HW2: Robot Path Planning
Assignment

• Program an A* heuristic search to allow an agent to compute the shortest path from a start point to a goal point that goes around rectangular obstacles.

• States: coordinates of corners of rectangles

• Legal move: from one corner to another without going through a rectangle.

• Going along the outside is fine and common.
Data Set 1

What’s the shortest path from (0,0) to (9,6)?
Data Set 1

What’s the shortest path from (0,0) to (9,6)?

states ((x,y),g,h,f)

\[
\begin{align*}
(0,0),&0,10.8166538264,10.8166538264 \\
(4,0),&4.0,7.81024967591,11.8102496759 \\
(9,6),&11.8102496759,0.0,11.8102496759 \\
(0,4),& & & \\
(4,4),& & & \\
(7,4),& & & \\
(2,8),& & & \\
(4,10),& & &
\end{align*}
\]

heuristic: straight line distance from a point to the goal.
Data Set 2
State Data Structure

- coordinates
- g-value
- h-value
- f-value
- successor list
- parent
Heuristic Function

- The heuristic function $h$ should use the straight line distance from the current vertex to the goal vertex, which can never overestimate the true distance.
We will give you

• The two data sets and directions for reading
• Starter code including
  – line intersection code
  – skeleton of the A* algorithm you are to program