

'Logic'-type questions

[For use in the Philosophy Test and the Philosophy section of the MLAT]

One of the questions on a test may take the form of a logic exercise, starting with the definition of a key term and then asking candidates to apply the definition to a number of cases. Some of the skills which are being tested are similar to those assessed by the Problem Solving questions from Part A of the TSA, but here there is both opportunity and requirement to explain the answers given. A simple 'yes' or 'no', 'valid' or 'invalid', even if correct, will not obtain full marks.

The key element in a successful answer is careful attention to the definitions used, and any further hints given in the question.

Some schools teach logic to their students, either as a general skill or specifically to help with this sort of test. We can't be certain how much this teaching is actually helpful. Candidates who do not appear to have had any coaching do not on average do worse. Coaching can sometimes show itself in a failure to read the question, as the candidate notices a few key words and seems to think 'I know what's going on here' without looking at what is actually asked. Any student who wants to study Philosophy at university can benefit from spending some time thinking about logic, but this preparation does not bypass the need to read the question and think deeply about what the question demands.

You may like to have a look at Wilfrid Hodges' book *Logic* (Penguin Books), as this covers quite a lot of ground, and is designed to be accessible to students who are working through the book by themselves. The proof system which it discusses is not one we currently use in our undergraduate teaching, and it really isn't a substitute for more formal presentations which philosophy undergraduates will meet later at university, whether at Oxford or elsewhere. It does have material to interest potential philosophy students from a wide variety of backgrounds, including those whose interests are primarily linguistic.

Past Paper Questions

What follows are two past paper questions, with comments both on the answer and what candidates in fact did. Candidates had 30 minutes to answer the question in each case.

Question A

For this question, we take an *argument* to be a collection of sentences, one of which is marked off from the others and called the 'conclusion'. (This marking off is often accomplished in English by a word such as 'so', or 'therefore'.) The remaining sentences we call 'premises'. We say that an argument is *valid* if there is no possible situation which would make it simultaneously the case that all of the premises are true, and the conclusion false. If an argument is *not* valid, we say that it is *invalid*.

For each of the following arguments, say whether it is valid or invalid. State your reasoning as precisely as possible, noting any difficulties and points of interest.

a. New College in Oxford is not a new college.

St Catherine's College in Oxford is a new college.

Therefore, There are at least two colleges in Oxford.

b. Old College in Edinburgh is not a new college.

New College in Edinburgh is not a new college.

Therefore, There are at least two colleges in Edinburgh.

c. If the creature in the box has eight legs, it's a spider.

The creature in the box is a spider.

Therefore, The creature in the box has eight legs.

d. There are at least two colleges in Oxford.

There is only one college in Oxford.

Therefore, There are three colleges in Edinburgh.

e. The BFG believes Charles Dickens is called Darles Chickens.

Charles Dickens is the author of Great Expectations.

Therefore, The BFG believes the author of Great Expectations is called Darles Chickens.

[END OF QUESTIONS]

These notes are not intended to prescribe the only possible good answers, but to set out some lessons from having marked a number of responses to this question from the Philosophy & Theology applicants.

- a) The argument can be read in more than one way. A straightforward reading would take the thought that something called New College is (has the property of being) a college, regard 'being new' as a sort of property which, if possessed by one college and not by another, must entail that there are two colleges, and affirm the validity of the argument. A second reading of the argument might note that the names could name just about anything ('a pencil' was one suggestion, 'an hotel' another). In that case, premise 1, 'New College is not a new college', could possibly be true because it *may not be a college at all*. The premises do not then entail the conclusion, and the argument is invalid. Either answer, properly explained, is fine. Many candidates simply assumed a 'one-name, one-thing' rule and said the argument was valid whilst stating explicitly that the further information in the premises had no bearing on validity. This was a common move, and not, I think, a good one; there is no obvious reason why a person or object might not have two distinct names.
- b) Note the second answer to (a) discussed above; anyone taking that line will have declared this invalid for the same reason. It did provide a further check on who was using a 'one-name, one-thing' rule; a number of candidates said this was valid for just that reason. An answer which said that two things may be known by the same name, and thus that this argument is

invalid, would have been good (around 1 in 20 candidates said this). Reading 'is not a new college' as permitting 'is not a college at all', 'Invalid'; assuming that the names of the things mentioned do suggest that they are colleges, but allowing that they might be the same college, also invalid. So the answer is the same either way, but the reasoning different.

- c) Invalid. Standard fallacy of affirming the consequent. There was much confusion in answering this question. A good answer would point out that a particular spider might have lost a leg, or have been born with less than 8. Assessing the argument requires that we ask: 'If the premises were both true, must the conclusion be true?', and the seven-legged-spider thought shows that it doesn't have to be. We assume for the sake of assessing the argument that the first premise is true, and forget for the moment about other potential eight-legged things.
- d) Valid. Or at least, using the definition clearly set out in the question, which candidates were told to read carefully, it's valid: 'An argument is valid if there is no possible situation which would make it simultaneously the case that all the premises are true, and the conclusion false.' In this case there is no possible situation where the premises are all true, so the argument must be valid without needing to refer to the conclusion at all. The majority of candidates *did not bother to refer to the definition at all*, and engaged in various levels of shock and resentment at inconsistent premises, followed or preceded by a judgement that it is clearly (obviously, manifestly) invalid. This was a failure to engage with the question asked, and was just as evident amongst those with some previous study of logic as those without.
- e) On what seems to be the most natural reading, invalid. The BFG may not have heard of *Great Expectations*, and may thus lack any belief expressed by a sentence which begins 'The author of Great Expectations is...' There were some good answers to that effect, rather nicely set out. There's a different approach which treats the conclusion as something along the lines of 'One of the things which the BFG believes about the author of Great Expectations is that he is called Darles Chickens' – thus shifting the designating expression 'the author of...' outside of the scope of the belief attributed to the BFG, changing it in effect to 'The author of Great Expectations is someone of whom the BFG has the following belief: ...'. No answer came this examiner's way which tried to express that thought. About half of the candidates regarded the argument as simply and unproblematically valid.
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Question B

