //cerr << "\n";

    for (int i = 1; i <= n; ++i) {
        int ans = -1;
        for (int u : g[i]) {
            if (u != par[i]) {
                ans = max(ans, w[u]);
            }
        }
        ans = max(ans, n - w[i]);
        cout << ans + 1 << "┘";
    }

}
```

Task D (—)

Task E (35)

```
mas_X = []
mas_Y = []
n = int(input())
for i in range(n):
    sus = list(map(int, input().split()))
    mas_X.append(sus[0])
    mas_Y.append(sus[1])

P = input()
Q = input()

maximal = 2000000000000000000
maximal = maximal*maximal

ans = []

for i in range(n):
    ans.append(((maximal - mas_X[i]) * (maximal - mas_X[i]) + mas_Y[i] * mas_Y[i], i))

ans = sorted(ans, key=lambda x: x[0])

if (n == 1):
    print('1')
elif (ans[0][0] == ans[1][0]):
    print('-1')
else:
    print(ans[0][1]+1)
```

Task F (72)

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

using namespace std;

int main() {
#define int long long
    int n, k;
    cin >> n >> k;
    int rem_r[2][n + 1];
    int rem_b[2][n + 1];
    int dp[2][n + 1];

    int r[n + 1], b[n + 1];
    for (int i = 1; i <= n; ++i) {
        cin >> r[i] >> b[i];
    }

    dp[0][1] = min(k, r[1]);
    rem_r[0][1] = max((int)0, k - r[1]);
    rem_b[0][1] = 0;

    dp[1][1] = min(k, b[1]);
    rem_r[1][1] = 0;
    rem_b[1][1] = max((int)0, k - b[1]);

    for (int i = 2; i <= n; ++i) {
        int cnt_r_x = rem_r[0][i - 1] + k;
        int cnt_b_x = rem_b[0][i - 1];

        int x = min(cnt_r_x, r[i]) + min(cnt_b_x, b[i]);

        int cnt_r_y = rem_r[1][i - 1] + k;
        int cnt_b_y = rem_b[1][i - 1];

        int y = min(cnt_r_y, r[i]) + min(cnt_b_y, b[i]);

        if (dp[0][i - 1] + x >= dp[1][i - 1] + y) {
            dp[0][i] = dp[0][i - 1] + x;
            rem_r[0][i] = max((int)0, cnt_r_x - r[i]);
            rem_b[0][i] = max((int)0, cnt_b_x - b[i]);
        }
        else {
            dp[0][i] = dp[1][i - 1] + y;
            rem_r[0][i] = max((int)0, cnt_r_y - r[i]);
            rem_b[0][i] = max((int)0, cnt_b_y - b[i]);
        }

        cnt_r_x = rem_r[0][i - 1];
        cnt_b_x = rem_b[0][i - 1] + k;

        x = min(cnt_r_x, r[i]) + min(cnt_b_x, b[i]);

        cnt_r_y = rem_r[1][i - 1];
        cnt_b_y = rem_b[1][i - 1] + k;

        y = min(cnt_r_y, r[i]) + min(cnt_b_y, b[i]);

        if (dp[0][i - 1] + x >= dp[1][i - 1] + y) {
            dp[1][i] = dp[0][i - 1] + x;
            rem_r[1][i] = max((int)0, cnt_r_x - r[i]);
            rem_b[1][i] = max((int)0, cnt_b_x - b[i]);
        }
        else {
            dp[1][i] = dp[1][i - 1] + y;
            rem_r[1][i] = max((int)0, cnt_r_y - r[i]);
            rem_b[1][i] = max((int)0, cnt_b_y - b[i]);
        }
    }
}
```

```
    }  
}  
cout << max(dp[0][n], dp[1][n]);  
}
```