Sample Exam

Philosophy 305

March, 2022

Instructions

- You have **3 hours** for the exam.
- Type up any answers you can.
- But for things you can't type – especially trees – write them out on paper, take a photo of them, and upload the photo.
- Note that there will be fewer questions than this on the final, but the structure will be similar. (It will be about 2/3 to 3/4 the length of this.) The point of this is to give you a sense of the kind of questions that there will be.

Truth Tables

For each of these sequents, do a truth table to test whether they are valid. In each case, say whether they are valid.

1. $A \lor B, B \rightarrow A \vDash A$
2. $\neg(A \land B), \neg(B \rightarrow A) \vDash A$
3. $A \rightarrow B \vDash B \rightarrow A$
4. $A \rightarrow (B \lor C), C \rightarrow (A \lor B) \vDash B$

Truth Trees

For each of these sequents, do a truth table to test whether they are valid. In each case, say whether they are valid.

5. $A \lor B, B \rightarrow A \vDash A$
6. $\neg(A \land B), \neg(B \rightarrow A) \vDash A$
7. $A \rightarrow B \vDash B \rightarrow A$
8. $A \rightarrow (B \lor C), C \rightarrow (A \lor B) \vDash B$

Proofs

Construct a proof for each of the following. (If you want to use Carnap, you can do the proofs at https://carnap.io/shared/weath@umich.edu/Playground.pandoc).

9. $P \rightarrow (Q \wedge R), S \wedge P \vdash R \wedge (S \vee T)$
10. $(P \wedge Q) \rightarrow R \vdash P \rightarrow (Q \rightarrow R)$
11. $P \rightarrow R, Q \rightarrow R \vdash (P \vee Q) \rightarrow R$
12. $P \rightarrow (Q \wedge R), P \rightarrow (R \rightarrow \neg Q) \vdash \neg P$

Probability

13. A fair coin (with equal chance of landing heads and landing tails) is about to be flipped. Ankita is offered the following bet – if it lands heads she wins \$200, and if it lands tails she loses \$100. Do we know enough to advise Ankita whether or not she should take the bet? Why or why not?
14. Explain why the following decision rule is not generally reasonable: Identity the most likely state; then choose an act which maximizes utility in that state. (Hint: Describe a situation where this would lead to doing something unreasonable.)

Modal Logic

For each of the following sentences, do **three** truth trees: one to check whether it is a logical truth in K, one to check whether it is a logical truth in S4, and one to check whether it is a logical truth in KT4B (i.e., S5). You can use the simplified rules for S5.

15. $\Box(\Box A \rightarrow B) \vee \Box A$
16. $\Diamond(A \rightarrow \Diamond \Box A)$

Conditionals

17. Show that $\Box(A \rightarrow B) \rightarrow \Box((A \wedge C) \rightarrow B)$ is a theorem of S5.
18. Describe a sphere model (from the minimal change semantics chapter of Boxes And Diamonds) that shows $((A \mathbin{\Box\!\!\rightarrow} B) \wedge (B \mathbin{\Box\!\!\rightarrow} C)) \rightarrow (A \mathbin{\Box\!\!\rightarrow} C)$ is not a logical truth in the minimal change semantics.