Sample In-Class Mid-Term (with Solutions)

Philosophy 12A
March 4, 2010

This is a sample in-class mid-term examination. The structure of the actual in-class mid-term will be exactly the same as this sample. The particular problems on the actual mid-term will be different (but of similar difficulty).

1 Problem #1

Determine whether the following statement is correct, using any legitimate truth-table technique.

$$A \to (B \,\&\, C), D \to (B \vee A), C \to D \vDash A \leftrightarrow C$$

This is problem I.4 on p. 66 of the text. Forbes describes a "short method" solution to this problem on p. 363 of the text.

2 Problem #2

Determine whether the following statement is correct, using any legitimate truth-table technique.

$$\sim\!A \vee (B \to C), E \to (B \,\&\, A), C \to E \vDash C \leftrightarrow A$$

This is example D on page 64 of the text. Forbes gives a detailed "short method" solution there.

3 Problem #3

Two Parts: (1) symbolize the following English argument in LSL (hint: use the 4 letters suggested at the end of the passage — but be explicit about your atomic sentence key), and (2) determine whether the argument is valid or invalid, using any legitimate truth-table method (remember: if the argument is valid, the "short method" requires a thorough explanation).

> If God knows today what I will do tomorrow, then what I do tomorrow is foreordained. And if it's foreordained, then either I have no freedom of choice, or else I will freely choose to do what's foreordained. However, the latter is impossible. Therefore I have no freedom of choice unless God doesn't know today what I will do tomorrow. (G, F, C, R)

(1) This is symbolization problem #6 in §2.4 of the text. Its solution is as follows. First, here are the **atomic sentences**:

> G: God knows today what I will do tomorrow
> F: What I will do tomorrow is foreordained
> C: I have freedom of choice
> R: I will freely choose to do what is foreordained

And, here is the **LSL Argument Form**: $G \to F, F \to (\sim\!C \vee R), \sim\!R. \therefore \sim\!\sim\!G \to \sim\!C$.

(2) The symbolized LSL argument is *valid*. Here is a "short method" solution (note the thorough explanation). Suppose that the premises are all ⊤ while the conclusion is ⊥. That would mean there exists a row/interpretation that looks like this:

C	F	G	R	$G \to F$	$F \to (\sim\!C \vee R)$	$\sim\!R$	$\sim\!\sim\!G \to \sim\!C$
				⊤	⊤	⊤	⊥

There is only one way for the conclusion $\sim\!\sim\!G \to \sim\!C$ to be ⊥, and that is if its antecedent is ⊤ and its consequent is ⊥. This implies that both G and C are ⊤. Moreover, if $\sim\!R$ is ⊤, then R must be ⊥. As such, our hypothetical row must look like:

C	F	G	R	$G \to F$	$F \to (\sim\!C \vee R)$	$\sim\!R$	$\sim\!\sim\!G \to \sim\!C$
⊤		⊤	⊥	⊤	⊤	⊤	⊥

But, if G is ⊤ and $G \to F$ is ⊤, then F must also be ⊤. Hence, we must have:

C	F	G	R	$G \to F$	$F \to (\sim\!C \vee R)$	$\sim\!R$	$\sim\!\sim\!G \to \sim\!C$
⊤	⊤	⊤	⊥	⊤	⊤	⊤	⊥

We are now *forced into a contradiction*, because the second premise $F \to (\sim\!C \vee R)$ must be ⊥ if F and C are ⊤ while R is ⊥.

C	F	G	R	$G \to F$	$F \to (\sim\!C \vee R)$	$\sim\!R$	$\sim\!\sim\!G \to \sim\!C$
⊤	⊤	⊤	⊥	⊤	⊤/⊥!	⊤	⊥

Therefore, our assumption that there is an interpretation on which all the premises of this argument are ⊤ but its conclusion is ⊥ has led to a contradiction. This means there is no such interpretation, which implies that the argument is valid. ✦