

Page 1 of Six pages (7743)

THE UNIVERSITY OF ADELAIDE

EXAMINATION FOR THE ORDINARY DEGREE OF BA

JUNE 1994

7743 LOGIC I - FINAL EXAMINATION

TIME: THREE HOURS

[In addition, candidates are allowed TEN minutes before the examination begins, to read the paper]

CANDIDATES MUST HAVE A COPY OF COPI, I.M. SYMBOLIC LOGIC  
(LATEST EDITION) BUT MAY HAVE NO OTHER BOOKS,  
NOTES OR MATERIALS

Answer ALL SIXTEEN questions

ANSWER EACH QUESTION ON A SEPARATE SIDE OF A PAGE

PLEASE SEE NEXT PAGE

1 Using the statement-letters R, A and B, symbolise the following compound statement:  
Provided that it is not raining, Alan will go to the beach if Betty does.

(2 marks)

2 Write down three statements, in the first of which the statement The Earth is flat occurs as a truth-functional component, in the second it occurs as a non-truth-functional component, and in the third it occurs as a part but not a component.

(6 marks)

3 For the argument  $\frac{\cdot \cdot A \quad \sim B}{\cdot \cdot A \quad \sim B}$ , say which, if any, of the following argument-forms

have the given argument as a substitution-instance, and say which, if any, is its specific form.

(i)  $\frac{\cdot \cdot p}{\cdot \cdot q \quad r}$                       (ii)  $\frac{\cdot \cdot \sim p}{\cdot \cdot p \quad \sim r}$                       (iii)  $\frac{\cdot \cdot \sim p}{\cdot \cdot q}$                       (iv)  $\frac{\cdot \cdot \sim[(pvq) \quad (pvq)]}{\cdot \cdot (pvq) \quad \sim(pvq)}$

Give your answers in exactly the same format as Copi's answers to starred exercises in I page 25, giving an answer for each argument-form.

(8 marks)

4 For each of the following remarks, say whether it is true or false and justify your answers.

(i) Any conditional which is false on a strong interpretation is also false on a weak interpretation.

(ii) Any conditional which is true on a strong interpretation is also true on a weak interpretation.

(4 marks)

PLEASE SEE NEXT PAGE

5 Use the full truth-table method as described in lectures (no short-cuts) to decide the validity or invalidity of the following argument-form. Say whether the argument-form is valid or invalid and justify your answer by reference to specific features of your truth-table.

$$\frac{\begin{array}{l} p \wedge (\sim q \vee r) \\ q \vee p \end{array}}{\therefore \sim p \vee r}$$

(6 marks)

6 Use the short-cut method as described in lectures to decide the validity or invalidity of the following argument-form. Make as few truth-value assignments as possible. Explain, in writing, each stage of your progress. Say whether the argument-form is valid or invalid. If it is invalid say how many counter-examples there are and say what they are. If it is valid, say how your test has established its validity. Credit will be given for clarity, brevity and accuracy.

$$\frac{\begin{array}{l} (p \wedge q) \vee \sim r \\ \sim r \wedge \sim s \end{array}}{\therefore \sim s \vee (s \wedge r)}$$

(8 marks)

7 Supply truth-table tests which show whether the following statement-forms are tautologous, contradictory or contingent and say which is which. Use whatever short-cut methods you like but make sure that the truth-value assignments that you write down are sufficient to determine your answer. Credit will be given for economy.

- (i)  $\sim(p \wedge q) \vee (p \wedge q)$
- (ii)  $[\sim p \vee (p \wedge q)] \wedge (\sim p \vee q)$
- (iii)  $(p \wedge q) \vee (\sim p \wedge \sim q)$

(6 marks)

PLEASE SEE NEXT PAGE

8 For each of the arguments below, say whether it is an elementary valid argument in Copi's sense and give your reasons.

(i)  $A \supset (B \supset C)$

(ii) 
$$\frac{\dots [A \supset (B \supset C)] \vee \sim [A \supset (B \supset C)]}{A}$$

(iii) 
$$\frac{\dots A}{(A \supset A) \vee (\sim A \supset \sim A)}$$

$$\dots A \supset A$$

(6 marks)

9 Disjunctive Syllogism is redundant in Copi's 19 Rules. The answer to exercise IV, 5 is given on page 358. Reconstruct this proof without using D.S. but using any of the other 19 Rules.

(6 marks)

10 In the final paragraph of page 59, Copi says that a proof given earlier on that page could have been done using Indirect Proof. Show that it can. Supply all provenances for your new proof. Credit will be given for economy.

(8 marks)

11 Near the bottom of page 53 Copi describes a class of arguments that cannot be proved valid using only the methods of 3.1, 3.2 and 3.4, and gives an example. Provide an example of your own that has more than one premiss and does not have a disjunctive conclusion.

(4 marks)

PLEASE SEE NEXT PAGE

12 Use the method of section 3.6 to prove by Conditional Proof that  $(A \supset B) \supset [(A \vee C) \supset (B \vee C)]$  is a tautology. Supply all provenances.  
(8 marks)

13 Explain the relationship between Conditional Proof and Strong Conditional Proof. Rewrite the proof at the bottom of page 58 as a Conditional Proof in the sense of section 3.4. In a Strong Conditional Proof, is it possible for two scopes to overlap without one being entirely contained within the other? If so, give an example. If not, say why not.  
(10 marks)

14 Convert the following Indirect Proof into a Strong Conditional Proof, strictly according to Copi's routine for such conversions.

1	$A \supset (B \supset \sim C)$	
2	$(B \vee C) \supset D$	
3	$A$	$\therefore \dots D$
4	$\sim D$	I.P.
5	$B \supset \sim C$	1,3,M.P.
6	$B$	5, Simp.
7	$\sim(B \vee C)$	2,4,M.T.
8	$\sim B \supset \sim C$	7,De.M.
9	$\sim B$	8,Simp.
10	$B \supset \sim B$	6,9,Conj.

(8 marks)

PLEASE SEE NEXT PAGE

15 Explain how and why I.P. works by appealing to the notion of an inconsistent set of statements. Your answer must be quite general but you should illustrate it by reference to the Indirect Proof given in Question 14.

(10 marks)

16 Supply all scopes and provenances for the following proof.

- 1  $A \vee (B \supset C)$
- 2  $[B \supset (B \supset C)] \supset D \vee E$
- 3  $(D \supset A) \wedge (E \supset F) \quad \therefore \therefore A \vee F$
- 4  $\sim A$
- 5  $B \supset C$
- 6  $B$
- 7  $C$
- 8  $B \supset C$
- 9  $B \supset (B \supset C)$
- 10  $D \vee E$
- 11  $A \vee F$
- 12  $F$
- 13  $\sim A \supset F$
- 14  $\sim \sim A \vee F$
- 15  $A \vee F$

(20 marks)