

PHILOSOPHY TRIPOS Part II

Monday 28 May 2001

9 to 12

Paper 7

MATHEMATICAL LOGIC

*Answer **three** questions only.*

Write the number of the question at the beginning of each answer. If you are answering an either/or question, indicate the letter as well.

**You may not start to read the questions
printed on the subsequent pages of this
question paper until instructed that you
may do so by the Invigilator**

- 1 'Second order logic is not really logic because it is not axiomatizable.'
Discuss.
- 2 (i) What is it for a logic to be compact?
(ii) Is first order logic with identity compact? Is second order logic compact?
Explain your answers.
(iii) Show that no set of sentences in the language of first order logic with identity has all and only the finite structures as its models.
- 3 Describe and motivate the iterative conception of set.
- 4 Outline a proof of the unsolvability of the Halting Problem. What is the significance of this result?
- 5 **Either** (a) Assuming that recursive functions are representable in first order Peano arithmetic, show that this theory of arithmetic is incomplete.
Or (b) Compare and contrast first order and second order theories of arithmetic.
- 6 'Peano arithmetic is consistent.' Discuss the problem of proving that this is so.
- 7 What is the status of Church's thesis?
- 8 What is Skolem's paradox? Is it really a paradox?
- 9 Why be an intuitionist?
- 10 What is the axiom of choice? Should we accept it?

END OF PAPER