

Logic Assignment Semester II, MM

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KopyriteoktatetooTowsandgrandprofetj obywankenobi

Question one

(a)

1. $\sim(\sim C \& B) \Rightarrow (A \& D)$
2. $\sim[(\sim E \Rightarrow B) \& A]$
3. $(E \Rightarrow B) \Rightarrow \sim(A \vee D) \quad / \quad \therefore D \Rightarrow (C \& \sim E)$
4. $\sim(\sim E \Rightarrow B) \vee \sim A$ 2, deM
5. $\sim(\sim \sim E \vee B) \vee \sim A$ 4, imp
6. $\sim(E \vee B) \vee \sim A$ 5, dn
7. $(\sim E \& \sim B) \vee \sim A$ 6, deM
8. $\sim A \vee (\sim E \& \sim B)$ 7, comm
9. $(\sim A \vee \sim E) \& (\sim A \vee \sim B)$ 8, dist
10. $(\sim \sim A \Rightarrow \sim E) \& (\sim \sim A \Rightarrow \sim B)$ 9, imp
11. $(A \Rightarrow \sim E) \& (A \Rightarrow \sim B)$ 10, dn
12. $(E \Rightarrow B) \Rightarrow (\sim A \& \sim D)$ 3, deM
13. $(E \Rightarrow B) \Rightarrow \sim D$ 12, simp
14. $\sim(E \Rightarrow B) \vee \sim D$ 13, imp
15. $\sim(\sim E \vee B) \vee \sim D$ 14, imp
16. $(\sim \sim E \& \sim B) \vee \sim D$ 15, deM
17. $(E \& \sim B) \vee \sim D$ 16, dn
18. $\sim D \vee (E \& \sim B)$ 17, comm
19. $(\sim D \vee E) \& (\sim D \vee \sim B)$ 18, dist
20. $(D \Rightarrow E) \& (D \Rightarrow \sim B)$ 19, imp
21. $(\sim \sim C \vee \sim B) \Rightarrow (A \& D)$ 1, deM
22. $(C \vee \sim B) \Rightarrow (A \& D)$ 21, dn
23. $(C \vee \sim B) \Rightarrow \sim(\sim A \vee \sim D)$ 22, deM
24. $\sim(C \vee \sim B) \vee \sim(\sim A \vee \sim D)$ 23, imp
25. $(\sim C \& \sim \sim B) \vee (\sim \sim A \& \sim \sim D)$ 24, deM
26. $(\sim C \& B) \vee (A \& D)$ 25, dn
27. $\sim C \vee (A \& D)$ 26, simp
28. $(\sim C \vee A) \& (\sim C \vee D)$ 27, dist
29. $(C \Rightarrow A) \& (C \Rightarrow D)$ 28, imp
30. $C \Rightarrow A$ 29, simp
31. $A \Rightarrow \sim E$ 11, simp
32. $C \Rightarrow \sim E$ 30, 31, HS
33. $C \Rightarrow (C \& \sim E)$ 32, abs
34. $\sim C \vee (C \& \sim E)$ 33, imp
35. $\sim[C \& \sim(C \& \sim E)]$ 34, deM
36. $\sim \sim(C \& \sim E)$ 35, simp
37. $C \& \sim E$ 36, dn
38. $(C \& \sim E) \vee \sim D$ 37, Add
39. $\sim D \vee (C \& \sim E)$ 38, comm
40. $D \Rightarrow (C \& \sim E)$ 39, Imp

(b)

