

1. (10 points)
 - (a) Problem 3.4, pg. 113. Assume for the moment that we list all of the tiles in a single line, one row at a time. The goal state now looks like 1,2,3,4,5,6,7,8,blank, and an initial state might look like 4,2,3,7,5,blank,1,6,8. An *inversion* is a set of two numbers in the list a and b where a comes before b in the list but $a > b$. An example of an inversion would be the numbers 4 and 2 in the initial state listed above. Let N be the total number of inversions in the list (for example in the goal state $N = 0$, while in the initial state listed above $N = 8$). Now consider what legal actions for the 8-puzzle will do to N .
 - (b) Modify your argument above to prove that the 15-puzzle state space can be divided in a similar manner.
2. (5 points) Problem 3.5, pg. 113.
3. (10 points) Problem 3.6, pg. 113. Do only parts a) and d).
4. (10 points) Problem 3.9, part a, pg. 115. Use your state space diagram to find a solution to the problem.
5. (10 points) Problem 3.15, pg. 116.
6. (5 points) Problem 3.18, pg. 117.