



Core Logic

2005/2006; 1st Semester
dr Benedikt Löwe

Homework Set # 6

Deadline: October 18th, 2005

Exercise 16 (total of five points).

Correct or false? (½ point each)

- (1) Averroes and Al-Gazali held a famous debate in Cordoba about Al-Gazali's *Destructio Philosophorum* in which Averroes attacked Gazali's position harshly. This debate was the source of Averroes' *Destructio Destructionis*.
- (2) Boëthius of Dacia was assassinated by his secretary.
- (3) Giovanni Pico della Mirandola wrote the famous *oratio de hominis dignitate* which can be seen as a "manifesto of the Italian renaissance".
- (4) Before returning to Italy where he was going to be sentenced to death, Giordano Bruno spent some time in England.
- (5) Arius claimed that God-Father and God-Son have different substances, but both are eternal. This teaching was rejected in the Council of Nicaea in 325 AD.
- (6) Anselm of Canterbury and Lanfranc of Bec knew each other personally.
- (7) Johannes Scotus Eriugena wrote a book entitled *De gemina praedestinatione* on predestination in which he discusses the debate between Gottschalk and Hrabanus Maurus.
- (8) "Bononia docet" was the motto of the group of international students at the University of Bologna.
- (9) Despite their differences, Abelard speaks very highly of his former teacher Anselm of Laon in his *Historia Calamitatum Mearum*.
- (10) Ockham's nominalistic ideas go back to a Xth century treatise that was condemned in 1204.

Exercise 17 (total of three points).

Give the names of the following medieval logicians and philosophers (¾ point each):

- *W* was strongly influenced by the Jewish and Arabic culture. His ideas about a logical machine were taken up by Leibniz and the logicians of the XIXth century. You can see a statue of *W* at the University of Barcelona.
- *X* studied in Oxford and wrote a famous commentary on the *sententiae* of Petrus Lombardus. He was beatified by John Paul II. in 1993.
- *Y* was one of the students of Anselm of Laon and taught a strongly realistic philosophy in Paris in the early XIIth century. After one of his students was very successful in arguing against *Y*'s philosophy, *Y* retired to the abbey of St. Victor and was later made bishop of Châlons-sur-Marne.

- *Z* was an archbishop of Canterbury of Italian descent, immediate predecessor of Anselm of Canterbury. At the Council of Vercelli in 1050, he defended the doctrine of *transsubstantiation* against Berengar of Tours.

Exercise 18 (total of four points).

Consider the sentence *tantum omnis philosophus albus est* (“only every philosopher is white”, *i.e.*, every philosopher is white but nothing else is).

- (1) Give a modern semantics for the *tantum omnis* construction: suppose we have a universe of discourse X and two predicates $\Phi, \Psi \subseteq X$. Give a formal definition such that

$$\mathbf{tantumomnis}(\Phi, \Psi)$$

is true if and only if *tantum omnis* Φ *est* Ψ (“only every Φ is Ψ ”) (2 points).

- (2) Give a modern semantics for the *omnis praeter* construction: take a universe of discourse X and two predicate $\Phi, \Psi \subseteq X$. Give a formal definition such that

$$\mathbf{omnispraeter}(x, \Phi, \Psi)$$

is true if and only if *omnis* Φ *praeter* x *est* Ψ (“every Φ except for x is Ψ ”) (2 points).

Note. The “modern semantics” is not necessarily unique. There might be different semantics that describe the natural language sentences reasonably adequately.

Exercise 19 (total of five points).

Consider the sophisma

$$(\star) \textit{omnis homo praeter Socratem excipitur}$$

(“every man except for Socrates is excepted”).

- (1) Give a background story which describes a situation in which (\star) is true (1 point).
- (2) Argue informally that (\star) is false (2 points).
- (3) Solve the apparent contradiction by explaining the fallacy as a *secundum quid et simpliciter* (2 points).

Exercise 20 (total of five points).

If X is any set and $\wp(X)$ is its power set (the set of all subsets of X), we call $Q \subseteq \wp(X)$ a **generalized quantifier**. If $\Phi \subseteq X$ is a predicate on X , we say that $Q\Phi$ holds (in words: “for Q -many x , $\Phi(x)$ holds”) if $\Phi \in Q$.

- (1) Let $\forall := \{X\}$ and $\exists := \{A \subseteq X; A \neq \emptyset\}$. Argue that $\forall\Phi$ and $\exists\Phi$ have the intended meanings “for all x , $\Phi(x)$ holds” and “there is an x such that $\Phi(x)$ holds” (½ point each).
- (2) (Suppose that X is infinite for this part.) Paraphrase the meanings of $Q_0\Phi$, $Q_1\Phi$, and $Q_2\Phi$ in words: $Q_0 := \{A \subseteq X; A \text{ is finite}\}$, $Q_1 := \{A \subseteq X; X \setminus A \text{ is finite}\}$, $Q_2 := \{A \subseteq X; A \text{ is infinite}\}$ (½ point each).
- (3) Fix some $x \in X$ and give a definition of a generalized quantifier op_x that corresponds to the *omnis praeter* construction from **Exercise 18** (2½ points).