Name:_____

CSE 3521 Artificial Intelligence AU'15

Homework Assignment #3 (23 points)
Due: Thursday, Sep. 17

This assignment requires coding in Matlab. Use the template Matlab function files provided in `HW3_template.zip` to get started.

1. Implement a successor function and goal test function for the 8-puzzle problem, as described in the slides. Refer to the provided template files `successor_8puzzle.m` and `goaltest_8puzzle.m` for more detailed instructions. (Also see the `examples/` folder for examples of these functions for some other problems.) (4 pts)

2. Come up with several board configurations and test your functions from (1) against them. (Be sure to include the goal state!) Do the results from your functions match your expectations? Explain. (1 pt)

3. Implement the breadth-first search algorithm. Refer to the provided template file `bfs.m` for more detailed instructions. (6 pts)

   NOTE: The search functions are designed to be generic (i.e. usable for many different problems) so they accept the successor and goal test functions as arguments. The syntax for this is to prefix the name of the function with the @ symbol. For example:

   ```
   [state,path] = bfs([0 1 2 3 4 5 6 7 8],@successor_8puzzle, @goaltest_8puzzle)
   ```

   HINT: Because the functions are generic, you can also use the provided example successor and goal test functions as additional ways to test your code.

4. Implement the depth-limited search algorithm. Refer to the provided template file `dls.m` for more detailed instructions. (6 pts)

5. Implement the iterative-deepening search algorithm. Refer to the provided template file `ids.m` for more detailed instructions. (4 pts)

(continued)

6. Come up with several board configurations and test your 3 search functions on them (you may re-use the boards from (2)). For depth-limited search, use a

depth limit of 31. Do the returned solutions (or lack thereof) match your expectations? Explain.

Also, modify your successor function to count the number of times it has been called (i.e., the number of states that have been expanded). Report the number of states expanded for each board and function combination. Do these values match your expectations? Explain. (2 pts)

HINT: You may use the provided `set_expanded_state_count` and `set_expanded_state_count` functions for this. Be sure to set the count to 0 before each run!

Create (and submit in class) a report including answers to the asked questions and a printout of your code. Also, create a ZIP archive of your code files and submit it in the Homework 3 dropbox on Carmen.