HW1

0 OF 17 QUESTIONS REMAINING

Test Content

Question 1

2 Points

What is the correct equation that represents an intelligent agent?

(A) Agent = Percepts + Actions

Agent = architecture + program.

B Agent = Architecture + Program

(C) Agent = Sensors + Effectors

(D) Agent = Data + Algorithms

Question 2

4 Points

Match the following terms with their correct definitions:

Prompts	Answers
(1) Intelligent Agent	A system that perceives its environment and acts to achieve goals.
(2) Percepts	Inputs received from the environment through sensors.
(3) Actions	Behaviors performed by an agent in response to percepts.

4 Architecture	→	The structure that defines an agent's capability.

Question 3

4 Points

Match the following terms to their definitions:

Prompts		Answers
1 Fully Observable	→	Agents can access the complete state of the environment.
2 Deterministic	→	Next state is completely determined by current state and actions.
3 Benign	→	Opponents might affect the outcome of your actions but you are not the target.
4 Discrete	→	Discrete inputs with finite options.

Question 4

4 Points

Match the characteristics of each agent type with their descriptions:

Prompts		Answers
1 Simple Reflex Agent	→	Operates solely on current sensory input.
2 Model-based Reflex Agent	→	Keeps track of elements not currently perceived.

3 Goal-based Reflex Agent → Makes decisions based on goal achievement.

4 Utility-based Reflex Agent → Evaluates and chooses actions for maximum benefit.

Question 5

2 Points

Which of the following algorithms maintain a FIFO for its frontier?

A Depth First Search LIFO / stack

B Uniform First Search priority queue

C Iterative Deepening Search LIFO/ stack

D Breadth First Search FIFO / queue

Question 6

2 Points

Which of the following algorithms is not complete in a finite space. **[choose all correct answers that apply]**

A Greedy Search

B A* Search

C Iterative Deepening Search

D Depth-Limited Search

Question 7

2 Points

Which algorithms has a time complexity of $O(b^d)$ where b is the branching factor and d is the depth of the shallowest goal? **[choose all correct answers that apply]**

A Uniform Cost Search

B Breadth First Search

Time complexity

C Greedy Best First search

D Depth Limited Search

Question 8

2 Points

Which of the following is correct about A* search? **[choose all correct answers that apply]**

A If the heuristic is consistent then A* Graph-search is optimal.

B If the heuristic is consistent then A* Tree-search is optimal.

