國立中正大學九十一學年度碩士班招生考試試題

系所別：哲學系　　科　目：初階邏輯

1. Define the following statements.（定義下列陳述）(每題五分)

   (1) $\phi_1 \ldots \phi_n$ logically implies ψ (in symbol: $\phi_1 \ldots \phi_n \models \psi$)（$\phi_1 \ldots \phi_n$ 邏輯上蘊含 ψ）：

   (2) ϕ is logically equivalent to ψ（ϕ 邏輯上等值於 ψ）：

2. Decide the truth values of the following statements. (決定下列各陳述的真假) (每題二分)

   (1) An argument can have true premises and a true conclusion and yet not be deductively valid.（一個論證可能有真的前提和真的結論，但卻不是演繹上有效的。）

   (2) A deductively valid argument can have some false premises and a false conclusion.（一個演繹上有效的論證可以有假的前提和結論。）

   (3) In an invalid argument, at least one proposition, either a premise or the conclusion, must be false.（在一個無效的論證裡，前提或結論中至少要有一個命題是假的。）

   (4) When an argument has inconsistent premises, it cannot be valid.（當論證的前提彼此不一致時，該論證不可能是有效的。）

   (5) A tautology is logically implied by every proposition.（套套邏輯為任何命題所蘊含。）

3. Symbolize the following sentences, using the indicated symbols as abbreviation.（利用所給的縮寫符號，將下列自然語言語句翻譯成形式語言語句。）(每題二分)

   (1) Drinks or meals are not allowed.（飲料或食物都不得攜入。）（Domain: everything. Let Dx = "x is a drink"; Mx = "x is a meal"; Ax = "x is allowed.）

   (2) If Art neither diets nor exercises, he will gain weight.（Art 如果既不節食又不運動，他將會變胖。）(D: Art diets; E: Art exercises; G: Art gains weight.)

   (3) It's either the case that logic students universally are illogical or the case that the unpopular students universally are logical.（或者邏輯課學生普遍都不邏輯，或者不受歡迎的學生普遍都很邏輯。）（Domain: students. Let Sx = "x is a logic student"; Lx = "x is logical"; and Px = "x is popular".）

   (4) Everything is smaller than something, though nothing is such that everything is smaller than it.（每個東西都比某個東西小，儘管沒有東西比任何東西都大）（Domain: everything. Let Sxy = "x is smaller than y"）

   (5) There is exactly one present king of France and he is bald.（剛好有一個人是法國國王，而且他是個禿頭。）(Domain: human beings. Let Kx = "x is a present king of France"; Bx = "x is bald".)

4. Use truth-table method to determine whether the following arguments are valid.（利用真值表（請畫出），並判斷下列論證是否有效。）(每題五分)

   (1) $(p \vee q), (p \wedge q) \rightarrow r \quad / r$

   (2) $\neg p \rightarrow (q \wedge \neg p), \neg q \rightarrow \neg p \quad / p$

5. Prove the following arguments.（證明下列論證）(每題十分)

   (1) 1. $\exists x \neg(Bx \rightarrow Cx)$
   2. $\forall x \neg(\neg Cx \wedge Ax)$ $\quad / \therefore \exists x \neg Ax$

   (2) 1. $\neg \exists x Fxx$

2. $\neg\forall yGy \rightarrow \exists zFzz$ /∴ $\exists w(Gw \wedge \neg Fww)$

(3) 1. $(A \vee B) \rightarrow C$ /∴ $\neg C \rightarrow \neg A$

(4) 1. $\neg E \rightarrow (F \wedge G)$
2. $\neg (F \vee \neg H)$ /∴ E

6. Show the following arguments are invalid. （證明下列論證是無效的）(每題十分)

(1) 1. $\exists x(Ax \wedge Bx)$
2. $\exists y(By \wedge Cy)$ /∴ $\exists z(Az \wedge Cz)$

(2) 1. $\exists x(Ax \wedge Bx)$
2. $\forall x(\neg Bx \vee \neg Cx)$ /∴ $\forall x(\neg Ax \vee \neg Cx)$

符號對照：

$\wedge$: &; •
$\neg$: ~
$\rightarrow$: $\supset$