20110269 387 Shome work 2>

Problem1)

 $(7rV7f) \rightarrow (SAL)$

(s→+) マナ

... r

Steps reasons

 $1)(\gamma r V \gamma f) \rightarrow (S \Lambda L)$ P1 (premise)

2)(s-)大) P2 (premise)

3)74 P3 (Premise)

4)75 Modus tolens of (2) & (3).

5)[7(7rv7f)v(SAR)] Equivalences of

= (YNf) V (SAL). (1)

simplification of (5). = (rvs)

D) 人 Disjunctive syllogism

of (4) & (6).

Problem 2)

a) Coougy Micrough

Va (ja) -> h(a)

: 3a(c(x) 1.h(x)).

Reasons. Steps

PI 1) (coons) 1 ic roug)

2) tx (5(2) -> h(x)) PL

3) Jimy - himy UI of (2)

4) j(00ug) and-elimination of (I)

5) Ccocugs Simplification of (1)

6) hooging) Malus povens ef (3) & (4)

7) Georgy 1 hipong, conjunction of (5)8(6).

8) Fx (Coal Ahas) Ef of (7).

b) 32 (CCX) / W(x)) Ya (W(x) -> P(x))

- : 3x (ccx) 1 P(2)

Steps

Reasons

1) =x(ccx) N(xx)

PI

2) C(a) 1 w(a)

EI of(1)

3) Ya (W(2) -> P(2))

P2

4) Way -> Play

UI of (3).

6) Was

and- elimination of (3)

6) P(a)

Modus ponens of (4) & (5)

7) (ca)

Simplification of

8) C (a) 1 p(a)

conjunction of (6)&(n)

9) fx (C(x) 1 p(x)) Eff of (8).

c) $\forall x (C(x) \rightarrow P(x))$

(P(Z) -> W(Z))

.'. W(zeke).

Steps

reasons

1) ta (ca) to pra)

PI

2) ((seke) -> Proseke) UI of (1)

3) Ya (P(x) -> W(x))

PZ

4) Przeke) – Wczeke)

UI of (3)

Hypothetical

5) C(reke) -> W(reke)

Syllogism of (2)8(4

6) (Qeke)

P 3

7) W(Zeke) Modus ponens of (5)&(6). d) Va (Ja) -> fa) Fa(J(x) 1 75(a)) .. Ix (f(x) 1 7 S(x)) Reasons Steps 1) 42(5(x)->f(x)) PI 2) j(a) -> f(a) UI of (1) 3) 3x (Jax) ~75(x1) Pa 4) ia) 175(a) EJ of (3) and-ulimination of 5) 75(a) 6) j(a) simplification of (4). 1) f(n) Modus ponens of (2) &(6). 8) fa nasca) consunction of (5)&(n) EG of (8). 9) = (fa) 1 - S(21) Problem 3 $\forall \alpha (p(\alpha) \rightarrow (Q_{\infty} \land S_{\infty}))$ Va (Pa) 1 Ra) Va(Ra) ∧ Sa). Reasons 1) Va (Pa) -> (Qa) 1 S(Z)) PI 2) Pra) -> (a(n) Asra) UI of (1)

3) 4x(P(x) 1 R(x))

4) Pray 1 Rray

PZ

UI of (3)

Steps Reasons Simplification 5) P(a) 0f(4) 6) O(a) 1 Sca) Modus Pohens of (2)&(5)n) Ra and- elimination of 8) Sca) and - elimination of 9) Real Ascon conjunction of (1)&(8) 10) the (Rexist Sex) Uf of (9). Problem 4) a) 7(P-18) V(r-18) =7(7pvg) V(7r V8) = (P178) V(7rv8) =[PV (7rV 8)]1[78 V (7rV8)] = (PV7rVg) 1 (78 V7rVg). b) 7(PV78)= 7P18. C) (PAF) V(79/14) =[PV (78 NY)] / [&V(78 NX)] =[(PV78)/(PVY)]/[(GV78)/(QVT] = (PV74)1(PVH)1(4V74)1(4VH). d)(p1 79xr)v(7P1 7g1r) =[(PV(7P17q1r)]1/17qV(7P17q1r)]1 [720(7717977)] =[(PV7P)1(PV78)1(PVT)]1[(78V7P)1(つない78)へ(つないかい)]へ[(コャリア)へ(コトレアを) 1 (Trvr)7 = (PV7P)1(PV78)1 (PVr)1(18V7P)1(78V78) ハ (7をリア)ハ (7トV7P)ハ (7トV7を)ハ(7rVr).

e)(p→g) V7(gV7r) = (7PV8)V(78-1 r) = (79 Ar) V (7PV&) =[78 V(7PV&)] N[rv(7PV&)] = (78 V7PV 8)1 (rv 7PVB) f)7(PA8) H (PV8) = (7PV78) (PV8) =[(7PV78)-> (PV8)] 1 [(PU8)-)(7PV-9)] =[7 (7PV78)V(PV8)] [7(PV8)V (7PV78)] = [P18)U(PV8)]1[6P178)V (7PV79-)]. > [(8v9)) \(8v(pv8))] \

 $= [(P(PV8)) \wedge (8V(PV8))] \wedge (7PV78)) \wedge (7PV78)) \wedge (7PV78)) \wedge (7PV78) \wedge (7PV78) \wedge (7PV7PV78)$ $= (PVPV8) \wedge (8VPV8) \wedge (7PV7PV78) \wedge (7PV78) \wedge (7PV$

problem ()

a) $a \wedge (b \leftrightarrow c)$ $= a \wedge [(b \to c) \wedge (c \to b)]$. $= a \wedge [(7b \vee c) \wedge (7c \vee b)]$. $= a \wedge [(7b \wedge (7c \vee b)) \vee (c \wedge (7c \vee b))]$. $= a \wedge [((7b \wedge (7c \vee b)) \vee ((c \wedge (7c \vee b))) \vee ((c \wedge (7c \vee b)))]$. $= [(((c \wedge (7b \wedge (7c \vee b)) \wedge ((c \wedge (7c \vee b))) \vee ((c \wedge (7c \vee b))) \vee ((c \wedge (7c \vee b))) \wedge ((c \wedge (7c \vee b)) \vee ((c \wedge (7c \vee b))) \wedge ((c \wedge (7c \vee b)) \vee ((c \wedge (7c \vee b))) \wedge ((c \wedge (7c \vee b)) \vee ((c \wedge (7c \vee b))) \wedge ((c \wedge (7c \vee b)) \vee ((c \wedge (7c \vee b))) \wedge ((c \wedge (7c \vee b)) \vee ((c \wedge (7c \vee b))) \wedge ((c \wedge$

= (76 MC Ma) V (nb Mb Ma) V (CM Ma). V(CAbAa). b)(a→b) 1 (¬a→7b). = (ravb) 1(avb) =[7an(avb)]V[bnavb)] $= (7a \wedge a) \vee (7a \wedge b) \vee (b \wedge a) \vee (b \vee b)$ () PEPF = (P -> q) 1 (q->P) = (7PV g) 1/27 g-VP). = (7P1 (7 &VP)] V [&1(7&VP)]. = [(7P17g)v(7P1P)]V[(817g)V (gnp)]. = (7P178) V(7P1P) V(8178) V(81P) d)(P-)8)178 = (7pvg)178. = (7PMF)V(.g.179)