Linguistics 280: Problem Set 3

Scott Martin

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Instructions. *Complete these problems by the start of class on Thursday, March 3, 2011. All submitted work must be your own.*

Problem 1. Explain what using natural deduction (ND) allows us to do that we couldn't do using just propositional logic (PL) alone. Your answer should include both a formal/technical reason ND is worthwhile and a reason that takes into account how it gets us closer our overall goal of analyzing reasoning patterns.

Problem 2. How does ND capture our technical definition of an argument? How is it capable of demonstrating an argument's validity and soundness?

Problem 3. Explain how the inference rules for Implication Elimination, Conjunction Elimination (both 1 and 2) and Conjunction Introduction stay faithful to what we already understood about the connectives $\rightarrow$ and $\wedge$ from truth tables.

Problem 4. Examine the informal argument in (1):

(1) a. If Wally is at the bar, so is Evelyn.
　　 b. If Wally and Evelyn are both at the bar, Clint stops for a beer.
　　 c. Clint doesn't go fishing if he stops for a beer.
　　 d. Wally is at the bar.
　　 e. Therefore, Clint must not go fishing.

Then do the following:

a. Translate all of the atomic propositions in (1) into PL.

b. List the premises of the argument.

c. Name the conclusion of the argument.

d. Construct a truth table that shows that the argument is valid.

e. Give a formal proof using ND that shows that the argument is valid.

Hint: Remember that we can represent an argument as a single proposition by connecting its premises into one big proposition using $\wedge$, then connecting that big proposition to its conclusion using $\rightarrow$.