

Midterm Test (Version A)

PHIL 2006

Logic for Philosophers 1

1 March 2011

Answer

Key

Student ID Number

Chun

Please write clearly.

You have 60 minutes to complete this test.

Mark _____%

1. (20 marks)

True or false?

Circle 'T' if the statement is true.

Circle 'F' if the statement is false.

Assume that φ is a WFF of SL.

- F Sentential logic is an example of a formal system of logic.
T Some arguments are neither valid nor unsound.
T Every valid argument has a true conclusion.
T If φ is not contingent, then φ is a tautology.
T No WFF of SL contains exactly 17 symbols.
 F φ is an expression of SL.
 F The main connective of " $\sim(A \vee B)$ " is " \sim ".
 F Whenever " $(A \& B)$ " is true, " $(A \leftrightarrow B)$ " is also true.
 F The consequent of " $(A \rightarrow C)$ " is " C ".
 F If φ contains exactly 5 symbols then φ contains a two-place connective.

2 marks each /20

2. (5 marks)

Circle each expression of SL below:

$((C \rightarrow A) \& A)$

$((A \leftrightarrow A) \leftrightarrow (\sim B \vee A)) \vee \sim(B \leftarrow C))$

$C \& D$

$\sim \sim \sim$

$((C \& A) \vee \sim B)$

/5

3. Make a truth table for each of the following WFFs of SL. (20 marks)

a. $(B \leftrightarrow (B \vee A))$

B	A
T	T
T	F
F	T
F	F

$(B \leftrightarrow (B \vee A))$
T
F
F
T

b. $((A \& B) \rightarrow \sim A)$

A	B
T	T
T	F
F	T
F	F

$((A \& B) \rightarrow \sim A)$
F
T
T
T

c. $((A \vee B) \leftrightarrow (A \vee D))$

A	B	D
T	T	T
T	T	F
T	F	T
T	F	F
F	T	T
F	T	F
F	F	T
F	F	F

$((A \vee B) \leftrightarrow (A \vee D))$
T
T
T
F
T
F
T
F

d. $((A \rightarrow D) \leftrightarrow (D \vee B))$

A	D	B
T	T	T
T	T	F
T	F	T
T	F	F
F	T	T
F	T	F
F	F	T
F	F	F

$((A \rightarrow D) \leftrightarrow (D \vee B))$
T
F
T
T
T
T
T
F

e. $((\sim \sim A \rightarrow \sim B) \& \sim D)$

A	B	D
T	T	T
T	T	F
T	F	T
T	F	F
F	T	T
F	T	F
F	F	T
F	F	F

$((\sim \sim A \rightarrow \sim B) \& \sim D)$
F
F
F
F
T
T
F
F

4 marks each /20

4. (16 marks)

Fill in the blanks with a WFF of SL to make correct truth tables.

Each WFF you write must be a disjunction.

a.

A	B	$((A \& \sim A) \vee \sim B)$
T	T	F
T	F	T
F	T	F
F	F	T

b.

A	B	D	$(\sim A \vee (B \leftrightarrow \sim D))$
T	T	T	F
T	T	F	T
T	F	T	T
T	F	F	F
F	T	T	T
F	T	F	T
F	F	T	T
F	F	F	T

c.

D	$((D \& \sim D) \vee (D \& \sim D))$
T	F
F	F

d.

A	B	D	$((\sim A \& \sim B) \vee \sim D)$
T	T	T	F
T	T	F	T
T	F	T	F
T	F	F	T
F	T	T	F
F	T	F	T
F	F	T	T
F	F	F	T

4 marks each

/16

5. (12 marks) Suppose that “#” is a new connective added to SL.

You are told that “ $((P \rightarrow Q)\#Q)$ ” is a tautology, but “ $(P\#\sim Q)$ ” is not a tautology.

If possible, complete the following truth table for “ $(A\#B)$ ”.

If it is not possible to complete the truth table, explain why.

A	B	$(A\#B)$
T	T	\top
T	F	\top
F	T	\perp
F	F	\top

12 /12

6. (10 marks)

Translate the following statements into SL, preserving as much structure as possible.
Be sure to write down your translation scheme.

(a) Hermione will not remain, unless you buy her ticket.

A: Hermione will remain
B: You buy her ticket

$$(\sim A \vee B) \quad / \quad (\sim B \rightarrow \sim A)$$

(b) If you keep wasting your time, then you will be happy only if you are lucky.

D: You keep wasting your time
E: You will be happy
F: You are lucky

$$(D \rightarrow (E \rightarrow F))$$

(c) If Delia heard you she is not angry, but otherwise she knows.

G: Delia heard you
H: She is angry
I: She knows

$$((G \rightarrow \sim H) \& (\sim G \rightarrow I))$$

(d) Provided that Nellie comes, I will not go and I will not let you go.

J: Nellie comes
K: I will go
L: I will let you go

$$(J \rightarrow (\sim K \& \sim L))$$

(e) Either Dora or Lee knows where to go.

M: Dora knows where to go
N: Lee knows where to go

$$(D \vee N)$$

2 marks each
Each
Translation scheme 0.5
translation 1.5
/10

7. (12 marks)

Assume that each of the following four statements is **false**:

Alice is home only if Caspar is not near.

If Bela was not here yesterday, then Bela and Caspar are both near.

Alice is not home.

Either Bela was here yesterday and Bela is near, or Bela was not here yesterday and Caspar is not near.

1. Translate each of the three statements into SL, preserving as much structure as possible. Be sure to write down your translation scheme.

A: Alice is home

C: Caspar is near

B: Bela was here yesterday

D: Bela is near

$(A \rightarrow \sim C)$

$(\sim B \rightarrow (D \& C))$

$\sim A$

$(C \& D) \vee (\sim B \& \sim C)$

8 marks

2. Was Bela here yesterday?

No

4 marks

/12

8. (5 marks) Write down a tautology of SL without using the symbol ' \sim '.

$(P \rightarrow P)$

5 /5

