Homework #1: Chapters 2,3,4 and 6

The following exercises are due at the beginning of class on February 10.

1. *[5 points each part, 20 points total]* Do exercise 2.5 from the book (p. 57)
2. *[10 points]* Do exercise 3.7(d) from the book (p. 90). You can give the successor function by describing each action formally (i.e., precisely describe what kinds of states each action can be used in and how the state is changed when it is applied).
3. *[20 points]* Consider the 8-puzzle with the initial and goal states shown below. Use breadth-first search to solve this problem. In order to reduce unnecessary search, you can ignore moves that return you to the state you just came from. Show your search tree, and label each node with the order in which it is expanded. Hint: Your tree should have 5 levels (not including the root node), some of which may have almost 15 nodes, so be sure to leave room to fit it on one sheet of paper.

Initial State

2	8	3
1	6	4
7		5

Goal State

1	2	3
8		4
7	6	5

4. *[20 points]* Reconsider the 8-puzzle problem from exercise 3 above. This time, use A* to solve the problem. Assume that your path cost is 1 per move and that your heuristic function is the number of tiles that are out of place. Show your search tree, complete with f(n), g(n) and h(n) values for each node. Once again, when expanding nodes, assume that you can ignore actions that return you to the previous state. How does your solution compare with that found by breadth-first search? Is one of the algorithms better than the other? Why or why not?
5. *[6 points each part, 30 points total]* Do exercise 6.1 from the book (p. 189).