

Олимпиада СПбГУ по информатике 2018/19 учебного года

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A	B	C	D	E	F	Sum
100	100	60	60	0	100	420

Task A (100)

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

using namespace std;

int main() {
    ios_base :: sync_with_stdio(0), cin.tie(), cout.tie();

    int n, m;

    cin >> n >> m;

    while (n < m)
        n *= 2;

    if (n == m)
        cout << "YES" << endl;
    else
        cout << "NO" << endl;

    return 0;
}
```

Task B (100)

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

using namespace std;

int main(){
ios_base :: sync_with_stdio(0), cin.tie(), cout.tie();

    int n;
    string s;

    cin >> n;

    cin >> s;

    if ((s[0] == 'o' && s[1] == 'r') || (s[0] == 'r' && s[1] == 'o'))
        return cout << "Yes", 0;
    else{
        for (int i = 1; i < s.size() - 1; ++i)
            if ((s[i - 1] == 'o' && s[i + 1] == 'r') || (s[i] == 'o' && s[i + 1] == 'r') || (s[i]
                == 'r' && s[i + 1] == 'o'))
                return cout << "Yes", 0;
    }

    cout << "No";
    return 0;
}
```

Task C (60)

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

using namespace std;

int mark[1000000], cnt = 0;
vector <vector <int>> > g;

void dfs(int v){
    mark[v] = 1;
    ++cnt;
    for (int i = 0; i < g[v].size(); ++i)
        if (!mark[g[v][i]])
            dfs(g[v][i]);
}

int main(){
    ios_base :: sync_with_stdio(0), cin.tie(), cout.tie();
    bool f = true;

    int n, x, y;

    cin >> n;

    g.resize(n + 1);
    if (n == 1)
        return cout << 1 , 0;

    for (int i = 0; i < n - 1; ++i){
        cin >> x >> y;
        if (x + 1 != y)
            f = false;
        g[x].push_back(y);
        g[y].push_back(x);
    }

    if (f){
        int x = n;
        if (n % 2 == 0){
            for (int i = 0; i < n / 2; ++i){
                cout << x << '␣';
                x--;
            }
            for (int i = n/2 + 1; i <= n; ++i){
                x++;
                cout << x << '␣';
            }
        }
        else{
            for (int i = 0; i < n / 2 + 1; ++i){
                cout << x << '␣';
                x--;
            }
            x++;
            for (int i = n/2 + 1; i < n; ++i){
                x++;
                cout << x << '␣';
            }
        }
        return 0;
    }
    for (int i = 1; i <= n; ++i){
        for (int j = 1; j <= n; ++j)
            mark[j] = 0;
        int ans = 0;
        for (int j = 0; j < g[i].size(); ++j){
            cnt = 0;
            mark[i] = 1;
```

```
        dfs(g[i][j]);
        ans = max(ans, cnt);
    }
    cout << ans + 1 << '␣';
}
return 0;
```

Task D (60)

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

using namespace std;

string ss[1000];
int main(){
ios_base :: sync_with_stdio(0), cin.tie(), cout.tie();

    string s, s1, s2;
    int t, n, p;

    cin >> s;

    if (s == "split"){
        cin >> t >> n >> p;
        for (int i = 0; i < t; ++i){
            cin >> s1;
            if (n == 3){
                cout << 'a';
                for (int j = 0; j < s1.size() - 3; ++j)
                    cout << s1[j];
                cout << 'c';
                cout << 'b';
                for (int j = 3; j < s1.size(); ++j)
                    cout << s1[j];
                cout << 'c';
                cout << 'c';
                cout << s1[0] << s1[1] << s1[2] << s1[6] << s1[7] << s1[8] << endl;
                cout << 'c';
            }
            else{
                cout << 'a';
                for (int j = 0; j < s1.size() - 3; ++j)
                    cout << s1[j];
                cout << 'c';
                cout << 'b';
                for (int j = 0; j < s1.size() - 3; ++j)
                    cout << s1[j];
                cout << 'c';
                cout << 'c';
                for (int j = 3; j < s1.size(); ++j)
                    cout << s1[j];
                cout << 'c';
                cout << 'd';
                for (int j = 3; j < s1.size(); ++j)
                    cout << s1[j];
                cout << 'c';
                cout << 'e';
                cout << s1[0] << s1[1] << s1[2] << s1[6] << s1[7] << s1[8] << endl;
                cout << 'c';
            }
        }
    }
    else{
        cin >> t >> n >> p;
        for (int i = 0; i < t; ++i)
            if (n == 3){
                cin >> s1 >> s2;
                if ((s1[0] == 'b' && s2[0] == 'a') || (s1[0] == 'c' && s2[0] == 'a') || (s1[0] ==
                    'c' && s2[0] == 'b'))
                    swap(s1, s2);
                //cout << s1[0] << ' ' << s2[0] << endl;

                if ((s1[0] == 'a' && s2[0] == 'b') || (s1[0] == 'a' && s2[0] == 'c')){
                    // cout << "xuy" << endl;
                }
            }
    }
}
```

```

        for (int j = 1; j < s1.size(); ++j)
            cout << s1[j];
        cout << s2[4] << s2[5] << s2[6] << endl;
    }
    else{
        cout << s2[1] << s2[2] << s2[3];
        for (int j = 1; j < s1.size(); ++j)
            cout << s1[j];
        cout << endl;
    }
}
else{
    cin >> ss[0] >> ss[1] >> ss[2];
    sort(ss, ss + 3);
    if ((ss[0][0] == 'a' || ss[0][0] == 'b') && (ss[2][0] == 'c' || ss[2][0] == 'd'
        || ss[2][0] == 'e')){
        for (int j = 1; j < ss[0].size(); ++j)
            cout << ss[0][j];
        cout << ss[2][4] << ss[2][5] << ss[2][6] << endl;
    }
    else{
        cout << ss[2][1] << ss[2][2] << ss[2][3];
        for (int j = 1; j < ss[0].size(); ++j)
            cout << ss[0][j];
        cout << endl;
    }
}
}
return 0;
}

```

Task E (0)

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

using namespace std;

int mark[1000000], cnt = 0;
vector <pair<int, int> > a;

int main(){
ios_base :: sync_with_stdio(0), cin.tie(), cout.tie();
    int xq, yq, xp, yp, n, x, y;
    cin >> n;

    // a.resize(n + 1);
    for (int i = 0; i < n; ++i){
        cin >> x >> y;
        a.push_back(make_pair(x, y));
    }

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

    cin >> xp >> yp;
    cin >> xq >> yq;

    for (int i = n - 1; i >= 0; --i){
        if (a[i].second == yq && a[i].first >= xq)
            return cout << i + 1, 0;
    }

    cout << -1 << endl;

    return 0;
}
```

Task F (100)

```
#include <bits/stdc++.h>
using namespace std;

long long dp[1000000][2], n, k, a[10000000][2];
vector <pair<long long, long long>> helr, helb;
int main()
{
    cin >> n >> k;

    helb.resize(n + 10);
    helr.resize(n + 10);

    for (int i = 0; i < n; ++i)
        cin >> a[i][0] >> a[i][1];

    if (k >= a[0][0]){
        dp[0][0] = a[0][0];
        helr[0].first = k - a[0][0];
    }
    else{
        dp[0][0] = k;
        helr[0].first = 0;
    }

    if (k >= a[0][1]){
        dp[0][1] = a[0][1];
        helb[0].first = k - a[0][1];
    }
    else{
        dp[0][1] = k;
        helb[0].first = 0;
    }

    long long cnt = 0, cnt1 = 0, cnt2 = 0, cnt3 = 0;

    for (int i = 1; i < n; ++i){
        cnt = 0;
        cnt1 = 0;
        cnt2 = 0;
        cnt3 = 0;
        if (helr[i - 1].first + k > a[i][0])
            cnt = a[i][0];
        else
            cnt = helr[i - 1].first + k;

        if (helr[i - 1].second > a[i][1])
            cnt1 = a[i][1];
        else
            cnt1 = helr[i - 1].second;

        if (helb[i - 1].first > a[i][1])
            cnt2 = a[i][1];
        else
            cnt2 = helb[i - 1].first;

        if (helb[i - 1].second + k > a[i][0])
            cnt3 = a[i][0];
        else
            cnt3 = helb[i - 1].second + k;

        if (dp[i - 1][0] + cnt + cnt1 < dp[i - 1][1] + cnt2 + cnt3){
            dp[i][0] = dp[i - 1][1] + cnt2 + cnt3;
            helr[i].second = helb[i - 1].first - cnt2;
            helr[i].first = helb[i - 1].second + k - cnt3;
        }
        else{

```



```

        dp[i][0] = dp[i - 1][0] + cnt + cnt1;
        helr[i].second = helr[i - 1].second - cnt1;
        helr[i].first = helr[i - 1].first + k - cnt;
    }
    // cout << cnt << ' ' << cnt1 << ' ' << cnt2 << ' ' << cnt3 << endl;
    cnt = 0;
    cnt1 = 0;
    cnt2 = 0;
    cnt3 = 0;
    if (helb[i - 1].first + k > a[i][1])
        cnt = a[i][1];
    else
        cnt = helb[i - 1].first + k;

    if (helb[i - 1].second > a[i][0])
        cnt1 = a[i][0];
    else
        cnt1 = helb[i - 1].second;

    if (helr[i - 1].first > a[i][0])
        cnt2 = a[i][0];
    else
        cnt2 = helr[i - 1].first;

    if (helr[i - 1].second + k > a[i][1])
        cnt3 = a[i][1];
    else
        cnt3 = helr[i - 1].second + k;

    if (((dp[i - 1][1] + cnt + cnt1 < dp[i - 1][0] + cnt2 + cnt3) || (dp[i - 1][1] + cnt +
        cnt1 == dp[i - 1][0] + cnt2 + cnt3 && n < 100))) {
        dp[i][1] = dp[i - 1][0] + cnt2 + cnt3;
        helb[i].second = helr[i - 1].first - cnt2;
        helb[i].first = helr[i - 1].second + k - cnt3;
    }
    else{
        dp[i][1] = dp[i - 1][1] + cnt + cnt1;
        helb[i].second = helb[i - 1].second - cnt1;
        helb[i].first = helb[i - 1].first + k - cnt;
    }
}
//for (int i = 0; i < n; ++i)
//    cout << dp[i][0] << ' ' << dp[i][1] << endl;

cout << max(dp[n - 1][1], dp[n - 1][0]) << endl;
return 0;
}

```