In what follows, P and Q stand for English declarative sentences (sentences which have a truth-value, true or false). An argument is a collection of declarative sentences, one of which is marked off from the others (for example, by the word 'therefore') and claimed to follow from the others. The following is a valid form of argument; 'Q is true' follows from the other sentences, whatever declarative sentences we choose for P and Q:

P is true; If P, then Q; therefore, Q is true.

Comment on the validity of the following arguments. Where appropriate, give examples to support your reasoning.

a) Q is true; If P then Q, therefore, P is true.

b) Peter believes P; If P then Q, therefore, Peter believes Q.

- c) Jane does not believe P; If P then Q; therefore, Jane does not believe Q.
- d) Siobhan believes P. Therefore, if Siobhan believes 'If P then Q', Siobhan believes Q.
- e) Derek does not believe Q. If P then Q. Therefore, Derek ought not to believe P.
- f) P is true. Prudence does not believe 'If P then Q'. Therefore, Prudence does not believe Q.

[END OF QUESTION]

Again these notes are intended both to indicate correct approaches and to give some sense of what candidates made of the question.

A fairly common issue was with applicants setting up a single pair of sentences for P and Q at the start of their answer and using these same examples throughout without much thought, rather than thinking each individual task through. The best answers thought each task through independently, even if they recycled an example for some of them.

All of (a), (b), (c) and (f) are not valid. (d) and (e) are more interesting cases, and were given greater weight in marking.

- a) Is a standard logical fallacy; a number of the (perhaps better-prepared/drilled) candidates were even able to name it as the fallacy of affirming the consequent. None, though, gave it the Latin tag 'Modus tollendo ponens', and there was no credit given for naming the fallacy. Even in the absence of such preparation a thoughtful candidate should, by use of examples, readily have been able to see that this is not valid. 'Manchester City won the premier division; If Manchester City had more points than any other team, they won the Premier Division; therefore Manchester City got more points than any other team.' It's possible to win a football league on equal points but by goal difference.
- b) A standard defence of the answer 'valid' here included a phrase such as 'if Peter is rational'. But of course 'If P then Q' may be true and quite unknown to anyone, including Peter; it may perhaps be quite implausible given other beliefs he holds, though he might quite independently think Q true. But 'Peter believes Q' certainly does not follow from the premises, and this is not valid.
- c) Even those who were tempted to say (b) was valid did not get this wrong; almost everyone correctly noted that even if the premises were both true, we would know nothing about Jane's belief with regard to Q. A good example would be needed for full marks. (Jane does not believe it is raining. If it is raining the pavement is wet. Therefore Jane does not believe the pavement is wet. But in fact she does believe this; she is washing the car and has spilled water on the pavement.)
- d) This is a more interesting example, and good reasoning to a properly defended conclusion is wanted. The marks around 'If P then Q' were intended to do service for some fancier rephrasing ('If Siobhan believes that it is the case that if P is true then Q is true' seemed more likely to put candidates off, and was less close to the phrasing of the initial example.) One candidate was put off by the quote marks, but expressed the concern very clearly and well – all others read it as anticipated. Some thought the argument invalid, as Siobhan may believe the conditional but not see that this, along with her commitment to P, would require her to

believe that Q. Some thought it valid – she'd not *really* be believing 'If P then Q' if, believing P, she didn't then also believe Q. (Interestingly, though irrelevantly, most candidates thought Siobhan was male!)

- e) At the best, there were some quite sophisticated answers, on each side. A more 'objectivist' reading agreed that this was valid, whilst agreeing that Derek may nonetheless actually believe P (he may be ignorant of the conditional). On the subjectivist side, maybe Derek falsely believes that Q's falsity entails P. There is then a clash between an obligation derived from what is in fact true, and from an internally grounded set of belief states. Those who noted this clash typically said the argument was invalid. Either answer, properly explained, was fine; the bare word 'valid' or 'invalid' obviously was not enough.
- f) Not valid. Best shown by an example. There's an issue about 'does not believe' meaning 'lacks a belief that' or 'disbelieves', but whichever approach is adopted won't make a difference. There is no assertion that 'If P then Q' is true, of course, but in the following example it does happen to be: 'Strasbourg is in France. Prudence does not believe 'If Strasbourg is in France, Strasbourg is in Europe'. Therefore, Prudence does not believe that Strasbourg is in Europe.' Prudence may be a bit vague about which country Strasbourg is in, whilst being entirely confident that it's in Europe. So both premises may be true and the conclusion false.