Mathematical Methods for Philosophy:
Problem Set 2

Assignment: This problem set is due October 29th, 2013 at the beginning of class. Complete the following exercises, as well as the following lab problems from *Logic and Proofs*.

Lab Problems:

- Chapter 4: 4-6
- Chapter 5: 5.2 and 5.3.

Exercise 1 *Using truth-trees, show that the following rules of inference are valid: conditional introduction, conditional elimination, and disjunction introduction.*

Exercise 2 *In class, we discussed introduction and elimination rules for three sentential connectives, namely, the conjunction (&), the disjunction ($\vee$), the conditional ($\to$). Write down introduction and elimination rules for two additional connectives $\leftrightarrow$ and $|$, which are intended to represent "if and only if" and "neither ... nor" respectively. Both connectives should have "left" and "right" elimination rules. Using truth-tables that you wrote last week, show that the rules of inference that you propose are valid.*

Exercise 3 *Give proofs of the following two sentences. No premises are necessary.*

$$((p \to q) \to p) \to p$$

$$\neg(p \to q) \to (p \& \neg q)$$

Exercise 4 *Represent the sentences in the following argument as formula sentential logic. Then give a proof of the conclusion from the premises. Use only the basic sentential connectives and rules of inference that we discussed in class; in particular, do not use the "neither nor" rules you wrote for a previous problem.*

- *If Molly lost the competition, then either Jane or Suzy won.*
- *If Molly won the competition, then she received a gold medal.*
- *Neither Jane nor Suzy won the competition.*
- ***Conclusion:*** *Molly received a gold medal.*