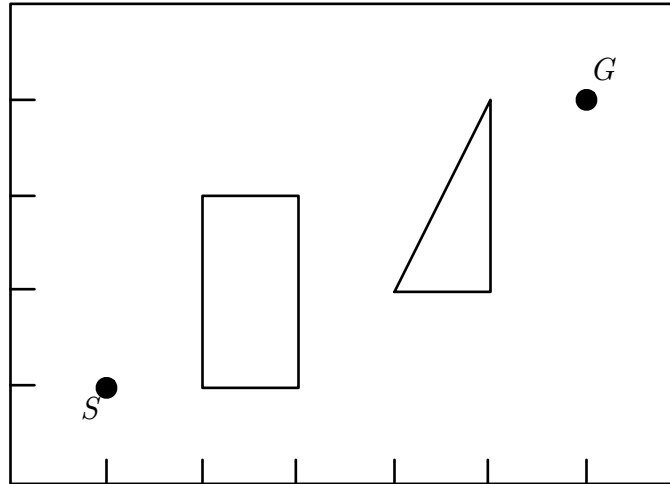


CSC242: Homework 1.5
AIMA Chapter 4.0–4.1.2

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. Consider the problem of finding the shortest path between two points S and G on a plane that has convex polygonal obstacles as illustrated in the following figure:



- (a) Suppose the state space consists of all (x, y) positions in the plane. What is the size of the state space? How many paths are there between S and G ?
- (b) Describe a better formulation of the problem that is more amenable to state-space search. You may assume that you can get arbitrarily close to the obstacles.
- (c) Using straight-line distance as a heuristic, show the execution of greedy local search to compute the length of the shortest path between S and G in the situation shown in the figure.
- (d) Does greedy local search always find a solution for this problem? What about if obstacles can be non-convex?

5. 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.