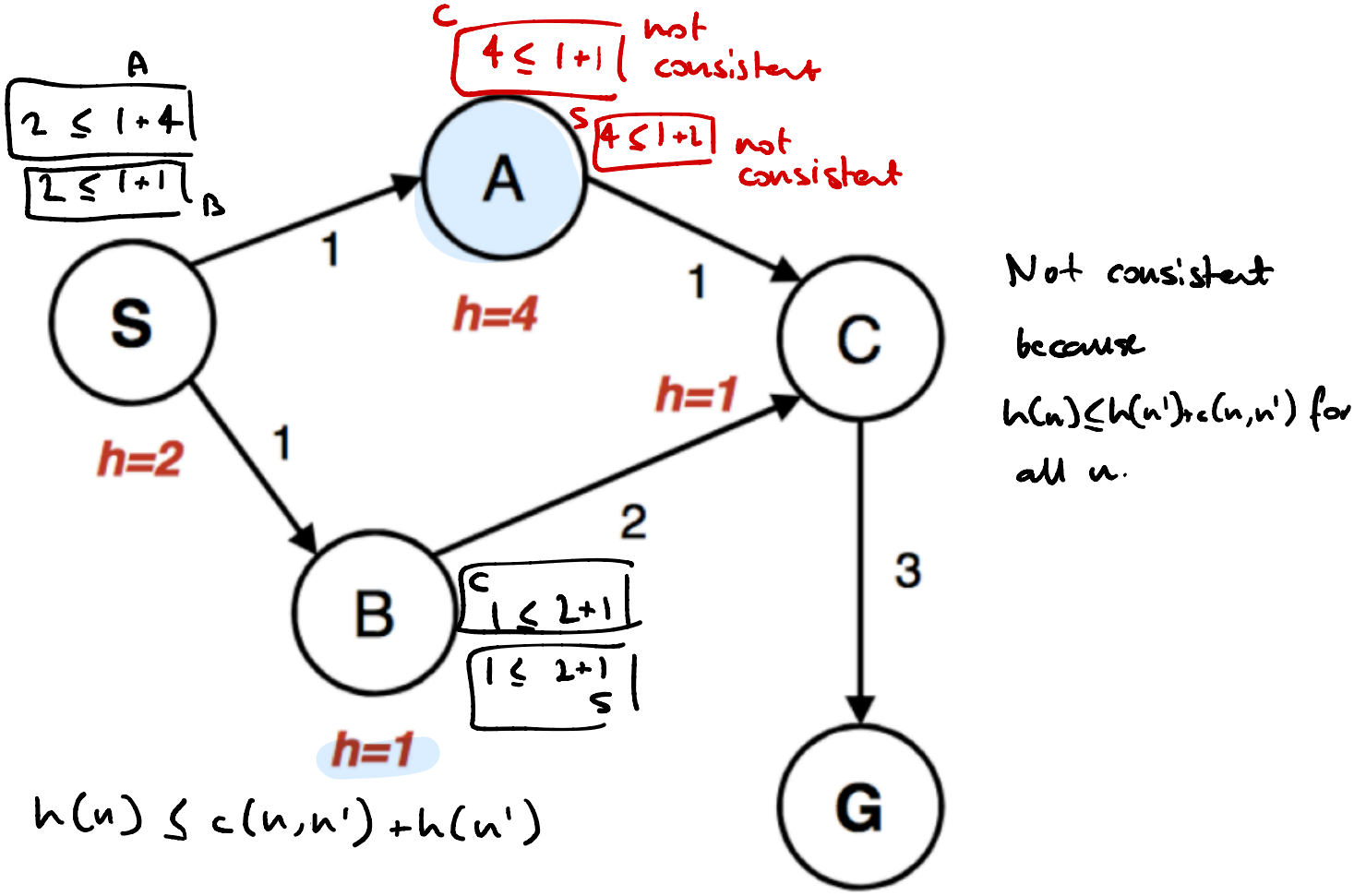
C If the heuristic is equal to zero then A* search is equivalent to UCS.

D If the heuristic is admissible then A* Graph-search is optimal.

Question 9

3 Points

Which of the following describes the graph below correctly?



