CS 335: Logical Agents

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1 TASK

Answer the following questions:

1. Given the following, can you prove the unicorn is mythical? How about Magical? and Horned? (adapted from Barwise and Etchemendy (1993)).

   > if the unicorn is mythical, then it is immortal, but if it is not mythical, then it is a mortal mammal. If the unicorn is either immortal or a mammal, then it is horned. The unicorn is magical if it is horned.

2. Which of the following are correct?

   (a) False $\models$ True

   (b) $(A \wedge B) \models (A \iff B)$

   (c) $A \iff B \models A \vee B$

   (d) $A \iff B \models \neg A \vee B$

   (e) $(A \vee B) \wedge (\neg A \vee B)$ is satisfiable

3. Create a program `kb.py` that is able to take in a file containing a knowledge base(KB) and a model and returns the truth value of the KB. The KB should be in CNF (that is, OR clauses joined by AND clauses). Your program should read a file where each line is comprised of a sentence in propositional logic, a comma and a set of key=value pairs separated by comma that denote the model. The symbols T,F,V are not allowed as they have a special meaning: True, False and OR. An example of a file is the following (you can use it to test):

```
(j V t) ^ (p V q) ^ (~p V t),j=T,t=F,p=F,q=T
(jon V chris V frank) ^ (candy V beef),jon=F,chris=T,frank=F,candy=F,beef=F
(C[cl] V C[bo] V C[ve]) ^ (P[pinera] V P[morales] V ~P[chavez]),C[cl]=T,C[bo]=T,C[ve]=T,P[pinera]=T,P[morales]=T,P[chavez]=F
```

   If you save this in a file called `prep.kb` then executing `python kb.py prep.kb` should return the truth value of each line. That is: `True,False,True`

2 MUST HAVE

- You must type your answers to the first task in a PDF file. No word files. Only PDF.
- Your program should be in one file: `kb.py`. No other names. No other files.
- You must comply with the guidelines for python listed in the next section.

3 SUBMIT

ONE ZIP file with (a) a PDF with the solutions to the first question and (b) one PYTHON file with the program.

The python file must comply with the following convention (THIS IS VERY IMPORTANT)

- The first line of your file should indicate the python version as follows:
  - If you are using a flavor of python 3.x, your first line should be: `#!/usr/bin/env python3`
  - If you are using a flavor of python 2.7.x your first line should be: `#!/usr/bin/env python2`
- The second line should have the name of the homework and optionally a couple of words about it. These should be enclosed in three quotation marks. For example: `""" Eliza homework. Relationship advisor """`
- The third line should have your name assigned to the `__author__` variable. For example if your name is "John Doe" your next line should be:

  `__author__="John Doe"`
- Optionally, you can specify a file encoding on your second line and then follow the convention. You do this by adding the following line as a second line: `# # -*- coding: utf-8 -*-`

A sample hello world file created with python 2.7.x for John Doe looks like this:

```
#!/usr/bin/env python2
# # -*- coding: utf-8 -*-
""" Hello World program """
__author__="John Doe"

print "Hello World"
```

The same file created with python 3.x looks like:

```
#!/usr/bin/env python3
# # -*- coding: utf-8 -*-
""" Hello World program """
__author__="John Doe"

print ("Hello World")
```