

## INTRODUCTION TO LOGIC - REVIEW

The final exam will contain questions concerning: (1) your knowledge of the basic terminology; (2) your ability to execute specific tasks; and (3) your ability to think about logic itself. More details about each item below. A model final exam will be circulated separately.

### 1 TERMINOLOGY

You should be familiar with these pieces of terminology:

- Syntax and rules of grammar for the propositional language
- Well-formed formulas (or grammatically correct formulas)
- Atomic formulas, denoted by lower case letters  $p, q, r, \dots$
- The connectives negation ( $\neg$ ), conjunction ( $\wedge$ ), disjunction ( $\vee$ ) and implication ( $\rightarrow$ )
- The notion of valuation and the principle of bivalence
- Truth tables for negation, conjunction, disjunction and implication
- The truth of a formula  $\varphi$  relative to a valuation  $V$ , denoted by  $V \models \varphi$
- The validity of a formula relative to all valuations, denoted by  $\models \varphi$
- Tautologies and contradictions
- The principle of Excluded Middle and the principle of Non Contradiction
- The validity of an argument
- Rules of derivation, such as  $R, \wedge I, \wedge E, \rightarrow I, \rightarrow E$
- The notational convention N.C. for negated formulas
- The derivability of a formula  $\varphi$  from no uncanceled assumptions, denoted by  $\vdash \varphi$
- The difference between the following expressions (with  $\varphi$  and  $\psi$  standing for any formula of any shape or complexity):

$$V \models \varphi$$

$$\models \varphi$$

$$\psi \models \varphi$$

$$\vdash \varphi$$

$$\psi \vdash \varphi$$

## 2 DOING THINGS WITH LOGIC

You should be able to execute the following tasks:

- Check whether a given formula is well-formed (or grammatically correct)
- Break down a well-formed formula using a tree structure
- Check whether a formula is true or false relative to a valuation
- Check whether a formula is valid relative to all possible valuations
- Check whether an argument is valid
- Construct derivations by applying derivation rules for  $\wedge$  and  $\rightarrow$
- Construct derivations for negated formulas using the notational convention N. C.

## 3 THINKING ABOUT LOGIC

You should be able to explain the following:

- How logics helps to identify good and bad reasoning
- How logic helps to make precise our thoughts
- The difference between syntax and semantics
- How to use the propositional language to formalize English sentences
- In what sense the truth tables give us the meaning of the connectives
- Why the principle of Excluded Middle depends on the principle of bivalence
- What logic looks like if we have three true values instead of just two
- Why the truth table for the implication is not entirely intuitive
- The significance of Wason's selection task for the study of reasoning
- Whether logic is a waste of your time and why