	h(n)	g(n)
S	2	5
A	4	4
B	1	5
C	1	3
G	0	0

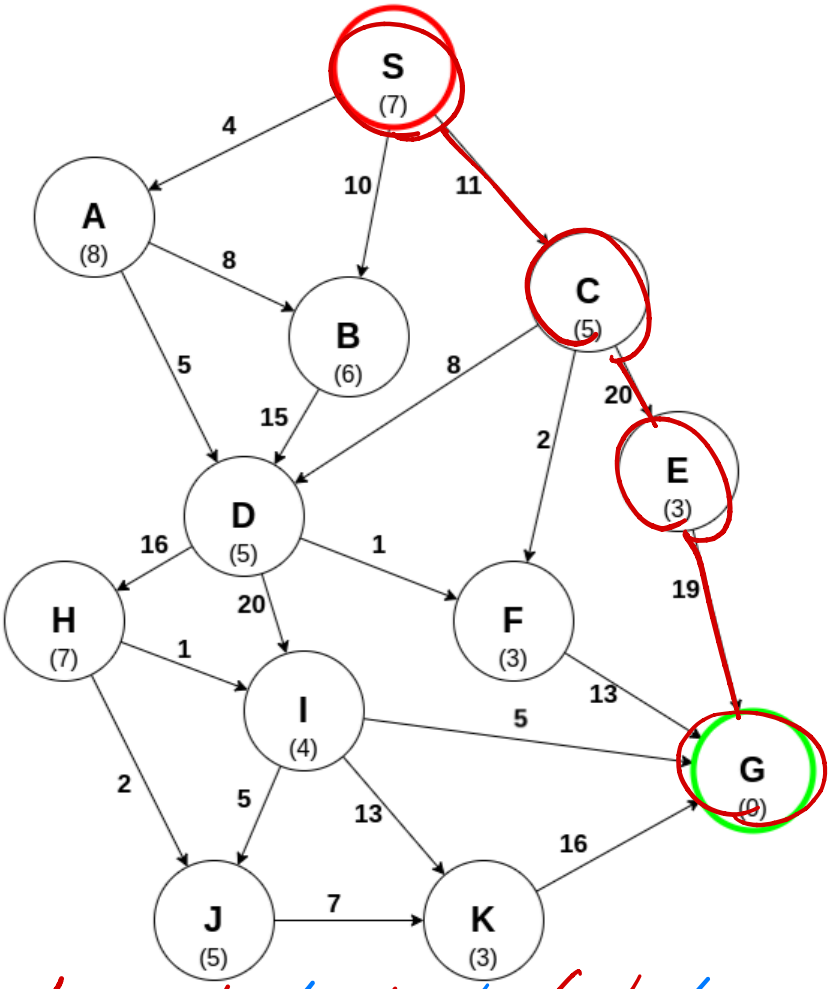
A The graph heuristic is admissible but not consistent

B The graph heuristic is not admissible but consistent

C The graph heuristic is not admissible but not consistent

D The graph heuristic is admissible and consistent

Use the following graph to answer the questions below. The value on each edge is the actual cost to move between the two nodes while the value between brackets in the nodes represents the heuristic at that node. The nodes are explored in alphabetical order in the case of ties.



Frontier: S A_S B_S C_S D_A D_A D_B E_C F_C F_D H_D I_D G_C G_F I_H J_H G_I J_I K_I

Explored: S A_S B_S C_S D_A E_C F_C H_D I_D G_E

Question 10

4 Points

Path:

Which of the following is true if we used BFS to move from node S to node G?

A
$Path\ Found = S \rightarrow C \rightarrow E \rightarrow G$
$Explored\ List = S \rightarrow A \rightarrow B \rightarrow C \rightarrow D \rightarrow E \rightarrow F \rightarrow H \rightarrow I \rightarrow G$

B
$Path\ Found = S \rightarrow C \rightarrow F \rightarrow G$
$Explored\ List = S \rightarrow A \rightarrow B \rightarrow C \rightarrow D \rightarrow E \rightarrow G$

C
$Path\ Found = S \rightarrow C \rightarrow E \rightarrow G$
$Explored\ List = S \rightarrow A \rightarrow B \rightarrow C \rightarrow D \rightarrow F \rightarrow E \rightarrow G$

D
$Path\ Found = S \rightarrow C \rightarrow E \rightarrow G$
$Explored\ List = S \rightarrow C \rightarrow B \rightarrow A \rightarrow F \rightarrow E \rightarrow D \rightarrow G$

Frontier: ~~S~~ A_S B_S ~~C_S~~ D_C E_C ~~F_C~~ ~~G_F~~

Question 11

4 Points

Explored: S C_S F_C G_F

Which of the following is true if we used DFS to move from node S to node G?

path: S → C → f → G

A
$Path\ Found = S \rightarrow C \rightarrow F \rightarrow G$
$Explored\ List = S \rightarrow C \rightarrow F \rightarrow G$

B
$Path\ Found = S \rightarrow C \rightarrow E \rightarrow G$
$Explored\ List = S \rightarrow C \rightarrow E \rightarrow G$

C
$Path\ Found = S \rightarrow C \rightarrow F \rightarrow G$
$Explored\ List = S \rightarrow A \rightarrow B \rightarrow C \rightarrow D \rightarrow E \rightarrow G$

D
$Path\ Found = S \rightarrow A \rightarrow B \rightarrow D \rightarrow F \rightarrow G$
$Explored\ List = S \rightarrow A \rightarrow B \rightarrow D \rightarrow F \rightarrow G$

Question 12

4 Points

Which of the following is true if we used A* to move from node S to node G?

