Formal Logic (Phil 205) Challenge Exam

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Example of Challenge Examination:

PART 1

I. SYMBOLIZATION

Symbolize the following sentences in sentential logic, and specifying the symbolization key you use:

Both John and Mary will go to France this winter, but only one of them will go to Paris. Only if it is Mary who goes to Paris, Peter will go to France as well. And Suzy will go to France if and only if Peter goes to France too. So if John goes to Paris, the others will not go to France.

II. TRUTH TABLES

P: $\sim A \& A$

Q: $\sim (A \vee B) \& A$

R: $[(A \& B) \supset \sim B]$

S: $B \supset (B \vee A)$

Construct a truth table with all four sentences (P, Q, R, S), and by using this truth table answer the following questions:

1. Determine for each of the sentences P, Q, R and S, whether the sentence is logically true, logically false or logically indeterminate.

2. Determine whether the following sets of sentences are consistent or inconsistent:

S1: {P, Q, R, S}   S2: {Q, R}   S3: {R, S}

3. On Equivalence: Are P and Q equivalent? Are R and S equivalent?

4. On validity: For each of the following arguments, determine whether it is valid or invalid:

$B \supset (B \vee A)$

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

$\sim (A \vee B) \& A$
$[(A \& B) \supset \sim B]$

$B \supset (B \vee A)$

III. DERIVATION

1. Derive B∨C from

| A≡B
| (L ∨ J) ⊃ A
| L & ~C

2. Derive ~A&B from

| (A&B) ⊃ (L&M)
| ~L &B

3. Derive (Q & R) ⊃ (S & T) from

| (R& Q) ⊃ P
| S & L
| P ⊃ T

4. Show that A ⊃ [B ⊃ (A & B)] is a logical truth

PART 2

I. SYMBOLIZATION

UD: Persons	Cx: x is a climber	Vx: x has vertigo
Hx: x is a hiker	Ax: x is adventurous	b: Bob
Mxy: x is more adventurous than y	Lxy: x likes y	c: Cathy
Fx: x is fearless	Axy: x admires y	

A. Symbolize the following sentences in PL using the given symbolization key

1. Either Cathy is a fearless hiker or Bob is an adventurous climber
2. Bob is fearless only if he doesn't have vertigo.
3. If Bob is neither fearless nor adventurous, Cathy doesn't admire him
4.Every climber is a hiker but not every hiker is a climber
5. Some hikers are climbers but no hiker who has vertigo is a climber
6. Not all fearless hikers are climbers but adventurous hikers are.
7. Hikers and climbers who are either adventurous or fearless are self-admiring
8. Every climber is more adventurous than some hiker

B. Translate the following symbolizations in English sentences using the given symbolization key

1. (~Ab v Mcb) ⊃ (Lcb & ~Acb)
2. (∀x)[(Hx v Cx) ⊃ Ax]
3. (∃x)(Hx ∨ Cx) & (∀y)~(Hy & Cy)

II. DERIVATION

A. Complete the following derivations, with justifications

(∀x) (Ax ⊃ Bx)	
~Ba ⊃ ~Aa	
(∀x) (~Bx ⊃ ~Ax)	

1	(∀x)(∀y)[Gxy ≡ (Ky ⊃ Cx)]
2	(∀x) Gix
3	(∃z) Kz
4	Kg
5	(∀y)[Giy ≡ (Ky ⊃ Ci)]
6	Gig ≡ (Kg ⊃ Ci)
7	Gig
8	Kg ⊃ Ci
9	Ci
10	(∃x) Cx
11	(∃x) Cx

B. Show that the following arguments are valid

(∀x)(~ Ax ⊃ Kx)
(∃y) ~Ky

(∃w)(Aw ∨ ~ La)

Ra
(∀x)(Rx ⊃ Qx)

(∃y)Qy