**Problem Statement:**

Run empirical studies to analyze the length of the longest edge in the MST and the number of graph edges that are not longer than the longest edge which we found.

**Procedure:**

In this problem we use different java files like GraphGenerator.java, MaxPQ.java, StdRandom.java, Stack.java, Edge.java, Kruskala.java, UF.java etc.

After using these files , different kind of graphs are generated. Some of them are Cycle graph, Complete graph, Binary tree graph, Star graph , Wheel graph, etc.

We study about the different types of graphs and how do they work. In the given graph we find the Minimum Spanning Tree and then find the maximum weight of the edges present in the MST.After getting the maximum weight, we will compare this weight to the all other weights in the complete graph and then find number of weights which are less than the maximum weight in MST in the complete graph.

In the code, First we give the number of vertices and edges for a graph to build .Then we find the MST of given graph. After that we create a MaxPQ to insert weights present in the MST and then find the maximum weight.After getting that then we will iterate through the graph and find all the weights which are less than the maximum weight in MST.

**Analysis:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| graph | vertices | edges | Maximum weight | Number of edges less than maximum edge | Ratio of the number of the edges less than maximum edge to the number of edges |
| graph1 | 7 | 15 | 10 | 6 | 0.4 |
| graph2 | 10 | 40 | 16 | 20 | 0.5 |
| graph3 | 15 | 20 | 28 | 9 | 0.45 |
| graph4 | 24 | 40 | 18 | 8 | 0.2 |

**Conclusion:**

Here we get different numbers for different graphs.It all depends on the number of edges and number of vertices.It also depends on the weights of the edges in the graph.