Competitive Programming Algorithms and Topics

BFS() not found!

1. Template

1.1. Código do Template

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

bool DEBUG = false;
// #define int long long
#define print if (DEBUG) std::cout <<
#define ff first
#define ss second
#define pii pair<int, int>
#define mp make_pair
#define pb push_back
#define vi vector<int>
#define INF (int)(1e9*2)
#define SYNC ios_base::sync_with_stdio(false), cin.tie(NULL), cout.tie(NULL)

using namespace std;

int32_t main() {
  SYNC;
  // Code
    return 0;
}
```

2. Matemática

2.1. Geometria

3. Grafos

3.1. Componentes fortemente conexas (SCC)

```cpp
void function() {
  // code
}
```

3.2. Caminho Euleriano

```cpp
list<int> cyc;
std::vector<pib > adj[MAX];
void euler_tour(list<int>::iterator it, int u) {
    for (int j = 0; j < (int)adj[u].size(); j++) {
        pib v = adj[u][j];
        if (v.not_visited) {
            adj[u][j].not_visited = false;
            for (int k = 0; k < (int)adj[v.ff].size(); k++) {
                pib uu = adj[v.ff][k];
                if (uu.ff == u && uu.not_visited) {
                    adj[v.ff][k].not_visited = false;
                    break;
                }
            }
            euler_tour(cyc.insert(it, u), v.ff);
        }
    }
}
```

4. Programação dinâmica

4.1. Mochila

```cpp
const int N = 2005;
int p[N], v[N];
int memo[N][N]; //memset(memo, -1, sizeof memo);
int mochila(int i, int j) {
  if(i == 0) return 0;
  if(memo[i][j] != -1) return memo[i][j];

  // no colocar o item => mochila(i-1. j)
  // colocar o item => mochila(i-1, j - p[i]) + v[i]
  int res = mochila(i-1, j);
  if(p[i] <= j) {
    res = max(res, mochila(i-1, j - p[i]) + v[i]);
  }

  return memo[i][j] = res;
}
```

4.2. Moedas

```cpp
void moedas(int argc, char const *argv[]){
  int m, n;
  cin >> m >> n;
  while(m){
    vector<int> array(m+1, 50001);
    array[0] = 0;
    for (int i = 0; i < n; ++i){
      int valor;
      cin >> valor;
      for (int j = 0; j < m; ++j){
        if(array[j] != 50001 && j + valor <= m)
          if(array[j+valor] > array[j] + 1)
            array[j+valor] = array[j]+1;
      }
    }
    if(array[m] < 50001){
      cout << array[m] << endl;
    }
    else
      cout << "Impossivel" << endl;
    cin >> m >> n;
  }
}
```

4.3. Troco

```cpp
void troco(){
  int v, m;
  cin >> v >> m;
  vector<int> moedas(v+1);
  vector<int> entrada(m);
  moedas[0] = 0;
  for (int i = 1; i <= v; ++i) moedas[i] = -1;
  for (int i = 0; i < m; ++i)
    cin >> entrada[i];
  for (int j = 0; j < m; ++j){
    int a = entrada.back();
    entrada.pop_back();
    for (int i = v; i >= 0; --i){
      if(moedas[i] >= 0 && (i + a) <= v){
        if(moedas[i + a] == -1)
          moedas[i + a] = 1;
        else
          moedas[i + a]++;
      }
    }

  }
  if(moedas[v] > 0)
    cout << "S\n";
  else
    cout << "N\n";
}
```