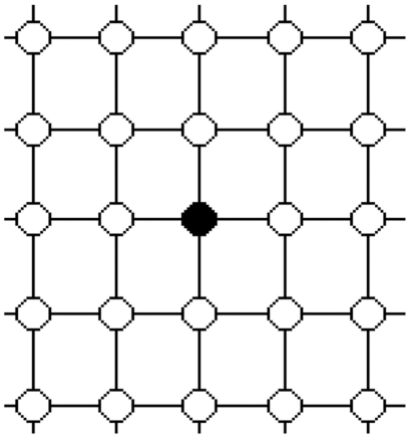
Artificial Intelligence

Written Problems

2D Grid Search (3pts)

Consider the unbounded 2D grid shown below. The start state is at the origin (0,0), the black dot and the goal state is at (x,y).



1. What is the branching factor *b* in this state space?
2. How many distinct states are there at depth *k* (for *k* larger than 0).
3. What is the maximum number of nodes expanded by breadth-first tree search?
4. What is the maximum number of nodes expanded by breadth-first graph search?
5. Is $h = |u - x| + |v - y|$ an admissible heuristic for a state at *(u,v)*? Explain.
6. How many nodes are expanded by A* graph search using *h*?
7. Does *h* remain admissible if some links are removed?
8. Does *h* remain admissible if some links are added between nonadjacent states?

Submit

All homework for this course must be submitted electronically using Blackboard. Do not e-mail your assignment to a TA or Instructor! If you are having difficulty with your Blackboard account, you are responsible for resolving these problems with a TA, an instructor, or someone from IRT, before the assignment is due.

For this assignment, you must submit a PDF document with your answers to the "Written problems" (please do NOT submit a Microsoft Word, OpenOffice document, Pages, or any other format that is not a PDF, points will be deducted if you do so!).