

CSI3108-01

2015. 10. 05

Programming HW#4

Max 40 points

Due on Oct. 13 (Tuesday), 2015, by 5 pm

Given a graph, write a **Java** program that finds the minimum cut by implementing the randomized min-cut algorithm. You should also implement Union-by-Rank and Path Compression for the disjoint set operations (Union and Find ops) to find a minimum weight spanning tree with Kruskal's algorithm.

Input

The input consists of a sequence of 20 test cases. Each test case consists of $m + 1$ lines, where m is the number of edges in the graph. In the first line, two integers n and m are given, where n is the number of vertices in the graph. The each of the next m lines has two integers, indicating the endpoints of the edge. The labels of the vertices are 0, 1, 2, ..., $n-1$. The maximum value of n is 1,000.

Output

There should be one line of output for each test case in the input file. For each test case, print out a single integer, indicating the size of the minimum cut of the graph found by the randomized Min-Cut algorithm.

Sample Input

20 // the no of test cases =20	1 2
8 11 // $\leftarrow n=8, m=11$, test case #1	1 3
0 1	1 4
0 4	2 5
1 4	2 6
1 5	2 7
4 5	3 4
2 3	4 5
2 5	4 6
2 6	5 6
3 6	5 7
3 7	6 7
6 7	...
8 15 // $\leftarrow n=8, m=15$, test case #2	
0 1	
0 3	
0 4	

Sample Output

1 // test case #1
3 // test case #2
...

Test case #1 example

