Question 5: One Hundred Puzzles Data

|  |  |
| --- | --- |
| Fraction solved: | 0.46 => 46% |
| Average path length: | 21.587 |
| Longest path length: | 26 |

Question 6: Hardest 8-Puzzle

The hardest puzzle with 31 moves is “806547231”

path length: 31. seconds to run: 1.828125.

|8 0 6|

|5 4 7|

|2 3 1|

|8 6 0|

|5 4 7|

|2 3 1|

|8 6 7|

|5 4 0|

|2 3 1|

|8 6 7|

|5 0 4|

|2 3 1|

|8 6 7|

|5 3 4|

|2 0 1|

|8 6 7|

|5 3 4|

|0 2 1|

|8 6 7|

|0 3 4|

|5 2 1|

|8 6 7|

|3 0 4|

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|8 0 7|

|3 6 4|

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|0 8 7|

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|4 7 5|

|6 0 8|

|3 1 2|

|4 0 5|

|6 7 8|

|3 1 2|

|0 4 5|

|6 7 8|

|0 1 2|

|3 4 5|

|6 7 8|

Question 7: DFS

The run time is significantly slower, about 20 minutes even for a one-move puzzle. The length of path outputted is also significantly longer, as it checks the path all the way down a branch. The most recent call for “087654321” ran for 820.921 seconds and had a path of 41910 states.

Question 9: Bar Graph for Path Length and Their Frequency for Goal State “012345678”

Question 10: Bar Graph for Path Length and Their Frequency for Goal State “123405678”

Question 9/10: Analysis

The bar graph is similar because the frequencies of path length is greatest between 22 and 24 states. This makes sense as majority of the states cannot be very close or very far from the goal state. The difference in the graphs are a shift in frequencies because of the placement of the empty. There are more lower path length frequencies in “1234506789” because the empty is more centralized so it is easier for states to reach.