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1  #include <bits/stdc++.h>
2  #define ll long long
3  #define inf (int)1e9
4  using namespace std;
5
6  2D-Prefix sum:
7  vector<vector<int>> prefix2d(1100 , vector<int>(1100 , 0)),
8      a(1100 , vector<int> (1100 , 0));
9
10 //a & prefix arrays start from 1 to n and from 1 to m
11 void generate_prefix(int n , int m){
12     for (int i = 1; i ≤ n; i++)
13         for (int j = 1; j ≤ m; j++)
14             prefix2d[i][j] = a[i][j] + prefix2d[i-1][j] +
15                 prefix2d[i][j-1] - prefix2d[i-1][j-1];
16 }
17
18 //get prefix for square between two points (inclusive)
19 int get_prefix(int x1 , int y1 , int x2 , int y2){
20     return (prefix2d[x2][y2] - prefix2d[x2][y1-1]
21         - prefix2d[x1-1][y2] + prefix2d[x1-1][y1-1]);
22 }
23
24
25 2D-Prefix (Min / Max):
26 vector<vector<int>> prefix2d(1100 , vector<int>(1100 , inf)),
27     a(1100 , vector<int> (1100 , 0));
28
29 //a & prefix arrays start from 1 to n and from 1 to m
30 //change the (min / max) and the value in prefix array
31 void generate_prefix(int n , int m){
32     for (int i = 1; i ≤ n; i++)
33         for (int j = 1; j ≤ m; j++)
34             prefix2d[i][j] = min({a[i][j] , prefix2d[i-1][j] , prefix2d[i][j-1]});
35 }
36
37 //get prefix for square from point to (1 , 1) (inclusive)
38 int get_prefix(int x , int y){
39     return prefix2d[x][y];
40 }
41
42
43 2D-Prefix GCD:
44 vector<vector<int>> prefix2d(1100 , vector<int>(1100 , 0)),
45     a(1100 , vector<int> (1100 , 0));
46
47 //a & prefix arrays start from 1 to n and from 1 to m
48 void generate_prefix(int n , int m){
49     for (int i = 1; i ≤ n; i++)
50         for (int j = 1; j ≤ m; j++)
51             prefix2d[i][j] = __gcd( a[i][j] ,
52                 __gcd(prefix2d[i-1][j], prefix2d[i][j-1]));
53 }
54
55 //get prefix for square from the point to (1 , 1) (inclusive)
56 int get_prefix(int x , int y){
57     return prefix2d[x][y];
58 }

```