Philosophy 214/414
Logical Methods in Philosophy
Spring 2008

Homework #4

Due at the beginning of class on Wednesday, February 13

I. Maximal Consistent Sets

1. Prove that for all wffs φ and all **maximal consistent sets** Γ, $\sim\varphi\in\Gamma$ iff $\varphi\notin\Gamma$.
   (Hint: use Definition 2.24 of 'maximal consistent set'. You may find Theorems 2.39 and 2.40 useful.)

II. Symbolization In Modal Propositional Logic Do the following:

(a) Symbolize the following sentences into modal propositional logic. Feel free to use any of the primitive and defined sentential and modal connectives: $\sim$, $\rightarrow$, $\wedge$, $\vee$, $\leftrightarrow$, $\Diamond$, $\Box$. If you think the sentence is ambiguous (can be symbolized in two or more non-equivalent ways), give all of its symbolizations. ***Be sure to indicate your symbolization scheme***.

(b) For each sentence, state an interpretation of the modality that a reasonable author is likely to have intended.

(c) Please use $\Box(\varphi\rightarrow\psi)$ rather than $(\varphi\Rightarrow\psi)$.

2. Clinton could have been born on Mars.
3. Humphrey might have won the 1968 election.
3. Descartes cannot exist if his body does not.
4. Descartes's thinking is necessary for his existence.
5. John has to take out the garbage.
6. Sarah can go to law school only by taking out loans.
7. Leigh's analyzing the data is necessary for a realistic forecast.
8. It just might be the case that Mary is both sincere and stupid.
9. If Earl knows that there is coffee in his cup, then there must be coffee in his cup.
10. Susan's getting a 'B' on her logic exam is enough for her to get a 'B' in her logic course.
11. It's not possible for Kathryn to be both at home and at work.
12. If God exists, then he necessarily exists.
13. Bill's passing the driving test is both necessary and sufficient for his getting a driver's license.

Continued

III. Truth Values of Abbreviated Wffs in a Model Use our conventions concerning abbreviations of wffs, and the definition of a valuation function for M (V_M) to show the following.

14. For all wffs φ and ψ, and all Leibnizian models M, and all $w \in W$, $V_M(\varphi \vee \psi, w)=1$ iff either $V_M(\varphi,w)=1$ or $V_M(\psi,w)=1$.

15. For all wffs φ, and all Leibnizian models M, and all $w \in W$, $V_M(\Diamond\varphi,w)=1$ iff: there is a $w' \in$ such that $V_M(\varphi,w)=1$.