

Wumpus World

CSE 391

1. Create data structures for dealing with propositional logic and implement the CNF conversion algorithm. One possible way is to represent sentences as nested lists, where the first element is an operator and the following elements are its arguments. So $(P \vee Q) \wedge (X \vee \neg Y)$ could be represented by ['and', ['or', ['literal', 'P'], ['literal', 'Q']], ['or', ['literal', 'X'], ['negation', ['literal', 'Y']]]]. **(30 points)**
2. We will apply what you've just done to the wumpus world domain.

Use the following conventions to represent information about the Wumpus World:

- (a) Use S,B,G,P,W stand for stench, breeze, glitter, pit, and wumpus, respectively.
- (b) For each of those five propositions, use PropXY to represent information about particular squares. For example, S21 represents that there is a stench in [2,1].
- (c) Use OK to represent a position being safe (that is, certain to contain neither a pit nor a wumpus), e.g. OK32
- (d) You may assume there is one wumpus, 0 or more pits, that the wumpus and pits don't move, and that the wumpus isn't in a pit.

Represent the initial Wumpus World knowledge base using the representation above. **(30 points)**

3. Provide a function called WumpusWalk which takes two arguments: the knowledge base and the sentence to be satisfied. Note that these arguments may not be in conjunctive normal form yet. It should return a model if the sentence is satisfiable and False otherwise. **(30 points)**

Test cases will be provided on the web site.

4. Now use WumpusWalk to write a Wumpus agent which, given a board description, will try its best to find the gold. Don't worry about shooting the wumpus, and assume there's always a safe path to the gold which does not require killing the Wumpus. And, of course, even though your program knows the whole board description, the Wumpus agent can only know what it finds out by exploration. Example board descriptions will be provided on the website. **(10 points)**

This assignment is non-trivial; you are encouraged to make use of office hours early and often.

To turn in: your *clear, understandable, commented* code and the output specified in the `wumpus-tests.txt` file on the website.