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| 1. $(\sim L \Rightarrow A) \equiv \sim B$ | |
| 2. $(J \equiv \sim L) \Rightarrow [(K \vee \sim B) \Rightarrow A]$ | |
| 3. $\sim[G \Rightarrow (\sim B \vee \sim K)]$ | |
| 4. $J \Rightarrow \sim G \quad / \quad \therefore \sim[(\sim A \Rightarrow K) \Rightarrow (\sim L \Rightarrow J)]$ | |
| 5. $[(\sim L \Rightarrow A) \Rightarrow \sim B] \& [\sim B \Rightarrow (\sim L \Rightarrow A)]$ | 1, equiv |
| 6. $[\sim(\sim L \Rightarrow A) \vee \sim B] \& [\sim\sim B \vee (\sim L \Rightarrow A)]$ | 5, imp |
| 7. $[\sim(\sim L \Rightarrow A) \vee \sim B] \& [B \vee (\sim L \Rightarrow A)]$ | 6, dn |
| 8. $[\sim(\sim\sim L \vee A) \vee \sim B] \& [B \vee (\sim\sim L \vee A)]$ | 7, imp |
| 9. $[\sim(L \vee A) \vee \sim B] \& [B \vee (L \vee A)]$ | 8, dn |
| 10. $B \vee (L \vee A)$ | 9, simp |
| 11. $\sim[\sim B \& \sim(L \vee A)]$ | 10, deM |
| 12. $\sim\sim(L \vee A)$ | 11, simp |
| 13. $L \vee A$ | 12, dn |
| 14. $\sim L \Rightarrow A$ | 13, imp |
| 15. $\sim\sim B$ | 11, simp |
| 16. B | 15, dn |
| 17. $[(J \Rightarrow \sim L) \& (\sim L \Rightarrow J)] \Rightarrow [(K \vee \sim B) \Rightarrow A]$ | 2, equiv |
| 18. $(\sim L \Rightarrow J) \Rightarrow [(K \vee \sim B) \Rightarrow A]$ | 17, simp |
| 19. $(\sim L \Rightarrow J) \Rightarrow [\sim(K \vee \sim B) \vee A]$ | 18, imp |
| 20. $(\sim L \Rightarrow J) \Rightarrow [(\sim K \& \sim\sim B) \vee A]$ | 19, deM |
| 21. $(\sim L \Rightarrow J) \Rightarrow [(\sim K \& B) \vee A]$ | 20, dn |
| 22. $(\sim L \Rightarrow J) \Rightarrow [A \vee (\sim K \& B)]$ | 21, comm |
| 23. $(\sim L \Rightarrow J) \Rightarrow [(A \vee \sim K) \& (A \vee B)]$ | 22, dist |
| 24. $(\sim L \Rightarrow J) \Rightarrow (A \vee \sim K)$ | 23, simp |
| 25. $\sim(\sim L \Rightarrow J) \vee (A \vee \sim K)$ | 24, imp |
| 26. $\sim[(\sim L \Rightarrow J) \& \sim(A \vee \sim K)]$ | 25, deM |
| 27. $\sim(\sim L \Rightarrow J)$ | 26, simp |
| 28. $\sim[\sim G \vee (\sim B \vee \sim K)]$ | 3, imp |
| 29. $[\sim\sim G \& \sim(\sim B \vee \sim K)]$ | 28, deM |
| 30. $[G \& \sim(\sim B \vee \sim K)]$ | 29, dn |
| 31. $G \& \sim(\sim\sim B \Rightarrow \sim\sim K)$ | 30, imp |
| 32. $G \& \sim(B \Rightarrow K)$ | 31, dn |
| 33. $\sim(B \Rightarrow K)$ | 32, simp |
| 34. G | 32, simp |
| 35. $\sim[(\sim L \Rightarrow J) \& (\sim A \& \sim\sim K)]$ | 26, deM |
| 36. $\sim[(\sim L \Rightarrow J) \& (\sim A \& K)]$ | 35, dn |
| 37. $\sim(\sim A \& K)$ | 36, simp |
| 38. $\sim\sim A$ | 37, simp |
| 39. A | 38, dn |
| 40. $A \vee K$ | 39, add |
| 41. $\sim A \Rightarrow K$ | 40, imp |

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|---|--------------|
| 42. $(\sim A \Rightarrow K) \& \sim(\sim L \Rightarrow J)$ | 27, 41, conj |
| 43. $\sim[\sim(\sim A \Rightarrow K) \Rightarrow (\sim L \Rightarrow J)]$ | 42, deM |
| 44. $\sim[\sim\sim(\sim A \Rightarrow K) \Rightarrow (\sim L \Rightarrow J)]$ | 43, imp |
| 45. $\sim[(\sim A \Rightarrow K) \Rightarrow (\sim L \Rightarrow J)]$ | 44, dn |

Question two

1. $\sim B \Rightarrow (A \& \sim C)$
 2. $\sim(C \Rightarrow \sim B) \vee \sim(A \Rightarrow \sim D)$
 3. $\sim[D \Rightarrow (B \& A)]$
- $\therefore D \& \sim(B \Rightarrow A)$

$$\sim(A \vee \sim D) = F$$

$$\therefore \underline{A = T}$$

$$\therefore \sim(C \Rightarrow \sim B) = T$$

$$\sim[D \Rightarrow (B \& A)] = T$$

$$\therefore \underline{D = T}$$

$$B \& A = F$$

$$\underline{B = T}$$

$$\sim B \Rightarrow (A \& \sim C) = T$$

$$F \Rightarrow (T \& \sim C) = T$$

$$\sim C = T$$

$$\underline{C = F}$$

$$\sim B \Rightarrow (A \& \sim C) = F \Rightarrow (T \& T), = T$$

$$\sim(C \Rightarrow \sim B) \vee \sim(A \Rightarrow \sim D) = \sim(F \Rightarrow F) \vee \sim(T \Rightarrow F) = T$$

$$\sim[D \Rightarrow (B \& A)] = \sim[T \Rightarrow (T \& T)] = F$$

$$D \& \sim(B \Rightarrow A) = T \& \sim(T \Rightarrow T) = F$$

T,T,F,F

ARGUMENT VALID!

Question three

1. $A \vee B \vee C \vee D \vee E$
2. $(\sim C \vee \sim E) \Rightarrow \sim(D \vee B)$
3. $\sim[(A \vee D) \Rightarrow C] / \therefore C$
4. $(\sim C \vee \sim E) \Rightarrow (\sim D \& \sim B)$ 2, deM
5. $\sim(\sim C \vee \sim E) \vee (\sim D \& \sim B)$ 4, imp
6. $(\sim\sim C \& \sim\sim E) \vee (\sim D \& \sim B)$ 5, deM

- 7. $(C \ \& \ E) \vee (\sim D \ \& \ \sim B)$ 6, dn
- 8. $\sim[\sim(C \ \& \ E) \ \& \ \sim(\sim D \ \& \ \sim B)]$ 7, deM
- 9. $\sim\sim(C \ \& \ E)$ 8, simp
- 10. $C \ \& \ E$ 9, Dn
- 11. $\sim(\sim A \ \& \ \sim B) \vee \sim(\sim C \ \& \ \sim D) \vee E$ 1, deM
- 12. $\sim[(\sim A \ \& \ \sim B) \ \& \ (\sim C \ \& \ \sim D)] \vee E$ 11, deM
- 13. $\sim(\sim A \ \& \ \sim B) \vee E$ 12, simp
- 14. $(\sim\sim A \ \vee \ \sim\sim B) \vee E$ 13, deM
- 15. $(A \ \vee \ B) \vee E$ 14, dn
- 16. $A \ \vee \ (B \ \vee \ E)$ 15, assoc
- 17. $\sim[\sim A \ \& \ \sim(B \ \vee \ E)]$ 16, deM
- 18. $\sim\sim(B \ \vee \ E)$ 17, simp
- 19. $B \ \vee \ E$ 18, dn
- 20. $\sim[\sim(A \ \vee \ D) \ \vee \ C]$ 3, imp
- 21. $\sim[(\sim A \ \& \ \sim D) \ \vee \ C]$ 20, deM
- 22. $\sim[\sim[\sim(\sim A \ \& \ \sim D) \ \& \ \sim C]]$ 21, deM
- 23. $\sim[\sim[\sim(\sim A \ \& \ \sim D)]]$ 22, simp
- 24. $\sim(\sim A \ \& \ \sim D)$ 23, dn
- 25. $\sim\sim A \ \vee \ \sim\sim D$ 24, deM
- 26. $A \ \vee \ D$ 25, dn
- 27. $\sim A \ \Rightarrow \ D$ 26, imp
- 28. $\sim B \ \Rightarrow \ E$ 19, imp
- 29. $\sim A \ \Rightarrow \ E$ 27, 28, HS
- 30. C 10, simp
- 31. $C \ \vee \ \sim E$ 30, add
- 32. $\sim E \ \vee \ C$ 31, comm
- 33. $\sim\sim E \ \Rightarrow \ C$ 32, imp
- 34. $E \ \Rightarrow \ C$ 33, dn
- 35. E 10, simp
- 36. C 34, 35, MP

Clair is guilty; the rest are not guilty.

Question four

(a)

Evan	Gary	Fliss	Evan is	Gary is	Fliss is
T	T	F	T	L	N
T	F	T	T	N	L
T	F	F	T	L	N
F	T	T	L	N	T
F	T	F	N	T	L
F	F	T	L	N	T

(b)

Evan	Gary	Fliss	Evan is	Gary is	Fliss is
T	T	F	T	N	L
T	F	T	N	L	T
T	F	F	T	L	N
F	T	T	L	N	T
F	T	F	L	T	N
F	F	T	N	L	T

TeendTisisTeendofTisassinementcopyritej obywankenob
itwothousandjibaj abaj oostrangerwal kingbahakingseya