UNIVERSITY OF LONDON

M. PHIL. EXAMINATION 1999 for Internal Students

PHILOSOPHY

Tuesday, 11 May. 10.00 - 1.00.

Philosophy of Mathematics

Answer THREE questions.

1. EITHER (a) Explain Kant's view that mathematical truth is analytic and *a priori*. Assess this view critically, with particular reference to subsequent developments in logic.

OR (b) Explain and assess Kant's view of the role of pure outer intuition in geometrical knowledge.

2. Can Russell's views on the nature of mathematical entities be classified as Platonist or constructivist?

3. Explain and discuss Hilbert's program for the foundations of mathematics, as presented by him in the mid-1920s. Do Gödel's incompleteness theorems imply the total collapse of that program, or can anything of importance still be rescued from it?

4. Explain and evaluate critically the position of 'concept Platonism' in the philosophy of mathematics, as advocated by Daniel Isaacson. Does it have any advantages compared to 'object Platonism'?

5. What were Berkeley's views on the relationship between sense-experience and mathematics? Are such views defensible in your opinion?

6. Does the Duhem-Quine thesis show that a broadly empiricist philosophy of mathematics can be developed?

7. Does the unrestricted use of the law of excluded middle in mathematics result in proofs which are not really valid?

8. 'If a contradiction were now actually found in arithmetic — that would only prove that

an arithmetic with such a contradiction in it could render very good service' (Wittgenstein). Discuss.

9. What was Frege's logicist programme for the philosophy of mathematics? What did the programme achieve and where did it fail?

TURN OVER

10. EITHER (a) State Russell's paradox and outline how it is resolved in type theory and in set theory. In your view which is preferable — a type theoretic approach or a set theoretic approach?

OR (b) Does the idea that sets are classes of limited size provide a satisfactory basis for axiomatic set theory?

11. 'The history of mathematics, lacking the guidance of philosophy, has become blind, while the philosophy of mathematics, turning its back on the most intriguing phenomena in the history of mathematics, has become empty' (Lakatos). Discuss.

12. Are numbers really necessary?

13. Could some diagrams constitute an indispensable part or indeed the whole of a mathematical proof?

14. What role, if any, does abstraction have in our knowledge of mathematical objects?

15. Does structuralism offer a satisfactory account of the content of mathematical knowledge?

16. Does Wright succeed in developing a satisfactory neo-Fregean account of number?

END OF PAPER