CSC 380/480  
A3

Q1

* knight(A) → ⌐ knave(A)
* knave(A) → ⌐ knight(A)
* says(a,s) ʌ knight(A) → s
* says(a,s) ʌ knave(a) → ⌐ s
* Suppose knight(a)
* Therefore says(a,”b is a naïve”)) ʌ knight(A) → “b is a naïve”
* So knave(b)
* Therefore says(a,”neither a nor I are knaves”) ʌ knave(a) → ⌐ ”neither a nor I are knaves”
* So knight(a) and knave(b)

Q2:

* knight(A) → ⌐ knave(A)
* knave(A) → ⌐ knight(A)
* says(a,s) ʌ knight(A) → s
* says(a,s) ʌ knave(a) → ⌐ s
* Suppose knave(a)
* Therefore says(a,”we are the same kind”) ʌ knave(a) → ⌐ ”we are the same kind”
* So knight(b)
* Therefore says(a,”we are different kinds”)) ʌ knight(A) → “we are different kinds”
* So knight(b) and knave(a)

**Q3:**

* knight(A) → ⌐ knave(A)
* knave(A) → ⌐ knight(A)
* says(a,s) ʌ knight(A) → s
* says(a,s) ʌ knave(a) → ⌐ s
* r(1) → death
* r(2) → freedom
* Suppose A is guarding r(2).
* Suppose B is guarding r(1).
* Suppose we point to R(2) and ask the person ‘will the other person this path is correct?”
* Says(a, no), as b will lie.
* Says(b, no) as the knight would say it’s the correct path and therefore the naïve must lie.
* Therefore, we can prove we are pointing to the proper path.

**Q4-Q5. Represent these facts as sentences in first-order predicate calculus.**

1. Creatures can clobber any creature they eat.

∀x ∃y [c(x) ʌ c(y)] ʌ e(x,y) → clob(x,y)

1. Monsters eat some other creatures.

∀x ∃y (m(x) ʌ c(y) → e(x,y))

1. Clobbering is transitive, i.e., if x clobbers y, and y clobbers z, then x clobbers z.

∀x ∀y ∀y [(c(x) ʌ c(y) ʌ clob(x,y)] ʌ [(c(y) ʌ c(z) ʌ clob(y,z)] → clob(x,z)

1. Ogres eat dwarves.

∀x ∀y o(x) ʌ d(y) → e(x,y)

1. Dwarves can clobber goblins.

∀x ∀y d(x) ʌ g(y) → clob(x,y)

1. Goblins are monsters.

∀x ∃x g(x) → m(x)

**Q6. Use resolution-refutation to prove that an ogre can clobber a goblin. In addition to the facts explicitly stated above, you may need to write other statements to do the proof.**

**Q7. What other creatures can an Ogre eat? Show your work.**

Q8a. True

Q8b. x = mia

Q8c. x = mia

Q8d. false

Q8e. x = Vincent, x = marsellus

Q8f. X = Vincent, X = marsellus

Q8g. X = honey\_bunny

Q9.

* is\_car(bmw).
* is\_car(civic).
* is\_moto(harley).
* is\_fast(bmw).
* is\_fast(harley).
* is\_fast(flash).
* is\_slow(civic).
* is\_fun(A) :- is\_car(A),is\_fast(A).
* is\_fun(A) :- is\_moto(A),is\_fast(A).
* is\_fun(bmw).
  + True
* is\_fun(flash).
  + False
* is\_fun(civic).
  + False
* is\_fun(harley).
  + True

Q10:

1. Ogre cannot clobber a goblin.
2. Orges eat dwarfs.

* ogres(x).
* dwarf(y).
* goblin(z).
* eat(A,B) :- ogres(A),dwarf(B).
* clobber(A,B) :- dwarf(A),goblin(B).
* clobber(x,z)
  + True
* eat(x,y)
  + True