Artificial Intelligence for Robots - Lab

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1. Give an explanation to prove the following statements:

- Breadth-first search is a special case of uniform-cost search.
  *Answer:*Breadth-first search is a special case of uniform-cost search: When all step costs are equal, g(n) is just a multiple of depth n. Thus,breadth-first search and uniform-cost search would behave the same in this case.

- Breadth-first search, depth-first search, and uniform-cost search are special cases of Greedy Best-First Search
  Answer: Breadth-first search, depth-first search, and uniform-cost search are special cases of Greedy Best-First Search:

$$BFS: f(n) = depth(n)$$

$$DFS: f(n) = -depth(n)$$

$$UCS: f(n) = g(n)$$

- Uniform-cost search is a special case of A* search
  *Answer:*Uniform-cost search is a special case of A* search:

$$A*search: f(n) = g(n) + h(n)$$

$$Uniform-costsearch: f(n) = g(n)$$

Thus, for $h(n) = 0$ uniform cost search will produce the same result as A* search.

2. When is A* complete?
*Answer:*A* is complete if it retrns a solution in cases where a solution exists and doesnâĂŹt return a solution when none exist.Also it must work on all possible inputs.

3. When does A* end the search process?
*Answer:*It ends the search process when it finds a goal with the least cost.

Comments:

- The heuristic manhatten distance is consistent.
- The heuristic misplaced tiles is admissible but not consistent.

Table 0.1: Runtime Analysis

	A*_manhatten	A*_misplaced	Greedy Search_manhatten	Greedy Search_misplaced
Runtime	5.75121903419 sec	183.1752038 sec	2.64326906204 sec	2.15457987785 sec
Cost to optimal goal	26	26	137	65