

Assignment 1:

Hypothesis:

Due to the nature of the RB-trees I hypothesize that the percentage of red nodes should be roughly around 25% of the total tree. This is due to the fact that every red node will have 2 black children, and if there can never be 2 red nodes in sequence. Thus I believe that roughly 1 out of every 4 nodes will be red.

Test Cases:

```
H:\CSC226\Assignments>java RedBlackBST test10.txt
Reading from file: test10.txt
Percent of Red Nodes: 20.0
```

```
H:\CSC226\Assignments>java RedBlackBST test100.txt
Reading from file: test100.txt
Percent of Red Nodes: 3.0
```

```
H:\CSC226\Assignments>java RedBlackBST test1000.txt
Reading from file: test1000.txt
Percent of Red Nodes: 0.6
```

```
H:\CSC226\Assignments>java RedBlackBST
Size of tree is 10000
Percent of Red Nodes: 25.169999999999998
Size of tree is 100000
Percent of Red Nodes: 25.323
Size of tree is 1000000
Percent of Red Nodes: 25.4217
H:\CSC226\Assignments>
```

The expected results of 25 percent became much better once the RB-trees were created with random numbers. Essentially the trees at this point became much more balanced.