

Олимпиада СПбГУ по информатике 2018/19 учебного года

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A	B	C	D	E	F	Sum
100	100	100	0	44	7	351

Task A (100)

```
#include <bits/stdc++.h>
#define X first
#define Y second
#define pb push_back
using namespace std;
main(){
    ios_base::sync_with_stdio(0);
    cin.tie(0);
    int n,m;
    cin >> n >> m;
    while (n < m)n*=2;
    if (n == m)cout << "Yes";
    else cout << "No";
    return 0;
}
```

Task B (100)

```
#include <bits/stdc++.h>
#define X first
#define Y second
#define pb push_back
using namespace std;
main(){
    ios_base::sync_with_stdio(0);
    cin.tie(0);
    int n;
    cin >> n;
    string s;
    cin >> s;
    bool f = 0;
    for (int i = 0; i < n-1; i++){
        if (s[i] == 'o' && s[i+1] == 'r' || s[i] == 'r' && s[i+1] == 'o') f = 1;
    }
    for (int i = 0; i < n-2; i++){
        if (s[i] == 'o' && s[i+2] == 'r') f = 1;
    }
    if (f) cout << "Yes";
    else cout << "No";
    return 0;
}
```

Task C (100)

```
#include <bits/stdc++.h>
#define X first
#define Y second
#define pb push_back
using namespace std;
int used[100002], ans[100002], n;
vector<int> g[100002];
pair<int, int> a[100002];
void dfs(int v){
    used[v] = 1;
    int x = 1;
    int ma = 0;
    for (auto i : g[v]){
        if (!used[i]){
            dfs(i);
            x+=a[i].X;
            ma = max(ma, a[i].X);
        }
    }
    a[v].X = x;
    a[v].Y = ma;
}
void dfs1(int v){
    used[v] = 1;
    int sp = n - a[v].X;
    int ma = a[v].Y;
    ma = max(ma, sp);
    ans[v] = ma+1;
    for (auto i : g[v]){
        if (!used[i]){
            dfs1(i);
        }
    }
}
}
main(){
    ios_base::sync_with_stdio(0);
    cin.tie(0);
    cin >> n;
    for (int i = 0; i < n-1; i++){
        int x, y;
        cin >> x >> y;
        g[x].pb(y);
        g[y].pb(x);
    }
    dfs(1);
    for (int i = 1; i <= n; i++)used[i] = 0;
    dfs1(1);
    //for (int i = 1; i <= n; i++)cout << a[i].X << " ";
    //cout << endl;
    for (int i = 1; i <= n; i++)cout << ans[i] << "␣";
    return 0;
}
```

Task D (—)

Task E (44)

```

#include <bits/stdc++.h>
#define X first
#define Y second
#define pb push_back
#define int long long
using namespace std;
int x3[100002],y3[100002];
main(){
    cout.precision(20);
    ios_base::sync_with_stdio(0);
    cin.tie(0);
    int n;
    cin >> n;
    bool f = 0;
    for (int i = 0; i < n; i++){
        cin >> x3[i] >> y3[i];
        if (x3[i] > 1e4 || y3[i] > 1e4)f = 1;
    }
    int xp,yp,xq,yq;
    cin >> xp >> yp >> xq >> yq;
    if (f){
        f = 0;
        int ans;
        if (xp < xq){
            int ma = -1e9-1;
            for (int i = 0; i < n; i++){
                if (x3[i] > ma){
                    ma = x3[i];
                    ans = i;
                    f = 0;
                }else if (x3[i] == ma && abs(y3[i]) < abs(y3[ans])){
                    ans = i;
                }else if (x3[i] == ma && abs(y3[i]) == abs(y3[ans])) f = 1;
            }
        }else{
            int ma = 1e9+1;
            for (int i = 0; i < n; i++){
                if (x3[i] < ma){
                    ma = x3[i];
                    ans = i;
                    f = 0;
                }else if (x3[i] == ma && abs(y3[i]) < abs(y3[ans])){
                    ans = i;
                    f = 0;
                }else if (x3[i] == ma && abs(y3[i]) == abs(y3[ans])) f = 1;
            }
        }
        if (f)cout << -1;
        else
            cout << ans+1;
        return 0;
    }
    int x1 = xq - xp,y1 = yq - yp;
    long long k;
    if (x1 == 0)k = 1e9/abs(y1);
    else if (y1 == 0)k = 1e9/abs(x1);
    else
        k = min((long long)(1e9/abs(x1)),(long long)(1e9/abs(y1)));
    long long x,y;
    x = xp + k*x1;
    y = yp + k*y1;
    //cout << x << " " << y << " " << k << endl;
    long double m1,m2;
    m1 = m2 = 0;
    int n1,n2;
    for (int i = 0; i < n; i++){
        //cerr<<1;
        long long x1 = x3[i],y1 = y3[i];
        int r;

```

```

    r = (x-x1)*(x-x1)+(y-y1)*(y-y1);
    //cout << x << " " << x1 << " " << y << " " << y1 << " " <<(x-x1)*(x-x1)+(y-y1)*(y-y1) <<
        endl;
    //cout << r << endl;
    if (r < m1 || m1 == 0){
        m2 = m1;
        m1 = r;
        n2 = n1;
        n1 = i;
    }else if (r < m2 || m2 == 0){
        m2 = r;
        n2 = i;
    }
    //cerr << 2;
}
//cout << m1 << " " << m2 << endl;
if (abs(m1 - m2) == 0)cout << -1;
else cout << n1+1;
return 0;
}

```

Task F (7)

```
#include <bits/stdc++.h>
#define X first
#define Y second
#define pb push_back
using namespace std;
int r[100],b[100];
main(){
    ios_base::sync_with_stdio(0);
    cin.tie(0);
    int n,k;
    cin >> n >> k;
    for (int i = 0; i < n; i++){
        cin >> r[i] >> b[i];
    }
    int ma = 0;
    for (int i = 0; i < (1<n); i++){
        int ans = 0,kr = 0,kb = 0;
        for (int j = 0; j < n; j++){
            if ((1<j)&i)kr+=k;
            else kb+=k;
            ans += min(kr,r[j])+min(kb,b[j]);
            kr-=min(kr,r[j]);
            kb-=min(kb,b[j]);
            //cout << j << " " << kr << " " << kb << " " << ans << endl;
        }
        ma = max(ans,ma);
    }
    cout << ma;
    return 0;
}
```