Phil 5312
Fall 2024

Assignment 5:
Read MacFarlane chapter 2 sections 2.1, 2.2. and Chapter 3, sections 3.2-3.4. Then do the exercises below. Answers should be uploaded into Blackboard by Wednesday, Oct 30th. This can be typed up or parts can be written and then you can upload a picture or scan. If you don't know how to do the problems, you should talk to me and/or your fellow students. Collaboration is totally fine (and encouraged). But the final work product should be your own work.

Part 1:

Do Exercise 2.2, problems 2-4.

Also, for each of these sentences, formalize it using the binary quantifier *the*, and then using the Russellian ɿ operator.

a) The man who loves Alice is tall.

b) The fastest teacher is also the youngest teacher who went to every meeting.

c) Everyone loves either their father or their mother.

Part 2:

Do all of the problems in Exercises 3.3, 3.4, and 3.5

Part 3:

1) Prove that for any formula ϕ, $\Box\phi$ is logically true in modal logic D iff $\Diamond\phi$ is logically true in D iff ϕ is logically true in D. In other words, either all three of $\Box\phi$, $\Diamond\phi$, and ϕ are logically true in D or none are. (HINT: Logically true in D means that the formula is true in every D-model. A D-model can make any world the actual world, so if it is true in every D-model it has to be true at every world in every D frame).

2) Prove that in K, $\Box\phi$ is logically true iff ϕ is logically true; however, it is false that for any formula ϕ, $\Box\phi$ is logically true iff $\Diamond\phi$ is logically true, and also false that $\Diamond\phi$ is logically true iff ϕ is logically true.

3) Prove that none of $\Box P \equiv \Diamond P$, $\Box P \equiv P$, $\Box P \equiv \Diamond P$ are logically true in modal logic D. In other words, no pair of $\Box P$, $\Diamond P$, and P is logically equivalent in D. It is easy to confuse these claims with the claims above in 1,2. Explain how they different (ideally, give an explanation to someone who is confused how this is possible).

4) Here is a sentence that is valid on all frames that have only one world:
$\neg(\Diamond P \wedge \Diamond\neg P)$ or equivalently, $\Box\neg P \vee \Box P$

Here is a sentence that is valid on all frames that have at most two worlds:
$\neg(\Diamond\neg P \wedge \Diamond(P \wedge Q) \wedge \Diamond(P \wedge \neg Q))$ or equivalently, $\Box P \vee \Box(\neg P \vee Q) \vee \Box(\neg P \vee \neg Q)$

In fact, for any n, there are sentences that are valid on every frame with at most n worlds. If you think about it, that means that for every n, there are sentences that can be made true only on frames with at least n+1 worlds (the unnegated sentences above).

Are there any sentences which can be made true only on frames with at most n worlds (for any n)? Or exactly n worlds? Either produce such an example or give an argument that there can't be one.

Part 4: Write a short argumentative paper (1-2 pages) that addresses some issue raised in our class in the past few weeks. Here are some possible topics:

1) Is Russell's analysis of definite descriptions correct?

2) Can a sentence with a definite description be true (or false) if there is no unique object that satisfies the description? (could be none or could be more than one)

3) are sentences like "The number of planets is nine" really identity claims?

4) What exactly is the flaw in the slingshot argument? (or is there no flaw??)

5) Does it make sense to say that an identity statement is contingently true?

6) Could Nixon have been someone other than Nixon?

7) Could Nixon have been a robot?

8) Is 'Cats are animals' analytic? Necessarily true? Knowable apriori?

9) What does metaphysical necessity mean? Is it different than logical necessity and also different than physical necessity?