**Phi 270 F00 test 3** | in pdf format |

Analyze the sentences below in as much detail as possible *using connectives*; that is, you *should not* identify components that are individual terms (or predicates or functors). Present the result in *both symbolic and English notation*. Be sure that the unanalyzed components of your answer are complete and independent sentences; also try to respect any grouping in the English.

1. *If it rains, you will get wet if you're outside*
   [ answer ]
2. *Al missed breakfast only if he overslept*
   [ answer ]

Use derivations to check whether each of the entailments below holds. You may use detachment and attachment rules. If an entailment fails, present a counterexample that divides an open gap.

3. A → (B → C) ⇒ (A → ¬ C) → (A → ¬ B)
   [ answer ]
4. A → B ⇒ ¬ A ∧ B
   [ answer ]

Analyze the sentence below in as much detail as possible. In this case you *should* identify components that are individual terms, predicates, or functors. Be sure that the unanalyzed components of your answer are independent (in particular, that none contains a pronoun whose antecedent is in another).

5. *Unless Al is the file's owner, the system didn't let him open it*
   [ answer ]

[The following question was on a topic not covered in F05] Expand the following sentence in all possible ways on each of the terms appearing in it (i.e., you need not use vacuous abstraction).

6. Tabc
   [ answer ]

Use a derivation to show that the entailment below holds. You may use detachment and attachment rules.

7. A → Ra(fb), Rb(fa) → Ga ⇒ A → (¬ Gb → ¬ a = b)
   [ answer ]

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**Phi 270 F00 test 3 answers**

1. *it will rain → you will get wet if you're outside*
   *it will rain → (you will get wet ← you will be outside)*

R → (W ← O) [*or:* R → (O → W)]
  if R then if O then W
[O: *you will be outside*; R: *it will rain*; W: *you will get wet*]

2. ¬ *Al missed breakfast ← ¬ Al overslept*
  ¬ M ← ¬ O [*or:* ¬ O → ¬ M)]
  if not O then not M
[M: *Al missed breakfast*; O:*Al overslept*]

3.

|  | A → (B → C) | 3 |

| | A → ¬ C | 4 |

| | A | (3),(4) |

| 3 MPP | B → C | 5 |
| 4 MPP | ¬ C | (5) |
| 5 MTT | ¬ B | (6) |
|  | ● |  |

| 6 QED | ¬ B | 2 |

| 2 CP | A → ¬ B | 1 |

| 1 CP | (A → ¬ C) → (A → ¬ B) | |

4.

|  | A → B | 3,5 |

| | A | (3) |

| 3 MPP | B | |
|  | ○ | A, B ⇒ ⊥ |
|  | ⊥ | 2 |

| 2 RAA | ¬ A | 1 |

| | ¬ B | (5) |

| 5 MTT | ¬ A | |
|  | ○ | ¬ A, ¬ B ⇒ ⊥ |
|  | ⊥ | 4 |

| 4 IP | B | 1 |

| 1 Cnj | ¬ A ∧ B | |

| A B | A → B | / | ¬ A ∧ B | | |
|-----|-------|---|---------|---|---|
| T T | T | | F | F | divides 1st gap |
| F F | T | | T | F | divides 2nd gap |

**5.** ¬ *Al is the file's owner* → *the system didn't let Al open the file*

¬ *Al is the file's owner* → ¬ *the system let Al open the file*

¬ *Al* = *the file's owner* → ¬ [λxyz (x *let* y *open* z)] *the system*
*Al the file*

¬ a = [λx (x*'s owner*)] *the file* → ¬ Lsaf

¬ a = of → ¬ Lsaf

[L: λxyz (x *let* y *open* z); a: *Al*; f: *the file*; o: λx (x*'s owner*); s: *the system*]

**6.** [This question was on a topic not covered in F05]

[λx Txbc]a

[λx Taxc]b

[λx Tabx]c

**7.**

|  | | A → Ra(fb) | |
|---|---|---|---|
|  | | Rb(fa) → Ga | 4 |
|  | | A | |
|  | | Ra(fb) | (5) |
|  | | ¬ Gb | (6) |
|  | | a=b | a-b, fa-fb |
|  | | ● | |
| 5 QED= | | Rb(fa) | 4 |
|  | | Ga | (6) |
|  | | ● | |
| 6 Nc= | | ⊥ | 4 |
| 4 RC | | ⊥ | 3 |
| 3 RAA | | ¬ a=b | 2 |
| 2 CP | | ¬ Gb → ¬ a=b | 1 |
| 1 CP | A → (¬ Gb → ¬ a=b) | | |