Minimum MST Graph

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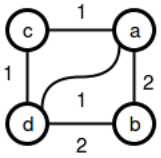
Problem Submissions Leaderboard Discussions Editorial

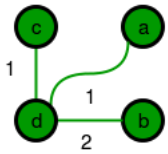
Allison loves graph theory and just started learning about Minimum Spanning Trees(MST). She has three integers, n, m, and s, and uses them to construct a graph with the following properties:

- The graph has n nodes and m undirected edges where *each edge has a positive integer length*.
- No edge may directly connect a node to itself, and each pair of nodes can only be directly connected by *at most* one edge.
- The graph is *connected*, meaning each node is reachable from any other node.
- The *value* of the minimum spanning tree is s. Value of the MST is the sum of all the lengths of all edges of which are part of the tree.
- The sum of the lengths of all edges is as small as possible.

For example, let's say $n = 4$, $m = 5$ and $s = 4$. We need to construct a graph with 4 nodes and 5 edges. The value of minimum spanning tree must be 4. The diagram belows shows a way to construct such a graph while keeping the lengths of all edges is as small as possible:



Original Graph



Minimum Spanning Tree

Here the sum of lengths of all edges is 7.

Given n, m, and s for g graphs satisfying the conditions above, find and print the minimum sum of the lengths of all the edges in each graph on a new line.

Note: It is guaranteed that, for all given combinations of n, m, and s, we can construct a valid graph.

Input Format

The first line contains an integer, g, denoting the number of graphs.
Each of the g subsequent lines contains three space-separated integers describing the respective values of n (the number of nodes in the graph), m (the number of edges in the graph), and s (the value of the MST graph).

Constraints

For 20% of the maximum score:

- $1 \leq g \leq 100$
- $2 \leq n \leq 10$
- $1 \leq m \leq 50$
- $1 \leq s \leq 20$

For 50% of the maximum score:

- $1 \leq g \leq 100$

- $2 \leq n \leq 50$
- $1 \leq m \leq 2000$
- $1 \leq s \leq 200$

For 70% of the maximum score:

- $1 \leq g \leq 100$
- $2 \leq n \leq 10^5$
- $1 \leq m \leq 10^{10}$
- $1 \leq s \leq 10^6$

For 100% of the maximum score:

- $1 \leq g \leq 1000$
- $2 \leq n \leq 10^8$
- $1 \leq m \leq 10^{16}$
- $1 \leq s \leq 10^{10}$

Output Format

For each graph, print an integer on a new line denoting the minimum sum of the lengths of all edges in a graph satisfying the given conditions.

Sample Input

```
2
4 5 4
4 3 6
```

Sample Output

```
7
6
```

Explanation

- Graph 1:

The answer for this sample is already explained the problem statement.

- Graph 2:

We must construct a graph with $n = 4$ nodes, $m = 3$ edges, and an MST value of $s = 6$. Recall that a connected graph with n nodes and $n - 1$ edges is already a tree, so the MST will contain all $m = 3$ edges and the total length of all the edges of the graph will be equal to the value of the minimum spanning tree. So the answer is 6.

```
import java.util.*;
import java.text.*;
import java.math.*;
import java.util.regex.*;

public class Solution {

    public static void main(String[] args) {
        Scanner in = new Scanner(System.in);
        int g = in.nextInt();
        for(int a0 = 0; a0 < g; a0++){
            int n = in.nextInt();
            int m = in.nextInt();
            int s = in.nextInt();
            // your code goes here
        }
    }
}

```

Line: 1 Col: 1

Upload Code as File Test against custom input Run Code Submit Code