**CS470/570**

**Artificial Intelligence**

Sample Midterm #2

Closed notes/closed book

1. Describe a heuristic that would be used in a constraint satisfaction problem to pick the next *variable* to assign a value to as part of a depth first search solution.
2. Describe a heuristic that would be used in a constraint satisfaction problem to pick the next *value* to assign to a variable as part of a depth first search solution.
3. What is forward checking in constraint satisfaction problems?
4. Consider the following search tree from an adversarial game of chance. It is the AI’s move and it has two choices of moves: move A or move B.

 In the game, after the AI moves, the opponent will either flip a coin (if the AI took move A) or roll a 4-sided die (if the AI took move B). Based on the outcome of the coin flip or die roll the opponent will have two moves to chose from. Each of those moves leads to a state and the evaluated values of the states have been filled in.

1. Complete the search tree by filling in the value in each node.

Die Roll

25%

25%

25%

25%

50%

50%

Move B

Move A

AI’s move

-6

2

2

4

-1

14

-3

-4

-4

-1

6

4

1. What move should the AI take?

Coin Flip

Chance nodes

Opponent’s

move

1. Write first order logic statements to represent the following English sentences (note that the sentences are not necessarily true, for purposes of this question you may assume that they are true).
2. All animals that have scales and lay eggs are reptiles.
3. Any animal X that builds a nest also lays eggs.
4. For all Y, if Y is an animal, and Y has bilateral symmetry, and Y has tentacles modified from a foot, then Y is a cephalopod.
5. Write the equivalent English sentence for the following logical sentences:
6. BD => PH ˅ PK

Where BD means “Breeze in the dining room”, PH means “Pit in the hallway”, and PK means “Pit in the Kitchen”.

1. ¬gS ˅ GS

Where gS means “glitter in the study” and GS means “Gold in the study”.

1. How is local search applied to a constraint satisfaction problem? What characteristics of a Constraint Satisfaction Problem make it a good choice for local search.