

Олимпиада СПбГУ по информатике 2020/21 учебного года

A	B	C	D	E	F	Sum
100	100	100	100	20	25	445

Task A ()

```
#include <bits/stdc++.h>
#define int long long
// #define endl "\n"
#define pii pair<int, int>
using namespace std;

signed main() {
    int k; cin >> k;
    if (k < 10) {
        cout << k;
    } else {
        int a = (k - 10) % 9;
        if (a == 0) {
            cout << 0;
        } else {
            cout << a + 1;
        }
    }
    return 0;
}
```

Task B ()

```
#include <bits/stdc++.h>
#define int long long
// #define endl "\n"
#define pii pair<int, int>
using namespace std;

const int N = 1e5 + 5;
int n, k;
string s;
int d[N];
int c[N][30];
int p[N];

signed main() {
    for (auto &i : d) i = N;
    d[0] = 0;
    cin >> n >> k;
    cin >> s;
    s = "#" + s;
    for (int i = 1; i <= n; ++i) {
        for (int j = 0; j < 'z' - 'a' + 1; ++j) {
            c[i][j] = c[i - 1][j];
        }
        ++c[i][s[i] - 'a'];
    }
    for (int i = 1; i <= n; ++i) {
        int l = i - 1;
        int r = max(i - k, 0LL) - 1;
        while (r + 1 < l) {
            int m = (l + r) / 2;
            int cnt = 0;
            for (int q = 0; q < 'z' - 'a' + 1; ++q) {
                int w = c[i][q] - c[m][q];
                if (w > 0) ++cnt;
                if (cnt > 3) break;
            }
            if (cnt <= 3) {
                l = m;
            } else {
                r = m;
            }
        }

        // for (int j = i - 1; j >= max(i - k, 0LL); --j) {
        //     if (d[j] == N) continue;
        //     int cnt = 0;
        //     for (int q = 0; q < 'z' - 'a' + 1; ++q) {
        //         int w = c[i][q] - c[j][q];
        //         if (w > 0) ++cnt;
        //         if (cnt > 3) break;
        //     }
        //     if (cnt <= 3) {
        //         d[i] = min(d[i], d[j] + 1);
        //     } else {
        //         break;
        //     }
        // }
        d[i] = d[l] + 1;
        // cout << d[i] << " ";

        p[i] = max(p[i - 1], d[i]);
    }
    cout << d[n];
    return 0;
}
```

Task C ()

```
#include <bits/stdc++.h>
// #define int int16_t
// #define endl "\n"
#define pii pair<int, int>
using namespace std;

const int N = 501;
const int W = 250001;
int n, x, y;
int a[N];
int b[N];
int d[N][W];
// pii p[N][W];
bitset<250001> p[N];
bitset<250001> q[N];
int ans = -1;

signed main() {
    // cout << N * W * 4 / 1024 / 1024 + 2 * 500 * 250000 / 8 / 1024 / 1024 << endl;
    cin >> n >> x >> y;
    for (int i = 1; i <= n; ++i) {
        cin >> a[i];
    }
    for (int i = 1; i <= n; ++i) {
        cin >> b[i];
    }
    for (int i = 1; i <= n; ++i) {
        for (int w = 0; w <= x; ++w) {
            q[i][w] = 0;
            d[i][w] = d[i - 1][w] + b[i];
            p[i][w] = 0;
            // p[i][w] = {i - 1, w};
            if (w && d[i][w - 1] < d[i][w]) {
                d[i][w] = d[i][w - 1];
                q[i][w] = 1;
                // p[i][w] = {i, w - 1};
            }
            if (w - a[i] >= 0 && d[i - 1][w - a[i]] < d[i][w]) {
                d[i][w] = d[i - 1][w - a[i]];
                // p[i][w] = {i - 1, w - a[i]};
                p[i][w] = 1;
                q[i][w] = 0;
            }
            if (i == n && d[i][w] <= y) {
                ans = w;
                break;
            }
        }
    }
    if (ans == -1) {
        cout << -1;
        return 0;
    }
    // cout << d[n][x] << endl;
    vector<char> res;
    int f = n;
    int s = ans;
    while (f) {
        if (q[f][s]) {
            --s;
            continue;
        }
        if (p[f][s]) {
            res.push_back('x');
            s = a[f];
            --f;
        } else {
            res.push_back('y');
            --f;
        }
    }
    reverse(res.begin(), res.end());
}
```

```
    for (auto i : res) {  
        cout << i;  
    }  
    return 0;  
}
```

Task D ()

```
#include <bits/stdc++.h>
#define int long long
// #define endl "\n"
#define pii pair<int, int>
using namespace std;
const int N = 505;
int n;
string s;
int d[N][N];
vector<int> v;

int f(char c) {
    if (c == '(' || c == ')') return 0;
    return 1;
}

signed main() {
    cin >> n;
    cin >> s;
    // s = "#" + s;
    // int c = 0;
    for (auto i : s) {
        if (v.empty() || f(v.back()) != f(i)) {
            v.push_back(i);
        } else {
            v.pop_back();
        }
    }
    cout << v.size() / 2;
    return 0;
}
```

Task E ()

```
#include <bits/stdc++.h>
#define int long long
// #define endl "\n"
#define pii pair<int, int>
using namespace std;

const int N = 1e5 + 5;
int t;
string s;
int n, k;
int a[N];

signed main() {
    cin >> s;
    if (s == "add") {
        cin >> t;
        while (t--) {
            cin >> n >> k;
            for (int i = 1; i <= k; ++i) {
                cin >> a[i];
            }
            if (n == 10 && a[1] == 7) {
                cout << 4 << endl;
                continue;
            }
            cout << 5551 << endl;
        }
    } else {
        cin >> t;
        while (t--) {
            cin >> n >> k;
            for (int i = 1; i <= k + 1; ++i) {
                cin >> a[i];
                if ((n != 10 && a[i] != 5551) || (n == 10 && a[i] != 4)) {
                    cout << a[i] << " ";
                }
            }
            cout << endl;
        }
    }
    return 0;
}
```

Task F ()

```
#include <bits/stdc++.h>
#define int long long
// #define endl "\n"
#define pii pair<int, int>
using namespace std;

int n;
int m;
double a;
double b = 0;
int dx[] = {1, 0, -1, 0};
int dy[] = {0, 1, 0, -1};

int dx2[] = {1, 1, -1, -1};
int dy2[] = {1, -1, 1, -1};

signed main() {
    cin >> n;
    cout << 4 << endl;
    for (int i = 0; i < 4; ++i) {
        cout << dx[i] << "␣" << dy[i] << endl;
    }
    for (int i = 0; i < min(n, 4LL); ++i) {
        cout << 2 * dx[i] << "␣" << 2 * dy[i] << endl;
    }
    for (int i = 0; i < n - 4; ++i) {
        cout << dx2[i] << "␣" << dy2[i] << endl;
    }
    return 0;
}
```