In this assignment, your task is to implement the A^* algorithm and investigate the impact of heuristic quality on search performance. In particular, your task is to reproduce the experimental results of Russell and Norvig in the 8-puzzle domain. Their experimental set-up and results are described on page 104 of the textbook (figure 3.29 and the text accompanying it).

A couple of things to note:

- In the description of their experiments, Russell and Norvig state that they "generated 1200 random problems". How are you going to generate random instances of the 8-puzzle problem (i.e., random starting configuration)? Simply picking a random position for each tile will not work — recall that the state space for the 8-puzzle actually comprises two disconnected components. If your starting position happens to be drawn from the wrong component, then there will be no path that leads you to the goal state and the puzzle will be unsolvable.
- Some program design advice: begin by writing a class to encapsulate the state and behavior of the puzzle board. Implement the A^* algorithm itself in a separate module using a collection of functions/static methods.

Your primary deliverable for this assignment is a write-up composed in LaTeX, formatted using the AAAI template. You will also submit a zip archive of your code via Moodle.

Optional Extra-Credit Task: In addition to the two heuristics discussed in the textbook, implement a third, admissible heuristic from the literature on heuristic search and compare it's performance to the h_1 and h_2. The following paper suggests one heuristic, and includes references to other papers that discuss other heuristics, and would be a good starting point for your research:

`http://academiccommons.columbia.edu/catalog/ac%3A141289`