M.G.Mam

3) $(x)(Dx \supset \sim Ex)$

$(x)(Fx \supset Ex)$

$\therefore (x)(Fx \supset \sim Dx)$

~~1. $Dy \supset \sim Ey$~~

~~2. $Fy \supset Ey$ /∴ $Fy \supset \sim Dy$~~

1. $(x)(Dx \supset \sim Ex)$
2. $(x)(Fx \supset Ex)$ /∴ $(x)(Fx \supset \sim Dx)$
3. $Dy \supset \sim Ey$ — 1, U.I.
4. $Fy \supset Ey$ — 2, U.I.
5. $\sim\sim Ey \supset \sim Dy$ — 3, Trans.
6. $Ey \supset \sim Dy$ — 5, D.N.
7. $Fy \supset \sim Dy$ — 6, 4, H.S.
8. $(x)(Fx \supset \sim Dx)$ — 7, U.G.

~~4) $(Jx \cdot Kx)$~~

4) $(\exists x)(Jx \cdot Kx)$

$(x)(Jx \supset Lx)$

2. 1. $(x)(Dx \supset \sim Ex)$

2. $(x)(Fx \supset Ex)$

$\therefore (x)(Fx \supset \sim Dx)$

3. $Dy \supset \sim Ey$ ———— 1 U.I

4. $Fy \supset Ey$ ———— 2 U.I

~~5. $\sim Ey \supset \sim Fy$ ———— 4 Trans~~

5. $\sim\sim Ey \supset \sim Dy$ ———— 3 Trans

6. $Ey \supset \sim Dy$ ———— 5 D.N

7. $Fy \supset \sim Dy$ ———— 4, 6 H.S

8. $(x)(Fx \supset \sim Dx)$ ———— 7 U.G

4. 1. $(\exists x)(Jx \cdot Kx)$

2. $(x)(Jx \supset Lx)$

$\therefore (\exists x)(Lx \cdot Kx)$

3. $Ja \cdot Ka$ ———— 1 E.I

4. $Ja \supset La$ ———— 2 U.I

5. Ja ———— 3 Sim

6. La ———— 4, 5 M.P

~~7. La.Ja~~ ———— 6, 5, conj.

7. $Ka \cdot Ja$ ———— 3 com

8. Ka ———— 8 Sim

9. $La \cdot Ka$ ———— 6, 9, conj.

10. $(\exists x)(Lx \cdot Kx)$ ———— 9 EG

2> 1. (x) (Dx ⊃ ~Ex)
2. (x) (Fx ⊃ Ex) /∴ (x) (Fx ⊃ ~Dx)
3. (Dy ⊃ ~Ey) — 1, (UI)
4. (Fy ⊃ Ey) — 2 (U.I)
5. (~~Ey ⊃ ~Dy) — 3 (Trans)
6. (Ey ⊃ ~Dy) — 5 (DN)
7. (Fy ⊃ ~Dy) — 4, 6 (H.S)
8. (x) (Fx ⊃ ~Dx) — 7 (U.G)

4> 1. (∃x) (Jx · Kx)
2. (x) (Jx ⊃ Lx)
∴ (∃x) (Lx · Kx)
3. (Ja · Ka) — 1, (EI)
4. (Ja ⊃ La) — 2, (UI)
5. Ja — 3 (simp)
6. La — 4, 5 (MP)
7. Ka · Ja — 3 (comb)
8. Ka — 7 (simp)
9. (La · Ka) — 6, 8 (conj)
10. (∃x) (Lx · Kx) — 9 — (E.G)

