Started on	Wednesday, 27 March 2024, 5:47 PM
State	Finished
Completed on	Wednesday, 27 March 2024, 5:56 PM
Time taken	8 mins 25 secs
Grade	**10.00** out of 10.00 (**100**%)

Question 1

Correct

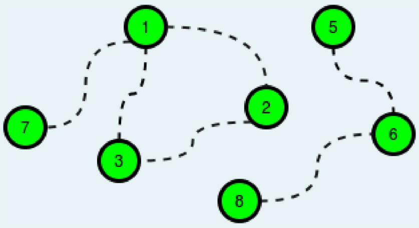
Mark 10.00 out of 10.00

Determine the minimum cost to provide library access to all citizens of HackerLand. There are n cities numbered from 1 to n. Currently there are no libraries and the cities are not connected. Bidirectional roads may be built between any city pair listed in $cities$. A citizen has access to a library if:

- Their city contains a library.
- They can travel by road from their city to a city containing a library.

Example

The following figure is a sample map of HackerLand where the dotted lines denote possible roads:



$c\_road = 2$
$c\_lib = 3$
$cities = [[1,7],[1,3],[1,2],[2,3],[5,6],[6,8]]$

The cost of building any road is $cc\_road = 2$, and the cost to build a library in any city is $c\_lib = 3$. Build 5 roads at a cost of $5 \times 2 = 10$ and 2 libraries for a cost of 6. One of the available roads in the cycle $1 \rightarrow 2 \rightarrow 3 \rightarrow 1$ is not necessary.

There are q queries, where each query consists of a map of HackerLand and value of c_lib and c_road. For each query, find the minimum cost to make libraries accessible to all the citizens.

Function Description

Complete the function *roadsAndLibraries* in the editor below.
roadsAndLibraries has the following parameters:

- *int n*: integer, the number of cities
- *int c_lib*: integer, the cost to build a library
- *int c_road*: integer, the cost to repair a road
- *int cities[m][2]*: each $cities[i]$ contains two integers that represent cities that can be connected by a new road

Returns
- *int*: the minimal cost

Input Format

The first line contains a single integer q, that denotes the number of queries.

The subsequent lines describe each query in the following format:
- The first line contains four space-separated integers that describe the respective values of n, m, c_lib and c_road, the number of cities, number of roads, cost of a library and cost of a road.
- Each of the next m lines contains two space-separated integers, $u[i]$ and $v[i]$, that describe a bidirectional road that can be built to connect cities $u[i]$ and $v[i]$.

Constraints

- $1 \leq q \leq 10$
- $1 \leq n \leq 10^5$
- $0 \leq m \leq min(10^5, \frac{n \cdot (n-1)}{2})$
- $1 \leq c\_road, c\_lib \leq 10^5$
- $1 \leq u[i], v[i] \leq n$
- Each road connects two distinct cities.

For example:

Input	Result

2
3 3 2 1
1 2
3 1
2 3
6 6 2 5
1 3
3 4
2 4
1 2
2 3
5 6
	4
	12

Answer: (penalty regime: 0 %)

Reset answer

```
        string first_multiple_input_temp;
        getline(cin, first_multiple_input_temp);

        vector<string> first_multiple_input = split(rtrim(first_multiple_input_temp));

        int n = stoi(first_multiple_input[0]);

        int m = stoi(first_multiple_input[1]);

        int c_lib = stoi(first_multiple_input[2]);

        int c_road = stoi(first_multiple_input[3]);

        vector<vector<int>> cities(m);

        for (int i = 0; i < m; i++)
        {
            cities[i].resize(2);

            string cities_row_temp_temp;
            getline(cin, cities_row_temp_temp);

            vector<string> cities_row_temp = split(rtrim(cities_row_temp_temp));

            for (int j = 0; j < 2; j++)
            {
                int cities_row_item = stoi(cities_row_temp[j]);

                cities[i][j] = cities_row_item;
            }
        }

        long result = roadsAndLibraries(n, c_lib, c_road, cities);

        cout << result << "\n";
    }

    return 0;
}

string ltrim(const string &str)
{
    string s(str);

    s.erase(
        s.begin(),
        find_if(s.begin(), s.end(), not1(ptr_fun<int, int>(isspace))));

    return s;
}

string rtrim(const string &str)
```

	Input	Expected	Got	
✓	2 3 3 2 1 1 2 3 1 2 3 6 6 2 5 1 3 3 4 2 4 1 2 2 3 5 6	4 12	4 12	✓
✓	5 9 2 91 84 8 2 2 9 5 9 92 23 2 1 5 3 5 1 3 4 3 1 5 4 4 1 5 2 4 2 8 3 10 55 6 4 3 2 7 1 1 0 5 3 2 0 102 1	805 184 80 5 204	805 184 80 5 204	✓
✓	1 5 3 6 1 1 2 1 3 1 4	15	15	✓

Passed all tests! ✓

▸ Show/hide question author's solution (Cpp)

Correct

Marks for this submission: 10.00/10.00.