Problem 1. True or False? You don't need to explain your answers

1. $h(n) = 0$ is an admissible heuristic for the 8-queens problem.

   True, since

   $$\begin{aligned} h(n) &\leq c(n) \\ 0 &\leq c(n) \end{aligned}$$

   where $c(n)$ is the actual cost to reach the goal state from node n.

2. Assume that a rook can move on a chessboard one square at a time vertically or horizontally, but cannot jump over other pieces. Manhattan distance is an admissible heuristic for the problem of moving the rook from square A to square B in the smallest number of moves.

   True, since the Manhattan distance represents the minimum number of moves required to reach the goal state. Any solution can only be greater or equal to the heuristic.

Problem 2. The heuristic path algorithm is a best-first search in which the evaluation function is $f(n) = (2-w) \cdot g(n) + w \cdot h(n)$. What kind of search does this perform for $w = 0, w = 1$, and $w = 2$?

$$\begin{cases} 2 \cdot g(n) & w = 0 \quad (UCS) \\ g(n) + h(n) & w = 1 \quad (A^*) \\ 2 \cdot h(n) & w = 2 \quad (Greedy) \end{cases}$$

Problem 3. Give the name of the algorithm that results from each of the following cases:

1. Local beam search with $k = 1$.

   This is the same as keeping track of one current state which is the hill-climbing search algorithm.

2. Simulated annealing with $T = \infty$ at all times.