

Олимпиада СПбГУ по информатике 2020/21 учебного года

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

Task A ()

```
//  
// Created by Anton Gorokhov  
//  
  
#ifdef lolipop  
#define _GLIBCXX_DEBUG  
#endif  
  
#include <iostream>  
#include <cstdint>  
#include <vector>  
#include <cstring>  
#include <string>  
#include <algorithm>  
#include <set>  
#include <map>  
#include <ctime>  
#include <unordered_map>  
#include <random>  
#include <iomanip>  
#include <cmath>  
#include <queue>  
#include <unordered_set>  
#include <cassert>  
#include <bitset>  
#include <deque>  
#include <utility>  
  
#define int long long  
#define all(x) x.begin(), x.end()  
#define rall(x) x.rbegin(), x.rend()  
#define ld double  
  
using namespace std;  
  
inline void fastio() {  
    ios_base::sync_with_stdio(false);  
    cin.tie(nullptr);  
    cout.tie(nullptr);  
}  
  
const int inf = 2e9 + 1;  
  
void solve() {  
    string s = "098765432";  
    reverse(all(s));  
    int n;  
    cin >> n;  
    n--;  
    if (n == 0) {  
        cout << "1\n";  
        return;  
    }  
    n--;  
    cout << s[n % s.size()] << "\n";  
}
```

```
signed main() {  
#ifdef lolipop  
    freopen("input.txt", "r", stdin);  
#else  
    fastio();  
#endif  
    int T = 1;  
    //    cin >> T;  
    while (T--) {  
        solve();  
    }  
    return 0;  
}
```

Task B ()

```
//  
// Created by Anton Gorokhov  
//  
  
#ifndef lolipop  
#define _GLIBCXX_DEBUG  
#endif  
  
#include <iostream>  
#include <cstdlib>  
#include <vector>  
#include <cstring>  
#include <string>  
#include <algorithm>  
#include <set>  
#include <map>  
#include <ctime>  
#include <unordered_map>  
#include <random>  
#include <iomanip>  
#include <cmath>  
#include <queue>  
#include <unordered_set>  
#include <cassert>  
#include <bitset>  
#include <deque>  
#include <utility>  
  
#define int long long  
#define all(x) x.begin(), x.end()  
#define rall(x) x.rbegin(), x.rend()  
#define ld double  
  
using namespace std;  
  
inline void fastio() {  
    ios_base::sync_with_stdio(false);  
    cin.tie(nullptr);  
    cout.tie(nullptr);  
}  
  
void solve() {  
    int n, k;  
    cin >> n >> k;  
    vector<int> cnt(26, 0);  
    int CNT = 0;  
    string s;  
    cin >> s;  
    int ans = 1;  
    int l = 0;  
    for (int i = 0; i < n; ++i) {  
        if (i - l + 1 > k) {  
            ans++;  
            CNT = 0;  
            cnt.assign(26, 0);  
            l = i;  
        }  
        if (cnt[s[i] - 'a'] == 0) {  
            CNT++;  
        }  
        if (CNT > 3) {  
            ans++;  
            l = i;  
            CNT = 1;  
            cnt.assign(26, 0);  
        }  
        cnt[s[i] - 'a']++;  
    }  
    cout << ans << '\n';  
}  
  
signed main() {
```

```
#ifdef lolipop
    freopen("input.txt", "r", stdin);
#else
    fastio();
#endif
    int T = 1;
    //    cin >> T;
    while (T--) {
        solve();
    }
    return 0;
}
```

