

CS440
ASSIGNMENT 4
DUE APRIL 10, 2019

Computer Science Department
Colorado State University

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Preliminaries. You are going to implement the logic inference portion of the Wumpus World example.

Input files. There will be two input files to your program: (i) sensory information as well as (available) knowledge of pits, wumpus, and gold locations in `beliefs.txt`, and (ii) query in `query.txt`, which you need to answer. Make sure your program reads from those files in the current directory.

`beliefs.txt` has multiple lines. The first line is an integer n which specifies the grid size, i.e. there are n^2 cells. Its subsequent lines are of the format

```
i j flag
```

where $1 \leq i, j \leq n$ are the coordinates of a cell and flag is in the set {Breeze, Stench, Glitter, Pit, Wumpus, Gold, NoBreeze, NoStench, NoGlitter, NoPit, NoWumpus, NoGold}. Note that a cell might have multiple flags, each of which comes on a separate line.

This input reflects partial (identified-so-far) beliefs about the world. However, the included information is consistent and correct. Fields on a line are separated by a tab. The following is a sample input file corresponding to a partial view of the world in Figure 7.2 of the textbook:

```
line 1: 4
line 2: 2 1 Breeze
line 3: 1 2 Stench
line 4: 3 2 Breeze
line 5: 2 2 NoBreeze
```

`query.txt` has one line of the format `i j flag`. Basically, your program will decide whether the query entails from the input knowledge base. A sample query file:

```
line 1: 3 1 Pit
```

Implementation. Transform the input information as well as rules of the Wumpus World into a knowledge base and use Z3 (either Python interface or shell/stdout) to perform inference. You can use either Propositional Logic or First Order Logic, whichever you feel more comfortable with.

Output. Your program should print either “entails” or “does not entail” on the output. Recall that a proposition entails from the knowledge base if it is true in **all models** that render the knowledge base true.

Grading. We will test your program on 10 different inputs and let it run for 1 minute each. Each test case is worth 10 points. If the output is correct, you get 10 points; otherwise, you get 0.

Upload your answer on Canvas in one zip file or tarball. Include a README file with running instructions and all the code/scripts you have written.