Task 1: Transforming 8-puzzle to 15-puzzle

-File: fifteenpuzzle.py

The 8-puzzle operates in a 3 by 3 table, one blank space, and 8 other spaces. As for the 15-puzzle, it should instead operate in a 4 by 4 tables, with 1 blank space and 15 other spaces, hence the name 15-puzzle. To support a 4x4 table, we changed:

-The row & col count both to 4 in the FifteenPuzzleState constructor where the table cells are initialized, and the isGoal(self) function where it handles goal checking of the current state:

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-The legalMoves(self) function to not allow movement beyond the newly extended table borders (row < 3 for down, col < 3 for right):

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-The ASCII drawing function getAsciiString(self) to handle drawing a larger 4x4 table:

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-The rest of the changes in the fifteenpuzzle.py file represent name refactoring of the classes and functions to better suit the FifteenPuzzle context, as well as commenting out the unused loadFifteenPuzzle:

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-Execution Trace:  
Running fifteenpuzzle.py:

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The Final State:  
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Task 2: Heuristic h1, h2, h3, and h4 implementation in the 15-puzzle:

-Heuristic 1: Number of Misplaced Tiles:  
The first heuristic consists of calculated the number of misplaced tiles from the goal state.

The implemented function h1 goes as follows:

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Usage in the A\* function:

For all the heuristics, replacing the nullHeuristic with the intended one would suffice:

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Execution Trace: