

School of Law, Kanazawa University  
 Special Lecture on Jurisprudence, Final Examination  
 7 June 2017, Hidehiko ADACHI

1. Assume that  $A=1$  and  $B=1$  ( $A$  and  $B$  are both true) while  $X=0$  and  $Y=0$  ( $X$  and  $Y$  are both false). Calculate the truth value of each wff below. (10 points)

- (a)  $(\sim A \cdot \sim X)$  \*1
- (b)  $(\sim A \supset X)$  \*2
- (c)  $(\sim Y \supset (A \cdot X))$  \*3
- (d)  $(\sim X \vee \sim (\sim A \equiv B))$  \*4
- (e)  $\sim ((A \supset B) \supset (B \supset Y))$  \*5

2. Assume that  $T=1$ ,  $F=0$ , and  $U=?$  ( $U$  is unknown). Calculate the truth value of each wff below. (10 points)

- (a)  $(U \cdot F)$  \*6
- (b)  $(U \supset \sim T)$  \*7
- (c)  $(F \supset U)$  \*8
- (d)  $(U \supset \sim F)$  \*9
- (e)  $(U \vee F)$  \*10

3. Prove each of these arguments to be valid or invalid. (15 points)

- (a) \*11
  - $A$
  - $\therefore (A \vee B)$
- (b) \*12
  - $((A \vee B) \supset C)$
  - $\therefore (\sim C \supset \sim B)$
- (c) \*13
  - $(A \supset B)$
  - $(C \supset B)$
  - $\therefore (A \supset C)$

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\*1 Harry J. Gensler, Introduction to Logic (3rd edn, Routledge 2017) 6.3a: 2.  
 \*2 6.3a: 7.  
 \*3 6.3a: 14.  
 \*4 6.3a: 13.  
 \*5 6.3a: 15.  
 \*6 6.4a: 1.  
 \*7 6.4a: 2.  
 \*8 6.4a: 5.  
 \*9 6.4a: 10.  
 \*10 6.4a: 12.  
 \*11 7.1a: 2.  
 \*12 7.1a: 4.  
 \*13 7.2a: 2.

4. Prove each of these arguments to be valid or invalid. (15 points)

(a) \*14

$$(x)Fx$$

$$\therefore (x)(Gx \vee Fx)$$

(b) \*15

$$(x)(Fx \supset Gx)$$

$$(\exists x)Fx$$

$$\therefore (\exists x)(Fx \cdot Gx)$$

(c) \*16

$$(\exists x)Fx$$

$$(\exists x)Gx$$

$$\therefore (\exists x)(Fx \cdot Gx)$$

5. Say in which systems the argument is valid: K, T, B, S4, or S5. (25 points)

(a) \*17

$$A$$

$$\therefore \Diamond A$$

(b) \*18

$$(A \supset \Box B)$$

$$\Diamond \sim B$$

$$\therefore \Diamond \sim A$$

(c) \*19

$$\Diamond \Box A$$

$$\therefore A$$

(d) \*20

$$\Diamond \Diamond A$$

$$\therefore \Diamond A$$

(e) \*21

$$\Box(A \supset \Box B)$$

$$\therefore (\Diamond A \supset \Box B)$$

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\*14 8.2a: 1.

\*15 8.2a: 5.

\*16 8.3a: 2.

\*17 10.2a: 2.

\*18 10.2a: 6.

\*19 11.1a: 1.

\*20 11.1a: 3.

\*21 11.1a: 8.

6. Say whether valid (and give a proof) or invalid (and give a refutation). (25 points)

(a) \*22

$$\sim \underline{A}$$

$$\therefore \sim (\underline{A} \cdot \underline{B})$$

(b) \*23

$$(A \supset B)$$

$$\therefore \sim (\underline{A} \cdot \sim \underline{B})$$

(c) \*24

$$O \sim \underline{A}$$

$$\therefore O \sim (\underline{A} \cdot \underline{B})$$

(d) \*25

$$\therefore O(O\underline{A} \supset \underline{A})$$

(e) \*26

$$O\underline{A}$$

$$R\underline{B}$$

$$\therefore R(\underline{A} \cdot \underline{B})$$

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\*22 12.2a: 1.

\*23 12.2a: 4.

\*24 12.4a: 1.

\*25 12.4a: 4.

\*26 12.4a: 12.