Homework #3: Chapters 7 and 8

The following exercises are due at the beginning of class on Friday, February 29.

1. *[20 pts.]* Do exercise 7.8 (a,b,c,d, and g) from the book (p. 237). Show your work.

2. *[20 pts. total]* Consider a knowledge base *KB* that contains the following propositional logic sentences:

    $$Q \Rightarrow P$$
    $$P \Rightarrow \neg Q$$
    $$Q \vee R$$

    a) *[5 pts.]* Construct a truth table that shows the truth value of each sentence in *KB* and indicate the models in which the *KB* is true.
    b) *[5 pts.]* Does *KB* entail $\neg Q$? Use the definition of entailment to justify your answer.
    c) *[5 pts.]* Does *KB* entail $P \Rightarrow R$? Extend the truth table and use the definition of entailment to justify your answer.
    d) *[5 pts.]* Does *KB* entail $P \vee Q$? Extend the truth table and use the definition of entailment to justify your answer.

3. *[50 pts.]* Do exercise 8.6 (a - j) from the book (p. 268). Use the following constants and predicates (and no others):

    - ***F***: a constant representing French
    - ***G***: a constant representing Greek
    - ***S***: a constant representing Spring 2001
    - ***UK***: a constant representing the U.K.
    - ***Agent(x)***: *x* is an agent
    - ***Barber(x)***: *x* is a barber
    - ***Expensive(x)***: *x* is expensive
    - ***Insured(x)***: *x* is insured
    - ***LocalMan(x)***: *x* is a man living in the town
    - ***Person(x)***: *x* is a person
    - ***Policy(x)***: *x* is a policy
    - ***Smart(x)***: *x* is smart
    - ***Student(x)***: *x* is a student
    - ***BestScore(c,s)***: *s* is the best score in course *c*
    - ***BornIn(x,c)***: person *x* is born in country *c*
    - ***Buys(x,y)***: person *x* buys item *y*
    - ***CitizenByBirth(x,c)***: person *x* is a citizen by birth in country *c*
    - ***CitizenByDescent(x,c)***: person *x* is a citizen by descent in country *c*
    - ***CitizenOf(x,c)***: person *x* is a citizen of country *c*
    - ***GreaterThan(x,y)***: *x > y*. You may assume that the standard mathematical semantics apply to this predicate.
    - ***Parent(x,y)***: person *x* has parent *y*
    - ***Passes(x,c)***: student *x* passes course *c*
    - ***ResidentOf(x,c)***: person *x* is a resident of country *c*
    - ***Sells(s,x,b)***: person *s* sells item *x* to person *b*
    - ***Shaves(x,y)***: person *x* shaves person *y*
    - ***TakesCourse(x,c,s)***: student *x* takes course *c* in semester *s*

4. *[10 pts.]* Do exercise 8.16 from the book (p. 270). Your axiom should be consistent with those defined on pages 258-260. You may also use any predicates already defined for the Wumpus world.