1. Sudoku  

Consider the popular game Sudoku, in which one tries to fill a 9 x 9  
grid of squares with numbers subject to some constraints:

- every row must contain all of the digits 1,2, ..., 9  
- every column must contain all of the digits 1,2, ..., 9  
- each of the 9 different 3 x 3 boxes (look online if you don’t know  
  what I’m talking about :) must also contain all of the digits 1, .  
  . . , 9  

A game is specified by filling in some of the boxes with numbers (in  
our case $M$). Each game is guaranteed to have a single solution, that  
is, there is only one assignment to the empty squares which satisfies all  
the constraints. For the purposes of this homework, use $n_{i,j}$ to refer  
to the number in row $i$, column $j$ of the grid.

(a) Formalize this problem as an incremental search problem. What  
    are the start state, actions, goal test, and edge costs?  
(b) What is the branching factor, solution depth, and maximum  
    depth of the search space? What is the size of the state space?  
(c) Assuming we don’t use a heuristic, which of the following would  
    you recommend for solving the incremental search formulation of  
    this problem: DFS, BFS, or Iterative Deepening (ID)? Why?  
(d) Assuming we use the incremental search formulation, is heuristic  
    search possible? If so, provide a heuristic. If not, why not?

2. Exercise 3.15 (parts a + b)
3. Exercise 3.18

4. Exercise 3.21

5. Exercise 3.23 (if you want more practice with A*)