30 Dec 2016

Name-Surn[redacted]
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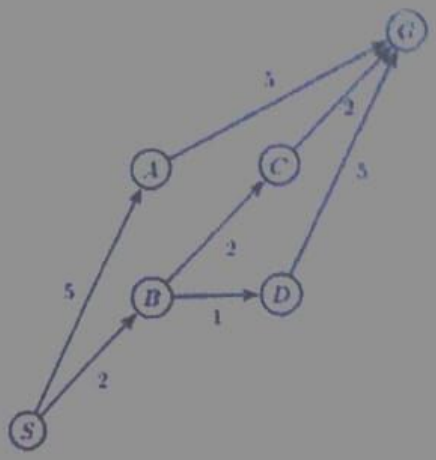
Artificial Intelligence and Expert Systems Final Exam

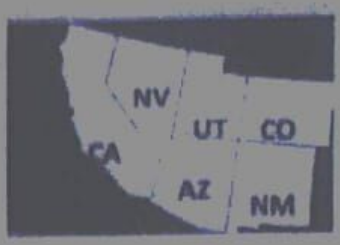
1.Consider the following search problem representing as a graph. The start state is S and the only goal state is G.



Node	h_0	h_1	h_2
S	0	5	6
A	0	1	5
B	0	1	4
C	0	2	5
D	0	5	1
G	0	0	0

a) Which of the given heuristics are admissible? Explain your answer.
b) Give the path A* search will return using each of the three heuristics h_0, h_1 and h_2?
c) What path will greedy best-first search return using h_1?

2. You are a map-coloring robot assigned to color this Southwest USA map. Adjacent regions must be colored a different color (R=Red, B=Blue, G=Green). (Note that "adjacent" means to share a border, so AZ:CO and UT:NM are not adjacent.)



a) Draw the constraint graph.

b) Cross out all values that would be eliminated by **Forward Checking**, after variable AZ has just been assigned value R.

c) CA is assigned B and AZ is assigned R, and no constraint propagation has been done. Cross out all values that would be eliminated by Arc Consistency (AC-3).

d) Consider the assignment below. NV is assigned G and constraint propagation has been done. List all unassigned variables that might be selected by the Minimum-Remaining-Values (MRV) Heuristic.

CA	NV	AZ	UT	CO	NM
R B	G	R B	R B	R G B	R G B

e)Consider the same assignment above given in (d). List all unassigned variables that might be selected by the Degree Heuristic.

f) Consider the assignment below. AZ has been selected to be assigned a new value. What new value would be chosen below for AZ by the Min-Conflicts Heuristic?

CA	NV	AZ	UT	CO	NM
B	G	?	G	G	B

3) Explain how genetic algorithms work. Your answer should include the terms chromosome, fitness function, crossover and mutation. Explain in detail.