A
$Path\ Found = S \rightarrow A \rightarrow D \rightarrow F \rightarrow G$
$Explored\ List = S \rightarrow A \rightarrow D \rightarrow B \rightarrow F \rightarrow C \rightarrow G$

B
$Path\ Found = S \rightarrow C \rightarrow E \rightarrow G$
$Explored\ List = S \rightarrow C \rightarrow E \rightarrow G$

C
$Path\ Found = S \rightarrow A \rightarrow D \rightarrow F \rightarrow G$
$Explored\ List = S \rightarrow A \rightarrow B \rightarrow D \rightarrow F \rightarrow G$

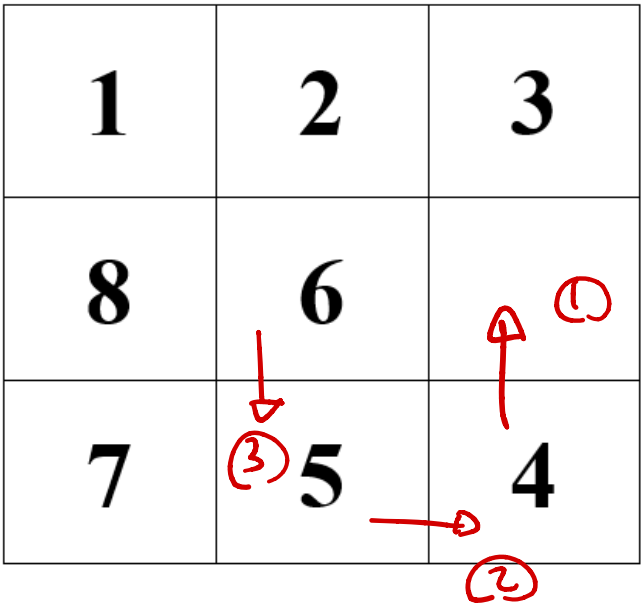
D
$Path\ Found = S \rightarrow A \rightarrow D \rightarrow F \rightarrow G$
$Explored\ List = S \rightarrow A \rightarrow D \rightarrow F \rightarrow B \rightarrow C \rightarrow G$

Use the initial state of the following 8-puzzle game and the final state to be reached to answer the questions below using a simple hill climbing algorithm.

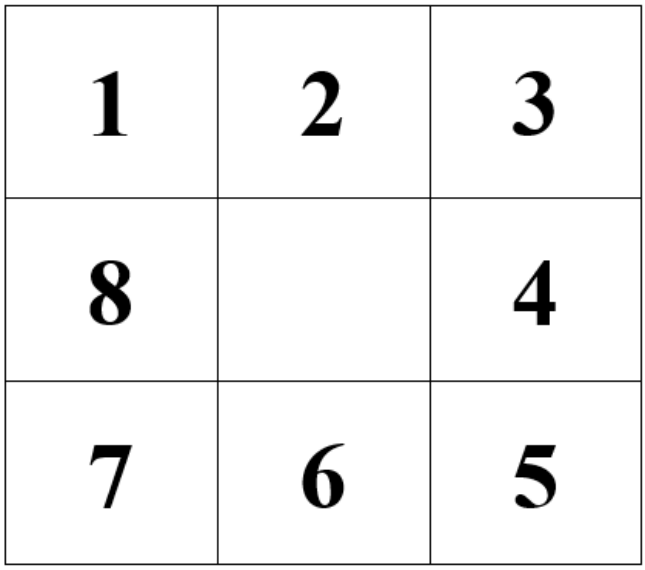
Frontier: ~~S~~ ~~A_S~~ 12 ~~B_S~~ 16 ~~C_S~~ 16 B_A 18 ~~D_A~~ 14 ~~F_D~~ 13 H_D 32 I_D 33 ~~G_F~~ 43 D_B 30 E_C 34 ~~F_C~~ 16 G_F 26

