Tevin Jeffrey

Homework #1 – Intro to Artificial Intelligence

**Explain the following concepts**

1. **Artificial Intelligence**

A simulation of human intelligence through the use of machines. This includes computer systems that like humans and think rationally in addition to acting like humans and acting rationally through reason and learning.

1. **Turing Test**

The Turing test a test to determine whether or not a computer is capable of thinking like a human. The test is named after Alan Turing

1. **State Space**

The state space is the set of all reachable states in a system.

**Find the state space of the following 2x2 puzzle by listing all its reachable states.**

|  |  |
| --- | --- |
| 1 | 2 |
| 3 |  |

|  |  |
| --- | --- |
| 3 | 1 |
| 2 |  |

|  |  |
| --- | --- |
| 2 | 3 |
| 1 |  |

|  |  |
| --- | --- |
| 1 |  |
| 3 | 2 |

|  |  |
| --- | --- |
| 3 |  |
| 2 | 1 |

|  |  |
| --- | --- |
| 2 |  |
| 1 | 3 |

|  |  |
| --- | --- |
|  | 1 |
| 3 | 2 |

|  |  |
| --- | --- |
|  | 3 |
| 2 | 1 |

|  |  |
| --- | --- |
|  | 2 |
| 1 | 3 |

|  |  |
| --- | --- |
| 3 | 1 |
|  | 2 |

|  |  |
| --- | --- |
| 2 | 3 |
|  | 1 |

|  |  |
| --- | --- |
| 1 | 2 |
|  | 3 |

**Show that the 8-puzzle state are divided into two disjoint sets, such that any state is reachable from the any other state in the same set, while no state is reachable from any state that is in the other set.**

|  |  |  |
| --- | --- | --- |
| 1 | 2 | 3 |
| 4 | 5 | 6 |
| 7 | 8 |  |

A = Goal state

|  |  |  |
| --- | --- | --- |
| 1 | 8 | 2 |
|  | 4 | 3 |
| 7 | 6 | 5 |

B = Reachable

|  |  |  |
| --- | --- | --- |
| 8 | 1 | 2 |
|  | 4 | 3 |
| 7 | 6 | 5 |

C = Not Reachable

An inversion is when a tile precedes another tile with a lower number on it. The goal state has zero inversion. If the grid width is odd, then the number of inversions in a reachable set is even. Moving a tile horizontally does not change the number of inversion, however moving the tiles vertically may either keep the number of inversions the same, increase the number of inversions by 2 or decrease the number of inversions by 2.

This creates two disjoint sets where the number of inversions are either even or odd.

B = 0 + 6 + 0 + 1 +0 + 2 + 1 = 10

C =7 + 0 + 0 + 1 + 0 + 2 +1 = 11