Task C ()

```
//
// Created by Anton Gorokhov
//

#ifdef lolipop
#define _GLIBCXX_DEBUG
#endif

#include <iostream>
#include <cstdint>
#include <vector>
#include <cstring>
#include <string>
#include <algorithm>
#include <set>
#include <map>
#include <ctime>
#include <unordered_map>
#include <random>
#include <iomanip>
#include <cmath>
#include <queue>
#include <unordered_set>
#include <cassert>
#include <bitset>
#include <deque>
#include <utility>

// #define int long long
#define all(x) x.begin(), x.end()
#define rall(x) x.rbegin(), x.rend()
#define ld double

using namespace std;

inline void fastio() {
    ios_base::sync_with_stdio(false);
    cin.tie(nullptr);
    cout.tie(nullptr);
}

const int inf = 1e9 + 1;

void solve() {
    int n, x, y;
    cin >> n >> x >> y;
    vector<int> a(n), b(n);
    for (int i = 0; i < n; ++i) {
        cin >> a[i];
    }
    int sum = 0;
    for (int i = 0; i < n; ++i) {
        cin >> b[i];
        sum += b[i];
    }
    /*vector<int> dp(x + 1, -inf);
    vector<int> p(x + 1, -1);
    dp[0] = 0;
    for (int i = 0; i < n; ++i) {
        for (int j = x - a[i]; j >= 0; --j) {
            if (dp[j] != -inf) {
                if (dp[j] + b[i] > dp[j + a[i]]) {
                    dp[j + a[i]] = dp[j] + b[i];
                    p[j + a[i]] = i;
                }
            }
        }
    }
    */
    vector<vector<int>> dp(n + 1, vector<int>(x + 1, -inf));
    vector<vector<bool>> p(n + 1, vector<bool>(x + 1, 0));
    dp[0][0] = 0;
```

```

    for (int i = 1; i <= n; ++i) {
        for (int j = 0; j <= x; ++j) {
            dp[i][j] = max(dp[i][j], dp[i - 1][j]);
            p[i][j] = 0;
            if (j - a[i-1] >= 0 && dp[i - 1][j - a[i-1]] != -inf) {
                if (dp[i][j] < dp[i - 1][j - a[i-1]] + b[i-1]) {
                    dp[i][j] = dp[i - 1][j - a[i-1]] + b[i-1];
                    p[i][j] = 1;
                }
            }
        }
    }

    for (int i = 0; i <= x; ++i) {
        if (dp[n][i] == -inf) continue;
        if (sum - dp[n][i] <= y) {
            int now = i;
            string ans(n, 'y');
            for (int j = n; j > 0; --j) {
                if (p[j][now] == 1) {
                    ans[j - 1] = 'x';
                    now -= a[j - 1];
                }
            }
            cout << ans << '\n';
            return;
        }
    }
    cout << "-1\n";
}

signed main() {
#ifdef lolipop
    freopen("input.txt", "r", stdin);
#else
    fastio();
#endif
    int T = 1;
    // cin >> T;
    while (T--) {
        solve();
    }
    return 0;
}

```

Task D ()

```
//  
// Created by Anton Gorokhov  
//  
  
#ifdef lolipop  
#define _GLIBCXX_DEBUG  
#endif  
  
#include <iostream>  
#include <cstdlib>  
#include <vector>  
#include <cstring>  
#include <string>  
#include <algorithm>  
#include <set>  
#include <map>  
#include <ctime>  
#include <unordered_map>  
#include <random>  
#include <iomanip>  
#include <cmath>  
#include <queue>  
#include <unordered_set>  
#include <cassert>  
#include <bitset>  
#include <deque>  
#include <utility>  
  
// #define int long long  
#define all(x) x.begin(), x.end()  
#define rall(x) x.rbegin(), x.rend()  
#define ld double  
  
using namespace std;  
  
inline void fastio() {  
    ios_base::sync_with_stdio(false);  
    cin.tie(nullptr);  
    cout.tie(nullptr);  
}  
  
void solve() {  
    int n;  
    cin >> n;  
    string s;  
    cin >> s;  
    vector<int> st(0);  
    for (auto c : s) {  
        if (c == ')' || c == '(') {  
            if (st.size() > 0 && st.back() == 0) {  
                st.pop_back();  
            } else {  
                st.push_back(0);  
            }  
        } else {  
            if (st.size() > 0 && st.back() == 1) {  
                st.pop_back();  
            } else {  
                st.push_back(1);  
            }  
        }  
    }  
    cout << st.size() / 2 << '\n';  
}  
  
signed main() {  
#ifdef lolipop  
    freopen("input.txt", "r", stdin);  
#else  
    fastio();  
#endif  
    int T = 1;
```

```
//      cin >> T;
      while (T--) {
          solve();
      }
      return 0;
}
```


