Examiners' Report: Preliminary Examination in Mathematics and Philosophy
Trinity Term 2014

October 28, 2014

Part I

A. STATISTICS

(1) Numbers and percentages in each class

See Tables 1 and 2. Overall, 13 candidates were classified.

Table 1: Numbers in each class (Preliminary Examination)

	Numbers		Percentages %	
	2014	(2013)	2014	(2013)
Distinction	4	11	30.77	61.11
Pass	8	5	61.54	27.78
Partial Pass	1	2	7.69	11.11
Fail	0	0	0	0
Total	13	18	100	100

Table 2: Numbers in each class (Honour Moderations)

	Numbers			Percentages %		
	(2012)	(2011)	(2010)	(2012)	(2011)	(2010)
I	6	7	8	40	38.89	36.36
II	6	10	12	40	55.56	54.55
III	0	1	1	0	5.56	4.55
Fail	3	0	1	20	0	4.55
Total	15	18	22	100	100	100

(2) Vivas

No vivas were given.

(3) Marking of Scripts

In Mathematics, all scripts were single marked according to a pre-agreed marking scheme which was strictly adhered to. There is an extensive checking process. In Philosophy, all scripts were single marked except for failing scripts, which were double-marked.

B. New examining methods and procedures

There were no new examining methods or procedures this year. This was the second year of the new examining structure following the change in 2013 from Honour Moderations to Preliminary Examination.

C. Changes in examining methods and procedures currently under discussion or contemplated for the future

Last year's report recommended scaling the marks for the paper on Elements of Deductive Logic (EDL). This year, the EDL marks were much more in line with the other papers, and no such action was deemed necessary. Nevertheless, the Moderators agreed that scaling the whole EDL cohort might be useful and encourage the Faculty of Philosophy to give this further consideration.

D. Notice of examination conventions for candidates

The Notice to Candidates, containing details of the examinations and assessment, including the Examination Conventions, was issued to all candidates at the beginning of Trinity term. All notices and examination conventions in full are on-line at https://www.maths.ox.ac.uk/members/students/undergraduate-courses/examinations-assessments/examination-conventions.

Part II

A. GENERAL COMMENTS ON THE EXAMINATION

Timetable

The examinations began on Monday 23rd June at 2.30pm and ended on Friday 27th June at 12:30pm.

B. EQUAL OPPORTUNITIES ISSUES AND BREAKDOWN OF THE RESULTS BY GENDER

The breakdown of the final classification by gender is as follows:-

Class	Num	Gender	Percent
Distinction	4	m	33.33
	0	f	0
Pass	7	m	58.33
	1	f	100
Partial Pass	1	m	8.33
	0	f	0
Fail	0	m	0
	0	f	0

C. DETAILED NUMBERS ON CANDIDATES' PERFORMANCE IN EACH PART OF THE EXAMINATION

Mathematics I

	Maths and Philosophy		Single School	
Question	Mean	Std Dev	Mean	Std Dev
Q1	16.00	4.38	11.38	4.47
Q2	10.45	2.94	11.69	3.77
Q3	15.42	4.29	15.85	3.36
Q4	16.00	3.39	13.99	3.90
Q5	12.17	2.29	11.74	3.33
Q6	14.45	3.56	13.63	3.51
Q7	14.00	5.56	11.31	3.72

Mathematics II

	Maths and Philosophy		Single School	
Question	Mean	Std Dev	Mean	Std Dev
Q1	12.17	4.81	12.12	3.18
Q2	10.33	2.52	12.36	4.02
Q3	12.00	3.07	12.32	3.39
Q4	12.33	6.43	11.15	5.50
Q5	14.80	3.99	14.06	3.99
Q6	15.15	4.10	14.25	4.10
Q7	10.25	6.66	11.47	5.52

Mathematics III(P)

	Maths and Philosophy		Single School	
Question	Mean	Std Dev	Mean	Std Dev
Q1	8.91	5.05	12.98	4.56
Q2	13.00	6.63	8.38	4.93
Q3	8.18	4.05	10.98	4.02
Q4	12.31	3.17	12.03	3.75
Q5	10.00	3.96	10.31	4.72
Q6	12.20	4.66	14.86	4.09

Elements of Deductive Logic

AvgUSM	StdDevUSM
65.38	10.87

Introduction to Philosophy

AvgUSM	StdDevUSM
60.62	18.62

D. COMMENTS ON INDIVIDUAL PAPERS

See the Mathematics report for reports on the following papers:

Mathematics I

Mathematics II

Mathematics III(P)

Report on Elements of Deductive Logic

(Note: These comments, and related percentages, apply to candidates from across all three schools taking this exam.)

The candidates who took this exam fell very clearly into two groups. In the first were those who had a clear handle on the fundamental theorems and results which form the backbone of the EDL course, and whose familiarity with a range of proofs and proof-styles allowed them to tackle the more complex and advanced questions on the paper with confidence, even if not always to perfect effect. In the second were those who had only a shaky grasp of the central material, and who, as a result, could only either 'wing it' unconvincingly on many questions or else leave them unanswered.

The distribution of answers shows that candidates generally answered the first four questions. This may suggest an incorrect assumption that the questions are ordered by difficulty. Alternatively, it may suggest a tendency to reject, without proper initial examination, questions that appear to deal with concepts and problems deviating from those encountered in classes.

Not uncommon across both groups was a rather *laissez-faire* approach to proof construction: many proofs left gaps between steps, when a theorem was relied upon it was not always stated, and notation was either inconsistent or, in some cases, virtually illegible. Additionally, some candidates did not know the difference between a proof and a proof-sketch. Another common issue arose in respect of definitions; while marks were *not* deducted for these deficits, many candidates did not seem to know that a definition is (a) always a complete sentence and (b) generally not a conditional.

Those candidates who did very well were almost always logicians who had in mind the important fact that a proof is something to be read and understood, the aim of which is to establish a result by way of a series of steps which stand in a more-or-less obvious deductive relationship. Many showed novelty in their approach to a question, and all saw valuable connections between results proved in earlier parts of the question (or, indeed, earlier questions) and the problem with which they were then engaged.

Q1. Compactness

This question was attempted by almost every candidate (81%), and it was generally well answered. Several candidates assumed what they were asked to prove in (b.i) by attempting to answer the question merely in terms of the truth function expressed by ϕ, instead of providing a proof by induction on complexity. The most common mistake was a failure, in question (c), to note the particular manner in which Γ_{n+1} was constructed in the question.

Q2. Duality

This was a reasonably straightforward question (attempted by 77%), but which divided candidates significantly. A small number of candidates made life difficult for themselves by attempting to answer (b) without making recourse to the definition of a dual. Most candidates saw the connection between their answer to (b) and the correct answer to (c), though one or two failed correctly to identify the relevant functions. A number of candidates did not seem really to know (d) what it means for a sentence to express a truth-function. There were a few excellent answers to (e), but on the whole it was either not attempted or only very partially completed.

Q3. Interpolation

Attempted by 62% of candidates, most of whom gave very good proofs of the Substitution Theorem, even though they did not always state it perfectly. A very surprisingly large number of candidates did not know what an interpolant is, which left them unable to provide correct answers to (b)–(e). Some candidates gave answers to (e.ii) which were not quite substitution instances of ψ, though they were broadly on the right track. (e.iii) was frequently ignored.

Q4. Proof theory

45% of the candidates attempted this question, and it was generally well answered. Many candidates were, however, unable to state the very simple rule of assumption. Proofs of (c) were generally good, though some candidates did not consider τ-Intro.

Q5. L_2 Formalisation and proofs

This question was, in general, very poorly answered, and was tackled by only 21% of candidates. Very few gave a perfect formalisation of the passage, though marks were awarded wherever a sentence was correctly formalised. For some reason, candidates frequently decided that any reference to the *a priori* was redundant, despite the fact that the expression occurs in the conclusion. Where proofs were attempted, they were mostly good, and marks were awarded even if the sequent proved was not a correct formalization of the passage. Candidates struggled with (b), mostly due to having apportioned too much time to (a) — very few, for instance, were able to provide a proof even of (b.i).

Q6. L = Formalisation and proofs

43% of candidates attempted this question, and it was mostly well answered.

A startlingly common error in the formalization of (a.i) and (a.vi) was that of conflating a subset of a set with a member of that set. There were several good attempts at (b) with deductions for elementary errors such as quantifier clashes and redundant premises. Some candidates attempted to simplify the sequent by introducing novel dictionary entries (e.g. x is a set), for which they were penalised.

Q7. Logical equivalence and expressive adequacy

Two categories of answer evenly divided the attempts by 50% of the cohort to this question. Slightly more than half gave excellent answers which showed a good understanding of the connection between questions, especially (c) and (e). Poorer answers failed to observe the instruction to state and prove any theorems relied upon in answering the question. Some candidates were unable to provide a clear answer to (d). Many candidates gave good answers to (f.i), but did not attempt (f.ii), presumably due to time constraints.

Q8. $L =$ and the ancestral relation

Few candidates (14%) attempted this question, making it easily the least popular. But those that did generally produced quite good answers. Question (a.i) and (a.ii) were sometimes correctly answered without adequate justifications. (b) was generally better, though some candidates balked at (b.iii). Question (d.i) was well answered, and, there were several pleasingly thoughtful answers to (d.ii).

Report on Introduction to Philosophy

General Philosophy Questions

The most common problems encountered, and for which candidates were penalized, are very familiar and appear frequently in these reports. First, many candidates failed to address themselves to the question as given. Instead, they used it as a prompt to provide either a survey loosely connected to the question, or to reproduce a tutorial essay which, while it might have answered *some* question, did not answer *that* question. Second, several candidates showed very little evidence of attending to the structure of their essays, instead presenting somewhat imprecise, rambling or disconnected work. First class essays invariably began by getting both of these things right, and then built upon that solid foundation by showing very good understanding of the views, arguments and objections in the literature. The very highest marks were awarded to candidates who did all of the above while showing some originality.

Q1a. Cartesian skepticism

There were three attempts to answer this question, all of which were rather weak. No candidate addressed the argument given in the quotation or discussed the notion of certainty, preferring to discuss skeptical hypotheses in looser and more general terms. Putnams argument from semantic externalism was sometimes brought in, but poorly explained.

Q1b. Externalism and scepticism

There was one very good attempt.

Q2a. Hume on induction

There was one attempt.

Q2b. Responses to inductive scepticism

There were two attempts.

Q3a. Cartesian dualism

There was one attempt.

Q3b. The knowledge argument

There were two answers to this question. One was good, containing clear exposition, a strong structure, and an attempt at a novel argument. The second was weaker – the case was correctly described and explained, but there was no attempt to assess it.

Q4a. Locke on personal identity

There was one attempt.

Q4b. Personal identity and thought experiments

There were 7 attempts to answer this question. Marks averaged to 65 and ranged from 60 to 72. Weaker answers failed entirely to restrict themselves to the question, ignoring the fact that what was required was a discussion of thought experiments involving brain transplants or duplication. Several falsely attributed an interest in these procedures to Williams. No candidate considered the use of the term 'proved' in the question.

Q5a. Hume on the will

No candidate attempted this question.

Q5b. Freedom of the will

There were 5 attempts at this question. The best answers spent time drawing out the different senses of 'the ability to do otherwise', and connected these with the different conceptions of freedom employed by compatibilists and incompatibilists. They used examples from the literature to support their answers, and imposed a clear argumentative structure on their writing. Weaker essays simply surveyed material, sometimes not even very well, with little critical engagement.

Q6a. Descartes ontological argument

No candidate attempted this question.

Q6b. The argument from evil

Two candidates attempted this question.

Frege Questions

Q7. Empiricism

There were 5 answers to this question. All answers showed good knowledge of Freges criticisms, but fewer were able to assess whether they were warranted by Mill's view. The best essays considered responses that an empiricist might make to Frege's points.

Q8. Attributions of number

There were 5 answers to this question, two of which were excellent. Weaker answers failed to consider Frege's view that attributions of number are statements about concepts, concentrating upon a range of arguments against empiricism, not all of which were relevant to this question.

Q9. The Context Principle

No candidate attempted this question.

Q10. The Julius Caesar problem

There were 7 attempts at this question. Marks averaged to 68; 5 excellent essays were awarded 70 or higher. The weaker essays showed a poor understanding of what exactly the Caesar problem is, and why it arose for Frege. The best answers showed a solid understanding of the semantic difficulties that the contextual definition raises for Frege, explaining the role of context principle and the idea of identity criteria, and carefully considered possible resolutions or dissolutions of the problem.

Q11. Humes Principle

No candidate attempted this question.

Q12. Mathematical induction

No candidate attempted this question.

Q13. Definitions

There was one attempt at this question.

Q14. Ontological commitments of logic

There were 5 attempts at this question. The weakest essays did not consider the ontological commitments of logic versus those of arithmetic, but rather the inconsistency of Frege's logic, presumably simply because of the presence of the word 'logic' in the question. The best answer gave a clear account of the neo-Fregean characterization of Hume's Principle, and made good use of objections from the literature, especially from Boolos.

E. RESERVED BUSINESS

Removed from the public version of the report.

F. NAMES OF MODERATORS

- Prof. Peter Howell (Chair for Preliminary Examinations)
- Prof. Marc Lackenby
- Prof. Peter Millican
- Dr Dennis Lehmkuhl

Assessors

- Dr Steven Methven
- Dr Brian King