Name:_____ Roll Number:_____

Quiz-1

Max. Time: 20 min **Max. Points: 20**

Note: Solve all parts. Limit your written responses to the provided space.

Q.1. [5] Choose by putting a check mark on the most appropriate option. Note: No cutting/overwriting allowed.

i. Number of nodes explored by IDS are always lesser than that for BFS.

(A) True (B) False

ii. Greedy search always gives an optimal solution for a 0-1 knapsack problem.

(A) True (B) False

iii. Uniform cost search is also known as greedy search.

(A) True (B) False

iv. Hill climbing search can never find an optimal solution.

(A) True (B) False

v. A _____ heuristic expands more states than a _____ heuristic.

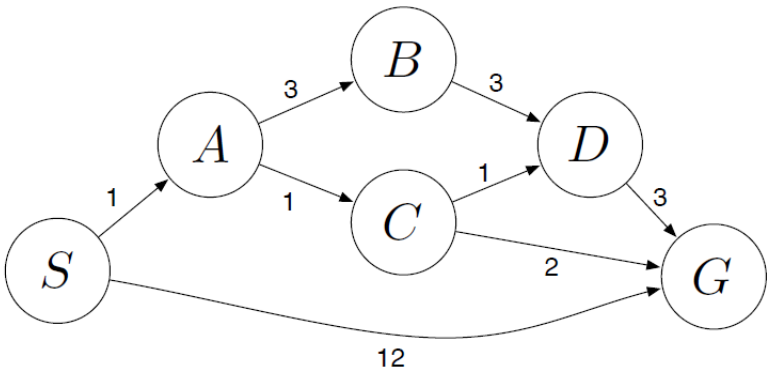
(A) Admissible, Informed (B) Monotone, Admissible (C) More Informed, less informed (D) None of the given choices

~~(A) True (B) False~~

Q.2. [5+5]

a) Consider the search problem shown in Figure 1, where 'S' is the start state and 'G' is the goal state, and answer the following:

What path would the following search algorithms return for the problem: breadth first search, uniform cost search (aka Dijkstra's algorithm), depth first search, depth first with iterative deepening, and A*. Note: Break ties alphabetically and output the paths as a list of nodes.



Name:_____ Roll Number:_____

Breadth First Search: S-G

Uniform Cost Search (Dijkstra's algorithm): S-A-C-G

Depth First Search: S-A-B-D-G

Depth First Iterative Deepening: S-G

A*: S-A-C-G

b) If 'h1' and 'h2' are heuristics for this problem as shown in table below., state and justify whether the heuristics are admissible and monotone?

State	h_1	h_2
S	5	4
A	3	2
B	6	6
C	2	1
D	3	3
G	0	0

h1: Not admissible (h1(S)=5>h1*(S)(=4)); Not monotone (h1(S)-h1(A)=5-3>cost(S,A) (=1)

h2: Admissible h2(n)<= cost(n,G); Not monotone (h2(S)-h2(A)=4-2>cost(S,A))

Q.3. [3+2]

a) How can you modify depth first search so that it acts like breadth first search?

Ans: Impose a depth bound of one. This will then become and IDS algorithm

b) Define monotonicity of a heuristic?

Ans: For any two states 'u' and 'v' in the state space 'S' such that 'u' is an ancestor of 'v', if h(u)-h(v)<=cost(u,v) along with the fact that h(Goal)=0; then the heuristic function 'h' will be called monotone. Note that cost(u,v) is the actual cost of the shortest path between the nodes 'u' and 'v'.