Task E ()

```
//  
// Created by Anton Gorokhov  
//  
  
#ifndef lolipop  
#define _GLIBCXX_DEBUG  
#endif  
  
#include <iostream>  
#include <cstdlib>  
#include <vector>  
#include <cstring>  
#include <string>  
#include <algorithm>  
#include <set>  
#include <map>  
#include <ctime>  
#include <unordered_map>  
#include <random>  
#include <iomanip>  
#include <cmath>  
#include <queue>  
#include <unordered_set>  
#include <cassert>  
#include <bitset>  
#include <deque>  
#include <utility>  
  
#define int long long  
#define all(x) x.begin(), x.end()  
#define rall(x) x.rbegin(), x.rend()  
#define ld double  
  
using namespace std;  
  
inline void fastio() {  
    ios_base::sync_with_stdio(false);  
    cin.tie(nullptr);  
    cout.tie(nullptr);  
}  
  
mt19937 rnd(time(nullptr));  
string s;  
const int CNST = 502184;  
  
vector<int> sampl = {7, 2, 3};  
vector<int> sampl2 = {2, 7, 3, 4};  
  
void solve() {  
    int n, k;  
    cin >> n >> k;  
    vector<int> v(k);  
    for (int i = 0; i < k; ++i) {  
        cin >> v[i];  
    }  
    // cout << rnd() % (int) (1e6) << '\n';  
    if (s == "add") {  
        if (v == sampl) {  
            cout << "4\n";  
            return;  
        }  
        cout << CNST << '\n';  
    } else {  
        int x;  
        cin >> x;  
        v.push_back(x);  
        if (v == sampl2) {  
            cout << "2_7_3\n";  
            return;  
        }  
        for (int i = 0; i < k + 1; ++i) {  
            if (v[i] == CNST) continue;  
        }  
    }  
}
```

```

        cout << v[i] << '␣';
    }
    cout << '\n';
}

signed main() {
#ifdef lolipop
    freopen("input.txt", "r", stdin);
#else
    fastio();
#endif
    cin >> s;
    int T = 1;
    cin >> T;
    assert(T == 1);
    while (T--) {
        solve();
    }
    return 0;
}

```

Task F ()

```
//  
// Created by Anton Gorokhov  
//  
  
#ifndef lolipop  
#define _GLIBCXX_DEBUG  
#endif  
  
#include <iostream>  
#include <cstdlib>  
#include <vector>  
#include <cstring>  
#include <string>  
#include <algorithm>  
#include <set>  
#include <map>  
#include <ctime>  
#include <unordered_map>  
#include <random>  
#include <iomanip>  
#include <cmath>  
#include <queue>  
#include <unordered_set>  
#include <cassert>  
#include <bitset>  
#include <deque>  
#include <utility>  
  
#define int long long  
#define all(x) x.begin(), x.end()  
#define rall(x) x.rbegin(), x.rend()  
#define ld double  
  
using namespace std;  
  
inline void fastio() {  
    ios_base::sync_with_stdio(false);  
    cin.tie(nullptr);  
    cout.tie(nullptr);  
}  
  
vector<pair<int, int>> v = {{0, 0}, {0, 1}, {1, 1}, {1, 0}};  
  
void solve25() {  
    int n;  
    cin >> n;  
    cout << "4\n";  
    for (auto i : v) {  
        cout << i.first << ' ' << i.second << '\n';  
    }  
    for (int i = -1; i <= 1; ++i) {  
        for (int j = -1; j <= 1; ++j) {  
            if (i == 0 && j == 0) continue;  
            n--;  
            cout << i << ' ' << j << '\n';  
            if (n == 0) return;  
        }  
    }  
}  
  
signed main() {  
#ifndef lolipop  
    freopen("input.txt", "r", stdin);  
#else  
    fastio();  
#endif  
    int T = 1;  
    // cin >> T;  
    while (T--) {  
        solve25();  
    }  
    return 0;  
}
```

}