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8) 1) $(x)(Vx \supset Wx)$

2) $(x)(Wx \supset \sim Xx)$

$\therefore (x)(Xx \supset \sim Vx)$

3) $Vy \supset Wy$ — 1, U.I

4) $Wy \supset \sim Xy$ — 2, U.I

5) $Vy \supset \sim Xy$ — 3, 4 H.S

6) $\sim\sim Xy \supset \sim Vy$ — 5, Trans

7) $Xy \supset \sim Vy$ — 6, D.N

8) $(x)(Xx \supset \sim Vx)$ — 7, U.G

9) 1) $(\exists x)(Yx \cdot Zx)$

2) $(x)(Zx \supset Ax)$

$\therefore (\exists x)(Ax \cdot Yx)$

3) $Ya \cdot Za$ — 1, E.I

4) $Za \supset Aa$ — 2, U.I

5) $Za \cdot Ya$ — 3 com

6) Za — 5 simp

7) Aa — 4, 6 M.P

8) Ya — 3 simp

9) $Aa \cdot Ya$ — 7, 8 conj

10) $(\exists x)(Ax \cdot Yx)$ — 9, E.G

10) 1) $(x)(Bx \supset \sim Cx)$

2) $(\exists x)(Cx \cdot Dx)$

$\therefore (\exists x)(Dx \cdot \sim Bx)$

3) $Ca \cdot Da$ — 2, E.I

4) $Ba \supset \sim Ca$ — 1, U.I

5) Ca — 3 simp

6) $\sim\sim Ca$ — 5 D.N

7) $\sim Ba$ — 4, 6, M.T

8) $Da \cdot Ca$ — 3 com

9) Da — 8 simp

10) $Da \cdot \sim Ba$ — 9, 7 conj

11) $(\exists x)(Dx \cdot \sim Bx)$ — 10, E.G

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

2) $(\exists x)(Fx \cdot \sim Gx)$

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

3) $Fa \cdot \sim Ga$ — 2, E.I

4) $Fa \supset Ga$ — 1, U.I

5) $\sim Ga \cdot Fa$ — 3 com

6) $\sim Ga$ — 5 simp

7) $\sim Fa$ — 4, 6, M.T

8) Fa — 3 simp

9) Ga — 4, 8 M.P

10) $(Ga \cdot \sim Fa)$ — 9, 7 conj

11) $(\exists x)(Gx \cdot \sim Fx)$ — 10, E.G

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M. G Mam

(2) ① (x) (Dx ⊃ ~Ex)
② (x) (Fx ⊃ Ex)
∴ (x) (Fx ⊃ ~Dx)
③ Dy ⊃ ~Ey — 1, U.I
④ Fy ⊃ Ey — 2, U.I
⑤ ~~Ey ⊃ ~Dy — 3 Trans
⑥ Ey ⊃ ~Dy — 5 D.N
⑦ Fy ⊃ ~Dy — 4, 6 H.S
⑧ (x) (Fx ⊃ ~Dx) — 7 U.G

(3) ① (x) (Gx ⊃ Hx)
② (x) (Ix ⊃ ~Hx)
∴ (x) (Ix ⊃ ~Gx)
③ Gy ⊃ Hy — 1, U.I
④ Iy ⊃ ~Hy — 2, U.I
⑤ ~~Hy ⊃ Iy — 4 Trans
⑥ Hy ⊃ Iy — 5 D.N
⑤ ~Hy ⊃ ~Gy — 3 Trans
⑥ Iy ⊃ ~Gy — 4, 5 H.S
⑦ (x) (Ix ⊃ ~Gx) — 6 U.G

(4) ① (∃x) (Jx · Kx)
② (x) (Jx ⊃ Lx)
∴ (∃x) (Lx · Kx)
③ Ja · Ka — 1, E.I
④ Ja ⊃ ~~Ka~~ — 2, U.I
⑤ Ja — 3 simp
⑥ La — 4, 5 M.P
⑦ Ka · Ja — 3 com
⑧ Ka — 7 simp
⑨ La · Ka — 6, 8 conj
⑩ (∃x) (Lx · Kx) — 9 E.G

(5) ① (x) (Mx ⊃ Nx)
② (∃x) (Mx · Ox)
∴ (∃x) (Ox · Nx)
③ Ma · Oa — 2, E.I
④ Ma ⊃ Na — 1, U.I
⑤ Ma — 3 simp
⑥ Na — 4, 5 M.P
⑦ Oa · Ma — 3 com
⑧ Oa — 7 simp
⑨ (Oa · Na) — 8, 6 conj
⑩ (∃x) (Ox · Nx) — 9, E.G

