

Hypothesis for the Percentage of Red Nodes in Any Red Black tree

Based on the results recorded in figure A, the expected value tends closer to 25.39 as the number of inputs increases. Further, the average of all expected value results was observed to be 25.3913335833333333, which is of course ~ 25.39 .

To conclude, based on analysis of the data in figures A and B, the expected percentage of red nodes in any Red Black tree is hypothesized to be ~ 25.39 .

Figure A.

Results for n randomized inputs ran through 100 trials

The Expected value for $n = 10000$: 25.395500
The Expected value for $n = 100000$: 25.393890
The Expected value for $n = 1000000$: 25.391879

The Expected value for $n = 10000$ is: 25.410200
The Expected value for $n = 100000$ is: 25.400820
The Expected value for $n = 1000000$ is: 25.389173

The Expected value for $n = 10000$: 25.365700
The Expected value for $n = 100000$: 25.384850
The Expected value for $n = 1000000$: 25.391522

Results for n randomized inputs ran through 200 trials

The Expected value for $n = 10000$: 25.382500
The Expected value for $n = 100000$: 25.397110
The Expected value for $n = 1000000$: 25.392859

Figure B.

Averages for all Expected Values

$n = 10000$:
25.388475

$n = 100000$:
25.3941675

$n = 1000000$

25.39135825

Average of all percentage results:

25.391333583333333