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Kth Shortest Path

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Author Solution by [ankit srivastava](#)

```
1. import java.io.*;
2. import java.util.ArrayList;
3. import java.util.StringTokenizer;
4.
5. class Solution {
6.     static boolean MAKE = true;
7.     static int SENTINEL = (int) (-1e7);
8.     static ArrayList<Integer> dp[][];
9.
10.    static void go(InputStream inputStream, OutputStream outputStream) {
11.        BufferedReader bufferedReader = new BufferedReader(new Inp
12.        PrintWriter printWriter = new PrintWriter(outputStream);
13.        int t = Integer.parseInt(bufferedReader.readLine());
14.        while (t-- > 0) {
15.            String[] args = bufferedReader.readLine().split(" ");
16.            int rowCount = Integer.parseInt(args[0]);
17.            int colCount = Integer.parseInt(args[1]);
18.            int[][] cost = new int[rowCount][colCount];
19.            for (int i = 0; i < rowCount; i++) {
20.                int j = 0;
21.                for (StringTokenizer tokenizer = new StringToken
22.                String s = tokenizer.nextToken();
23.                if (s.equals("##")) cost[i][j++] = SENTINEL;
24.                else cost[i][j++] = Integer.parseInt(s);
25.            }
26.        }
27.        dp = new ArrayList[rowCount][colCount];
28.        for (int i = 0; i < rowCount; i++) {
29.            for (int j = 0; j < colCount; j++) {
30.                dp[i][j] = new ArrayList<Integer>();
31.            }

```

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32.     }
33.     assert (cost[0][0] != SENTINEL);
34.     dp[0][0].add(cost[0][0]);
35.     for (int i = 1; i < rowCount; i++) {
36.         if(dp[i - 1][0].size() > 0 && cost[i][0] != SENTINEL)
37.             dp[i][0].add(dp[i - 1][0].get(0) + cost[i][0]);
38.     }
39.     for (int j = 1; j < colCount; j++) {
40.         if(dp[0][j - 1].size() > 0 && cost[0][j] != SENTINEL)
41.             dp[0][j].add(dp[0][j - 1].get(0) + cost[0][j]);
42.     }
43.     for (int i = 1; i < rowCount; i++) {
44.         for (int j = 1; j < colCount; j++) {
45.             ArrayList<Integer> top = dp[i - 1][j];
46.             ArrayList<Integer> left = dp[i][j - 1];
47.             if (cost[i][j] == SENTINEL) continue;
48.             int p1 = 0, p2 = 0;
49.             while (p1 < top.size() && p2 < left.size() &&
50.                 (top.get(p1) < left.get(p2))) {
51.                 dp[i][j].add(top.get(p1) + cost[i][j]);
52.                 p1++;
53.             } else {
54.                 dp[i][j].add(left.get(p2) + cost[i][j]);
55.                 p2++;
56.             }
57.             while (p1 < top.size() && p1 + p2 < 101) {
58.                 dp[i][j].add(top.get(p1) + cost[i][j]);
59.                 p1++;
60.             }
61.             while (p2 < left.size() && p1 + p2 < 101) {
62.                 dp[i][j].add(left.get(p2) + cost[i][j]);
63.                 p2++;
64.             }
65.         }
66.     }
67. }
68. int queryCount = Integer.parseInt(bufferedReader.readLine());
69. while (queryCount --> 0) {
70.     int query[] = new int[3];
71.     int j = 0;
72.     for (StringTokenizer tokenizer = new StringTokenizer(bufferedReader.readLine());
73.          tokenizer.hasMoreTokens(); j++)
74.         query[j] = Integer.parseInt(tokenizer.nextToken());
75. }
76. int tx = query[0], ty = query[1], k = query[2];
77. if(cost[tx][ty] == SENTINEL) printWriter.println(-1);
78. else if(dp[tx][ty].size() < k) printWriter.println(-1);
79. else printWriter.println(dp[tx][ty].get(k - 1));
80. }
81. }
82. printWriter.close();
83. }
84.
85. public static void main(String[] args) throws IOException {

```

