

SECTION 3: PRACTICE TESTS AND QUIZZES

This section contains actual exams and quizzes given during the Spring 2000 and Summer 2000 terms. They have been condensed to save space in this booklet.

3.1. Quizzes (Solutions follow in 3.2)

3.1.1. Quiz One

Problem 1: Using the table given on p. 24, translate the following sentences into FOL [40 points]

1. Claire gave Silly to Max at 3:05 p.m.
2. Max was angry at 2:10 p.m.
3. Folly *belonged to* Max at 3:00 p.m.
4. 3:01 p.m. *is later than* 3:00 p.m.
5. Folly *was erased* by Max at 2 p.m.

Problem 2: Create your own translation manual (using as less predicates as possible), and translate the following English sentences into FOL [60 points – Translation Manual: 25 points, Translations: 35 points].

1. Claire is *a* good student in Symbolic Logic.
2. Claire is *the* best student of Class 2000.
3. Claire is taller than the girl friend of Max's best friend.
4. Max prefers Claire to John's girl friend.
5. John and Nancy's youngest son is shorter than their oldest daughter.
6. The sum of 2 and 6 is less than the next number of 11.

3.1.2. Quiz Two

Problem 1. Give a *formal* proof of the sentence “Larger (c, d)” from the premises “Larger (b, a)”, “c = b”, and “a = d”. [20 points]

Problem 2. Use Double Negation rule, DeMorgen's rules and other Derivation Rules to prove that the following pair of sentences are logically equivalent. [30 points]

$$(1) \neg [(\neg A \wedge \neg \neg B) \vee \neg (A \vee C)] \Leftrightarrow (C \vee A) \wedge (\neg B \vee A)$$

$$(2) \neg [(\neg A \vee B) \vee \neg (A \wedge \neg (A \vee B))] \Leftrightarrow A \wedge \neg (A \vee B)$$

Problem 3. Translate the following English sentences into the formal language of *the Tarski's World* (50 points).

- (1) Either a is smaller than b or both a and b are larger than c .
- (2) a and b are both in front of c ; moreover, both are smaller than it.
- (3) c is neither between a and b , nor in front of either of them.
- (4) Neither d nor c is in front of either b or e .
- (5) **Only one** block, either a or b , is between c and d .
- (6) **Extra credit:** Although a small cube a is in front of a large dodecahedron b , the former is to the left of the latter unless a is between two tetrahedrons c and d .

3.1.3. Quiz Three

Problem 1: Using the names and predicates presented in Table 1 on page 23, translate the following into FOL (50 points = 10 points \times 5).

1. If Folly belonged to Max at 2 p.m., then it was not blank 5 minute later.
2. Claire erased Folly at 2 p.m. if and only if Max did not erase Folly at 2 p.m..
3. Folly was blank at 2 p.m. if Claire or Max erased it at 1:55 p.m..
4. Folly was blank at 2 p.m. unless Claire did not erase it at 1:55 p.m..
5. Folly was not blank at 2 p.m. only if neither Claire nor Max erased it 10 minutes before.

Problem 2: Give formal proofs of the following (50 points = 25 points \times 2).

1. $\{ A \rightarrow B, A \rightarrow (B \rightarrow C), B \rightarrow (C \rightarrow D) \} \models A \rightarrow D$
2. $\{ (F \wedge G) \leftrightarrow H, F \rightarrow G \} \models F \leftrightarrow H$

3.2. Solutions to Quizzes

3.2.1. Quiz One Solutions

Problem 1

1. Gave (Claire, Silly, Max, 3:05)
2. Angry (Max, 2:10)
3. Owen (Max, Folly, 3:00)
4. 3:00 < 3:01
5. Erased (Max, Folly, 2:00)