Explored: S A_S D_A F_D B_S C_S G_F

S → A → D → f → G



Initial State



Final State

Question 13

2 Points

A suitable objective function to optimize the hill climbing algorithm in this case would be _____

(A) The number of possible actions to take.

(B) The number of non-empty blocks at each iteration.

(C) The number of incorrectly placed digits.

(D) The number of consecutive digits that are connected to each other.

Question 14

3 Points

Solve the problem above using a simple hill climbing algorithm and report the number of actions it would take to reach the goal state

3

3 actions

Integer, decimal, or E notation allowed

Question 15

3 Points

Which of the following statements accurately describes the differences between Hill Climbing, Stochastic Hill Climbing, and Random-restart Hill Climbing? **[choose all correct answers that apply]**

A Hill Climbing always finds the global optimum, while Stochastic Hill Climbing is designed for problems with multiple local optima.

B Random-restart Hill Climbing and Stochastic Hill Climbing are equivalent, as both introduce randomness to avoid local optima.

C Stochastic Hill Climbing randomly selects among neighbors, whereas Random-restart Hill Climbing runs multiple Hill Climbing searches from random starting points.

D Hill Climbing performs worse than Random-restart Hill Climbing in highly multimodal search spaces.

Question 16

2 Points

In the context of Simulated Annealing, which of the following strategies is most likely to help the algorithm avoid getting stuck in a local maximum and improve the chances of reaching the global maximum?

A Use a high initial temperature and decrease it rapidly.

B Use a high initial temperature and decrease it slowly over time.

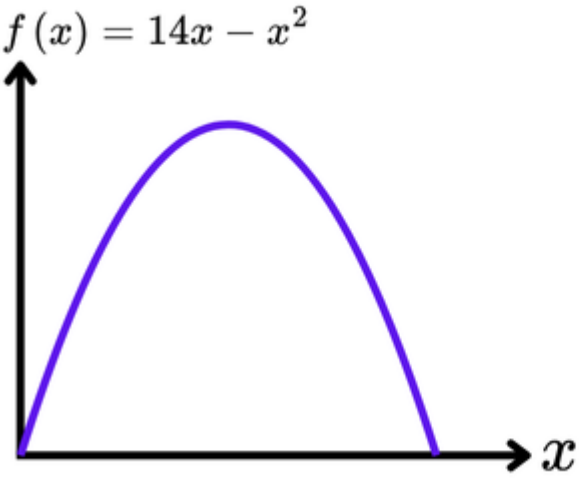
C Use a low initial temperature and decrease it slowly.

D Use a constant temperature throughout the process.

Question 17

3 Points

Devesh is trying to solve the problem below using genetic algorithms where he aims to find the global maxima of f(x) without any numerical method. He randomly chose a population of size 6 which consists of binary numbers to represent possible values of x as genes. As a starting point he begins with a cross-over probability (Pc) of 0.7 and no mutation probability. Which of the following statements is correct about the genetic algorithm implemented by Devesh? **[Choose all correct answers that apply]**



Initial Population

G1	1	0	0	0
G2	1	0	1	0
G3	1	1	1	1
G4	1	1	0	0
G5	1	0	0	1
G6	1	1	0	1

Since we don't have mutation probability, we don't get solution.

A The algorithm implemented will converge to the optimal solution after many generations due to the high cross-over probability used.

B The algorithm implemented will converge to the optimal solution in few generations.

C The algorithm implemented will not find the optimal solution due to population size of 6

D The algorithm is unlikely to find the optimal solution due to not having a mutation probability.

Additional content

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