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*)