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| **Question** | **Comments** | **Marks awarded** |
| Part 1:  1. What representation do you think will be best to implement? Why? **(2 marks)** |  | 2 |
| 2. What is the optimal number of moves for a Towers of Hanoi problem with n columns  and m rings? **(2 marks)** |  | 2 |
| 3. Write pseudocode to perform the node expansion for this problem. (i.e. in the 8-  Puzzle we have the left, right, up, down movement functions) **(2 marks)** |  | 2 |
| 4. Sketch the first four levels (i.e., root node plus next three levels) of the breadth-firstsearch search tree. Make sure that you indicate the state corresponding to each node, and the operators that have been applied to move from one state to another. Do not include illegal states, or states that have already been visited. **(2 marks)** |  | 2 |
| 5. As discussed in Lab 3, the heuristic function to a problem varies based on application. For the 8-Puzzle problem, we utilized a count of all misplaced tiles; for the Shortest Path Problem we calculated the distance to the end node. What heuristic function can be used for the Towers of Hanoi Problem? (hint: the end goal is to have all rings on the final column) **(2 marks)** |  | 2 |
| 6. As in question 4, Sketch the first four levels (i.e., root node plus next three levels) of  the A\* search tree. **(2 marks)** |  | 2 |
| Part 2:  Breadth-First Search algorithm Implementation **(15 marks)** |  | 15 |
| A\* search algorithm Implementation **(15 marks)** |  | 15 |
| Report Clarity **(8 marks)** |  | 8 |
| **Overall Total (out of 50)** |  | 50 |