CS135: Computational Semantics

Problem Set 1: First Order Logic
Instructor: James Pustejovsky

Posted: Tuesday, September 9, 2014
Due Date: Tuesday, September 16, 2014

1. **First-order Logic Translations**: Given the sentence below, translate into FOL:
   No student fails CS135.
   $\neg\exists x[\text{student}(x) \wedge \text{fail}(x, cs135)]$

   (a) If someone is happy, then Mary is happy.

   (b) All professors who fail their students are evil.

   (c) Every student takes some computer science course.

   (d) John likes every person who likes him.

2. **Translation and Inference**:
   We discussed in class the ambiguity with the noun *friend*. Give FOL translations for the following sentences with this noun.

   (a) John is a friend.

   (b) Mary and John are friends.

   (c) Everyone is John's friend.

3. Adverbial Types: Adverbs are words that combine with verbs, VPs, or sentences, to form complex expressions. For example, *slowly* modifies *walks* in *walks slowly*. Given the type for a predicate such as *walk* to be $e \rightarrow t$, then find the type for the following adverbs.

   (a) Mary talks *quietly*.

   (b) John hit Bill *accidentally*.

   (c) Mary *apparently* likes pizza.

4. Give Haskell types for the following verbs, accounting for the behavior seen below.

   (a) Mary *fell*.

   (b) John *gave* Mary a gift.

   (c) Mary *believes* that John is an alien.

   (d) John *told* Bill that Mary thinks he is an alien.