1. True or false: Local search is a form of systematic search.

2. True or false: Local search is guaranteed to find the optimal solution to a problem.

3. What is the minimum number of states that a local search algorithm must keep track of? What is the maximum?

4. What are the advantages and disadvantages of keeping track of more states in local search?

5. As you probably already know, a Traveling Salesperson Problem (TSP) for a set of cities involves finding the shortest tour (path) that visits each city exactly once. In the classic version of the problem, you are given a symmetric matrix of distances between cities, and all cities are connected (i.e., they form a complete graph). Variations involve having actual road networks (limited connectivity) and asymmetric distances.

   Formulate the classic TSP as a local search problem.

6. Suppose you have a set of Boolean (true/false) variables, and a set of rules of the form “if $x_1$ is true, then $x_2$ must be false,” or “if both $x_1$ and $x_2$ are true, then either $x_3$ or $x_4$ are true,” and so on. Your goal is to find values (true or false) for each of the Boolean variables ($x_i$) such that all the rules are satisfied.

   Formulate this so-called Boolean Satisfiability Problem as a local search problem.