```

86.      InputStream inputStream = System.in;
87.      OutputStream outputStream = System.out;
88.      for (int i = 0; i < 1; i++) {
89.          go(inputStream, outputStream);
90.      }
91.  }
92. }

```

Tester Solution by Prateek Gupta

```

1. #include <bits/stdc++.h>
2.
3. using namespace std;
4.
5. vector <int> dp[102][102];
6. int A[102][102];
7. bool obs[102][102];
8.
9. int main()
10. {
11.     int t,n,m,q,x,a,b;
12.     cin >> t;
13.     while ( t-- ) {
14.         cin >> n >> m;
15.         for ( int i = 0; i < n; i++ ) {
16.             for ( int j = 0; j < m; j++ ) obs[i][j] = false,
17.         }
18.         for ( int i = 0; i < n; i++ ) {
19.             for ( int j = 0; j < m; j++ ) {
20.                 string s;
21.                 stringstream ss;
22.                 ss.clear();
23.                 cin >> s;
24.                 if ( s == "##" ) obs[i][j] = true, A[i][j]
25.                 else {
26.                     ss << s;
27.                     ss >> A[i][j];
28.                 }
29.             }
30.         }
31.         if ( !obs[0][0] ) dp[0][0].push_back(A[0][0]);
32.         for ( int i = 1; i < n; i++ ) {
33.             if ( !obs[i][0] ) {
34.                 if ( (int)dp[i-1][0].size() > 0 ) dp[i][0]
35.             }
36.         }
37.         for ( int j = 1; j < m; j++ ) {
38.             if ( !obs[0][j] ) {
39.                 if ( (int)dp[0][j-1].size() > 0 ) dp[0][j]
40.             }
41.         }
42.     }

```

```

43.     for ( int i = 1; i < n; i++ ) {
44.         for ( int j = 1; j < m; j++ ) {
45.             if ( !obs[i][j] ) {
46.                 int sz1 = (int)dp[i-1][j].size();
47.                 int sz2 = (int)dp[i][j-1].size();
48.                 int idx1 = 0, idx2 = 0, cnt = 0;
49.                 while ( (idx1 < sz1 || idx2 < sz2)
50.                     if ( idx2 == sz2 ) {
51.                         dp[i][j].push_back(
52.                             idx1++;
53.                     }
54.                     else if ( idx1 == sz1 ) {
55.                         dp[i][j].push_back(
56.                             idx2++;
57.                     }
58.                     else {
59.                         if ( dp[i-1][j][idx1] < dp[i][j-1][idx2] ) {
60.                             dp[i][j].push_back( dp[i-1][j][idx1] );
61.                             idx1++;
62.                         }
63.                         else {
64.                             dp[i][j].push_back( dp[i][j-1][idx2] );
65.                             idx2++;
66.                         }
67.                     }
68.                     cnt++;
69.                 }
70.             }
71.         }
72.     }
73.     cin >> q;
74.     while ( q-- ) {
75.         cin >> a >> b >> x;
76.         if ( obs[a][b] ) {
77.             cout << "Obstacle" << endl;
78.             continue;
79.         }
80.         else if ( x > (int)dp[a][b].size() ) {
81.             cout << "Not so many paths" << endl;
82.             continue;
83.         }
84.         cout << dp[a][b][x-1] << endl;
85.     }
86. }
87. return 0;
88. }

```

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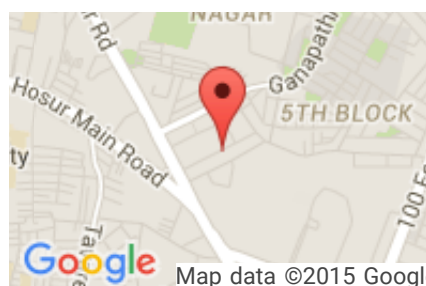
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