

Program Structures and Algorithms  
Spring 2023(SEC -03)

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**Task:**

Assignment 4 (WQUPC)

**Relationship Conclusion:**

y – connections

x – sites

$y = x - 1$

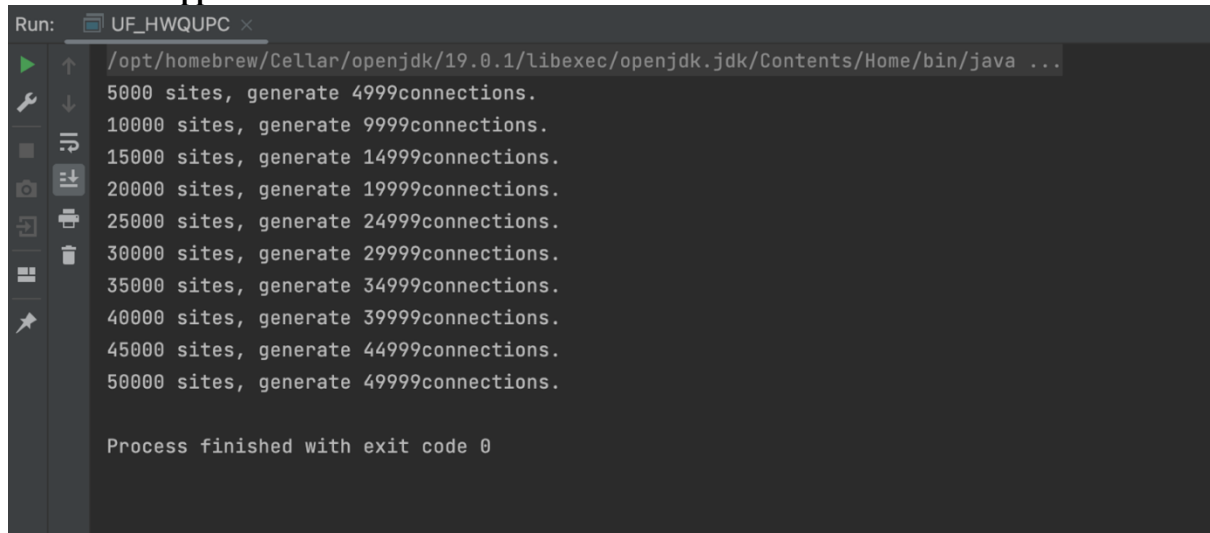
**Proof:**

Because every node is connected and has no cycle, the final graph is a tree. A tree with n vertices can have at most n-1 edges. So, the connections we generate must be less than the sites we have. ( $y < n$ )

Every time we make a connection, we can reduce the total components by 0 or 1. Finally, we will only have 1 component. So, the connections we generate must be at least n-1. ( $y \geq n-1$ )

So, we will exactly generate n-1 connections.

**Evidence to support that conclusion:**

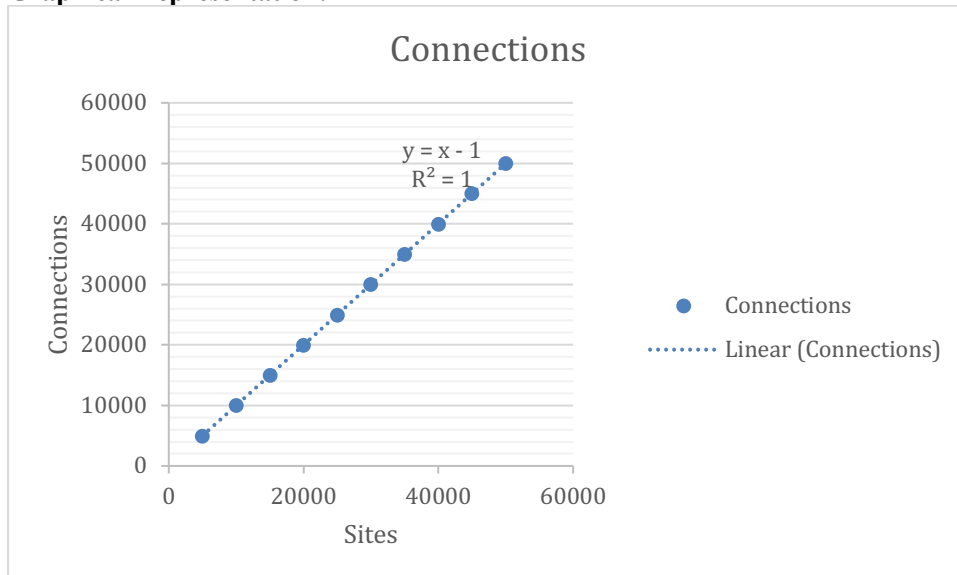


```
Run: UF_HWQUPC x
/opt/homebrew/Cellar/openjdk/19.0.1/libexec/openjdk.jdk/Contents/Home/bin/java ...
5000 sites, generate 4999connections.
10000 sites, generate 9999connections.
15000 sites, generate 14999connections.
20000 sites, generate 19999connections.
25000 sites, generate 24999connections.
30000 sites, generate 29999connections.
35000 sites, generate 34999connections.
40000 sites, generate 39999connections.
45000 sites, generate 44999connections.
50000 sites, generate 49999connections.

Process finished with exit code 0
```

Sites	Connections
5000	4999
10000	9999
15000	14999
20000	19999
25000	24999
30000	29999
35000	34999
40000	39999
45000	44999
50000	49999

## Graphical Representation:



## Unit Test Screenshots:

