Examiners' Report: Preliminary Examination in Mathematics and Philosophy
Trinity Term 2015

May 9, 2016

Part I

A. STATISTICS

(1) Numbers and percentages in each class

See Tables 1 and 2. Overall, 14 candidates were classified.

Table 1: Numbers in each class (Preliminary Examination)

	Numbers			Percentages %		
	2015	(2014)	(2013)	2015	(2014)	(2013)
Distinction	6	4	11	42.86	30.77	61.11
Pass	7	8	5	50	61.54	27.78
Partial Pass	1	1	2	7.14	7.69	11.11
Fail	0	0	0	0	0	0
Total	14	13	18	100	100	100

Table 2: Numbers in each class (Honour Moderations)

	Numbers		Percentages %	
	(2012)	(2011)	(2012)	(2011)
I	6	7	40	38.89
II	6	10	40	55.56
III	0	1	0	5.56
Fail	3	0	20	0
Total	15	18	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 third 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

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 22nd June at 2.30pm and ended on Friday 26th 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	40
	2	f	50
Pass	5	m	50
	2	f	50
Partial Pass	1	m	10
	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	15.57	3.13	14.73	3.32
Q2	12.50	3.48	12.09	3.41
Q3	14.40	4.03	12.53	4.27
Q4	10.50	5.68	13.32	5.10
Q5	13.83	5.09	11.97	4.00
Q6	15.25	3.86	11.71	4.54
Q7	13.42	3.06	12.53	2.65

Mathematics II

	Maths and Philosophy		Single School	
Question	Mean	Std Dev	Mean	Std Dev
Q1	12.64	2.20	11.08	3.38
Q2	11.55	3.14	12.04	3.59
Q3	15.17	2.23	11.48	4.09
Q4	14.09	3.36	10.87	5.26
Q5	10.80	6.22	11.00	5.28
Q6	9.36	2.16	8.46	3.21
Q7	14.86	5.33	11.70	6.56

Mathematics III(P)

	Maths and Philosophy		Single School	
Question	Mean	Std Dev	Mean	Std Dev
Q1	10.92	3.93	12.42	3.99
Q2	9.83	7.17	14.48	5.18
Q3	13.67	3.04	14.54	2.96
Q4	14.25	5.07	14.03	4.30
Q5	14.29	3.77	13.68	3.47
Q6	12.11	4.99	13.72	4.12

Elements of Deductive Logic

AvgUSM	StdDevUSM
71.43	16.75

Introduction to Philosophy

AvgUSM	StdDevUSM
67.00	4.00

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

This report on the EDL paper covers students in Physics & Philosophy, Maths & Philosophy, and Computer Science & Philosophy.

The following table summarises the performance of Physics & Philosophy candidates and compares it to that of the Maths & Philosophy candidates, the Computer Science & Philosophy candidates, and to that of the cohort as a whole.

	P&P	M&P	CS&P	Combined
Number in Cohort	17	14	7	38
mean mark	54.4	71.4	66.1	62.8
standard deviation	12.3	16.7	18.7	16.8

The following table provides statistics on individual questions for the combined cohort of 38 candidates. (The maximum mark available for each question was 25.) Note that the total number of questions answered is five more that $4 \times 38 = 152$. Three candidates attempted five questions; one candidate attempted six questions. A candidate's best four answers determined their overall mark.

Question	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
number of answers	33	27	32	27	19	1	7	11
mean mark	15.4	15.4	15.4	15.2	15.3	-	15.3	14.8
standard deviation	5.8	6.6	4.2	6.7	5.4	n/a	6.7	5.4

The paper proved to be more challenging than those set in the last two years. The marks for individual questions were scaled according to a procedure adopted for this paper in recent years. A measure of the difficulty of each question was obtained by comparing its average mark to the average obtained on other questions by candidates who did that question. The difference between these was then added or subtracted to obtain a provisional scaled mark. Marks of less than five were not scaled, and were not included in the calculations of averages. The process was iterated.

Scaling increased the average mark for the paper from 56.9 to 62.4. Nine out of 38 (24%) of scripts obtained a mark of 70 or higher. Scaling did not alter the number of these.

The Physics & Philosophy cohort performed less well than the other two groups of candidates, as the numbers in the previous section display.

The first four questions on the paper were on metalogical topics covered in the Hilary term course, and were much more popular than questions 5, 7 and 8, which were on issues of translation and proof, primarily covered in Michaelmas term. (Question 6, which explored consequences of the compactness of $\mathcal{L}_=$, surprisingly only received one answer.)

Question 1 elicited answers that were somewhat weak on average. Several candidates assumed that it followed *immediately* from the definition of finite satisfiability that if a set Δ is finitely satisfiable then it has a model. This is an error that recurs with surprising regularity over the years. Some candidates struggled with the notion of a partial structure, as defined in the question, and assumed, e.g., that every sentence had a truth value in an arbitrary partial structure.

Question 2 was found surprisingly challenging. Several answers to part (b) seemed confused about the meaning of "if", and provided, e.g., an argument in answer to part (i) that really addressed part (ii).

Question 3 was done very well on the whole. Some candidates claimed that χ was a contradiction. This did not stop them from claiming to be able to show that $\phi \vDash \chi$.

Question 4 was reasonably done on the whole. As usual for a question of this type, some candidates provided semantic arguments where proof-theoretic reasoning was required.

Question 5 was reasonably done on the whole but attracted a few surprisingly weak answers given the nature of the material tested. Correctly understanding the sentence given in (b)(iii) proved to be a challenge, with many candidates erroneously thinking that they could provide a model in which there was exactly one P non-identical to exactly one P.

Question 7 tested model-theoretic reasoning. Most candidates ignored the invitation to demonstrate the results "in any way you please", heroically attempting to provide natural deduction proofs rather than rigorous informal reasoning. Remarkably, one candidate succeeded in this attempt.

Question 8 Some candidates missed the "iff" in part (b)(iii). Some attempts at a counterexample for (b)(ii) overlooked the fact that, if a relation R is Euclidean, then any element of the domain that is Red by something must R itself.

Report on Introduction to Philosophy

General Philosophy Questions

A danger is staying too close to the lecture material; but another danger is straying too far into often unclear discussion. In general, candidates scored well when they demonstrated:

- a good nuanced understanding of the arguments,
- a familiarity with the literature, whether it be source material or secondary discussion,
- clarity of exposition.

Frege Questions

The Frege questions typically combined philosophical topics with technical ones. On these, candidates scored better by displaying a good exposition of technical notions and results, and how they relate to the philosophical issues in question. The best responses to questions on Frege were those that were careful to

- explain Frege's own arguments clearly (e.g., criticisms of Kant and Mill; the meaning of arithmetical claims),
- give an accurate exposition of Frege's logicist project and its central technical components and achievements,
- explain and analyse the philosophical and technical problems beset by Frege's logicism, and what responses might be given.

E. RESERVED BUSINESS

Removed from the public version of the report.

F. NAMES OF MODERATORS

- Prof. Jeffrey Ketland (Chair for Preliminary Examinations)
- Prof. Jochen Koenigsmann
- Prof. Jim Oliver
- Prof. Oliver Poolley