Problem #2 of Quiz #3 is now a pedagogical device. You may, if you wish, recover 50% of your missed points by showing that you have debugged and repaired your knowledge base. For each item on which you lost points:
(a) write in the (incorrect) answer that you provided;
(b) provide an equivalent English sentence, i.e., one that is true in exactly the same possible worlds; and
(c) explain how your knowledge base been repaired so that the error will not happen again?
To recover 50% of your points, turn in your completed exercise WITH YOUR QUIZ in class Thursday, 14 March. Please staple the pages to your quiz.
(You may find it helpful for analysis to convert your answer to conjunctive form instead of implicative form.)

2. (40 pts total, 8 pts each) ENGLISH TO FOPC CONVERSION.
For each answer on which you lost points, write an English sentence that is equivalent to the FOL sentence you wrote. Use Dog(x) for “x is a dog,” Bone(x) for “x is a bone,” and Likes(x, y) for “x likes y.”
The first one is done for you as an example.

2.a. Original: “Every dog likes every bone.”
Correct: ∀x ∀y [ Dog(x) ∧ Bone(y) ] ⇒ Likes(x, y)
Answer you gave: ∀x ∃y Dog(x) ∧ Bone(y)
Equivalent English: Everything is a dog and there is at least one bone.
(Note, this implies that one of the dogs must be a bone; not true in our world, but perhaps true in some possible world.)
How have you repaired your knowledge base? <your explanation here>

2.b. (8 pts) Original: “Some dog likes some bone.”
Correct: ∃x ∃y Dog(x) ∧ Bone(y) ∧ Likes(x, y)
Answer you gave: 
Equivalent English: Everything is a dog and there is at least one bone.
How have you repaired your knowledge base?

2.c. (8 pts) Original: “For every dog, there is a bone that the dog likes.”
Correct: ∀x ∃y Dog(x) ⇒ [ Bone(y) ∧ Likes(x, y) ]
Answer you gave: 
Equivalent English: 
How have you repaired your knowledge base?
2.d. (8 pts) Original: “For every bone, there is a dog that likes that bone.”

Correct: $\forall y \exists x \text{Bone}(y) \Rightarrow [\text{Dog}(x) \land \text{Likes}(x, y)]$

Answer you gave: 

Equivalent English: 

How have you repaired your knowledge base?

2.e. (8 pts) Original: “There is a bone that every dog likes.”

Correct: $\exists y \forall x \text{Bone}(y) \land [\text{Dog}(x) \Rightarrow \text{Likes}(x, y)]$

Answer you gave: 

Equivalent English: 

How have you repaired your knowledge base?

2.f. (8 pts) Original: “There is a dog that likes every bone.”

Correct: $\exists x \forall y \text{Dog}(x) \land [\text{Bone}(y) \Rightarrow \text{Likes}(x, y)]$

Answer you gave: 

Equivalent English: 

How have you repaired your knowledge base?