Олимпиада СПбГУ по информатике 2018/19 учебного года

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A	B	C	D	E	F	Sum
100	100	100	0	100	7	407

Task A (100)

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

using namespace std;

int main()
{
#ifdef LOCAL
        freopen("a.in", "r", stdin);
        freopen("a.out", "w", stdout);
#endif
        int n, m;
        cin >> n >> m;
        while(n < m) n *= 2;
        if(n == m) cout << "Yes";
        else cout << "No";
        return 0;
}
```

Task B (100)

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

using namespace std;

void get(string &s, int n) {
        getchar();
        for(int i = 0; i < n; i++) {
            char c = getchar();
                if(c >= 'A' && c <= 'Z')
                {
                        c = 'a' + (c - 'A');
                        //cerr << c << " " << int(c) << " " << c - 'A' << endl;
                }
                s += c;

        }

}

int main()
{
#ifdef LOCAL
        freopen("a.in", "r", stdin);
        freopen("a.out", "w", stdout);
#endif
        int n;
        string s = "";
        cin >> n;
        get(s, n);
        bool ok = 0;
        cerr << s;
        for(int i = 1; i < n; i++) {
                if((s[i - 1] == 'o' && s[i] == 'r') || (s[i - 1] == 'r' && s[i] == 'o'))
                        ok = 1;
                if(i > 1 && (s[i - 2] == 'o' && s[i] == 'r'))
                        ok = 1;
        }
        if(ok) cout << "Yes";
        else cout << "No";
        return 0;
}
```

Task C (100)

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

using namespace std;

vector <vector <int> > gr;
vector <int> ch, ans, z;

int calc_ch(int v = 1, int p = -1) {
        int cnt = 0;
        for(auto i : gr[v]) {
                if(i == p)
                        continue;
                cnt += calc_ch(i, v);
        }
        ch[v] = cnt + 1;
        return ch[v];
}

void get_ans(int v = 1, int p = -1) {
        int cans = 0;
        for(auto i : gr[v]) {
                if(i != p)
                        cans = max(cans, ch[i]);
        }
        if(p != -1)  {
                cans = max(cans, z[p]);
                z[v] += z[p];
        }

    ans[v] = cans;
    z[v] += ch[v];
    for(auto i : gr[v]) {
        z[v] -= ch[i];
        if(i != p)
                get_ans(i, v);
        z[v] += ch[i];
    }

}

int main()
{
#ifdef LOCAL
        freopen("a.in", "r", stdin);
        freopen("a.out", "w", stdout);
#endif
        int n, x, y;
        cin >> n;
        gr.resize(n + 1);
        ch.resize(n + 1);
        ans.resize(n + 1, 0);
        z.resize(n + 1, 0);
        for(int i = 0; i < n - 1; i++) {
                cin >> x >> y;
                gr[x].push_back(y);
                gr[y].push_back(x);
        }
        calc_ch();
        get_ans();
        /*for(int i = 1; i <= n; i ++)  {
                cerr << i << ": " << ch[i] << " " << ans[i] + 1 << endl;
        }*/
        for(int i = 1; i <= n; i++)
                cout << ans[i] + 1 << " ";
        return 0;
}
```

Task D (0)

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

using namespace std;

int t, n, p;


void split() {
        for(int _i = 0; _i < t; _i++)
        {
                string s;
                cin >> s;
                cerr << s;
                if(n == 3) {
                        cout << s.substr(0, 7) << "␣" << s.substr(2, 7) << "␣" << s.substr(0, 4) +
                                s.substr(6, 3) << "\n";
                }
        }
}

void mmerge() {
        for(int _i = 0; _i < t; _i++) {
                string s1, s2, s3;
                if(n == 3) {
                        cin >> s1 >> s2;
                        for(int j = 0; j < 2; j++) {
                                // 1 - 1
                                if(s1.substr(0, 4) == s2.substr(0, 4) && s1[6] == s2[4]) {
                                        cout << s1 << s2.substr(5, 2) << "\n";
                                        break;
                                // 1 - 2
                                } else if(s1.substr(2, 4) == s2.substr(0, 4)) {
                                        cout << s1 << s2.substr(5, 2) << "\n";
                                        break;
                                // 2 - 3
                                } else if(s1.substr(4, 3) == s2.substr(4, 3) && s1.substr(2, 2) ==
                                        s2.substr(0, 2))  {
                                        cout << s1.substr(0, 2) << s2 << "\n";
                                        break;
                                }
                                swap(s1, s2);
                        }
                }
        }
}

int main()
{
#ifdef LOCAL
        freopen("a.in", "r", stdin);
        freopen("a.out", "w", stdout);
#endif
    string s;
    cin >> s >> t >> n >> p;
    if(s == "split") split();
    else mmerge();
        return 0;
}
```

Task E (100)

```python
if __name__ == '__main__':
    n = int(input())
    points = []
    for _ in range(n):
        x, y = [int(i) for i in input().split()]
        points.append((x, y))

    Px, Py = [int(i) for i in input().split()]
    Qx, Qy = [int(i) for i in input().split()]

    Vx = Qx - Px
    Vy = Qy - Py
    Vx = Px + Vx * 10 ** 20
    Vy = Py + Vy * 10 ** 20
    md = (Vx - points[0][0]) ** 2 + (Vy - points[0][1]) ** 2
    cnt = 0
    n = 0
    for i, (x, y) in enumerate(points):
        cd = (Vx - x) ** 2 + (Vy - y) ** 2
        if cd < md:
            md = cd
            cnt = 1
            n = i
        elif cd == md:
            cnt += 1
        # print(cd)
        # print(md)
    if cnt >= 2:
        print(-1)
    else:
        print(n + 1)
```

Task F (7)

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

using namespace std;

int n, k;
vector < pair<int, int> >  v;


int calc(unsigned int mask) {
        int r = 0, b = 0, ans = 0;
        for(int i = 0; i < n; i++) {
                //cerr << ((mask >> i) & 1);
                if((mask >> i) & 1) r += k;
                else b += k;
                ans += min(v[i].first, r);
                r -= min(v[i].first, r);
                ans += min(v[i].second, b);
                b -= min(v[i].second, b);
        }
        //cerr << endl;
        return ans;
}

int main()
{
        ios_base::sync_with_stdio(0);
        cin.tie(0);
        cout.tie(0);
#ifdef LOCAL
        freopen("a.in", "r", stdin);
        freopen("a.out", "w", stdout);
#endif
        cin >> n >> k;
        int x, y, ans = 0;
        for(int i = 0; i < n; i++) {
                cin >> x >> y;
                v.push_back({x, y});
        }
        for(unsigned int mask = 0; mask < ((unsigned int)1 << (n)); mask++) {
                ans = max(ans, calc(mask));
        }
        cout << ans;
        return 0;
}
```