(6) ① (∃x) (Px · ~Qx)
② (x) (Px ⊃ Rx)
∴ (∃x) (Rx · ~Qx)
③ Pa · ~Qa — 1, E.I
④ Pa ⊃ Ra — 2, U.I
⑤ Pa — 3 simp
⑥ Ra — 4, 5 M.P
⑦ ~Qa · Pa — 3 com
⑧ ~Qa — 7 simp
⑨ Ra · ~Qa — 6, 8 conj
⑩ (∃x) (Rx · ~Qx) — 9, E.G

(7) ① (x) (Sx ⊃ ~Tx)
② (∃x) (Sx · Ux)
∴ (∃x) (Ux · ~Tx)
③ Sa · Ua — 2, E.I
④ Sa ⊃ ~Tx — 1, U.I
⑤ Sa — 3 simp
⑥ ~Tx — 4, 5 M.P
⑦ Ua · Sa — 3 com
⑧ Ua — 7 simp
⑨ Ua · ~Tx — 8, 6 conj
⑩ (∃x) (Ux · ~Tx) — 9, E.G

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1. $(\exists x)(Ax \cdot Cx)$

2. $(\exists x)(Bx \cdot Cx)$

$\therefore (\exists x)(Ax \cdot Bx)$

3. $Aa \cdot Ca$ 1, E.I.

4. $Ba \cdot Ca$ 2, E.I. (wrong)

5. Aa 3, Simp.

6. Ba 4, Simp.

7. $Aa \cdot Ba$ 5, 6, Conj.

8. $(\exists x)(Ax \cdot Bx)$ 7, E.G.

The need for the indicated restriction on the use of E.I. can be seen by considering the obviously invalid argument.

Governme

2. 1 $(x) \cdot (Dx \supset \sim Ex)$

2 $(x)(Fx \supset Ex)$

$\therefore (x)(Fx \supset \sim Dx)$

3	$Dy \supset \sim Ey$	1 U.I
4	$Fy \supset Ey$	2 U.I
5	$\sim\sim Ey \supset \sim Dy$	3 Trans
6	$Ey \supset \sim Dy$	5 D.N
7	$Fy \supset \sim Dy$	4, 6 H.S
8.	$(x)(Fx \supset \sim Dx)$	7 U.G

4. 1 $(\exists x)(Jx \cdot Kx)$

2. $(x)(Jx \supset Lx)$

$\therefore (\exists x)(Lx \cdot Kx)$

3	$Ja \cdot Ka$	1 E.I
4	$Ja \supset La$	2 U.I
5	$Ka \cdot Ja$	3 Com
6	Ka	5 Sim
7	Ja	3 Sim
8	La	4, 7 M.P
9	$La \cdot Ka$	8, 6 Conj
10	$(\exists x)(Lx \cdot Kx)$	9 E.G

1. $(x)(Hx \supset \sim Px)$

2. $(x)(Ix \supset Hx)$

$\therefore (x)(Ix \supset \sim Px)$

3. $Hy \supset \sim Py$ 1, U.I.

4. $Iy \supset Hy$ 2, U.I.

5. $Iy \supset \sim Py$ 4, 3, H.S.

6. $(x)(Ix \supset \sim Px)$ 5, U.G.

---

1. $(x)(Cx \supset Vx)$

2. $(\exists x)(Hx \cdot Cx)$

$\therefore (\exists x)(Hx \cdot Vx)$

3. $Ha \cdot Ca$ 2, E.I.

4. $Ca \supset Va$ 1, U.I.

5. $Ca \cdot Ha$ 3, Com.

6. Ca 5, Simp.

7. Va 4, 6, M.P.

8. Ha 3, Simp.

9. $Ha \cdot Va$ 8, 7, Conj.

10 $(\exists x)(Hx \cdot Vx)$ 9, E.G.

1.	$(x)(Ax \supset \sim Bx)$	
2.	$(\exists x)(Cx \cdot Ax)$	
	$\therefore\ (\exists x)(Cx \cdot \sim Bx)$	
3.	$Ca \cdot Aa$	2, E.I.
4.	$Aa \supset \sim Ba$	1, U.I.
5.	$Aa \cdot Ca$	3, Com.
6.	Aa	5, Simp.
7.	$\sim Ba$	4, 6, M.P.
8.	Ca	3, Simp.
9.	$Ca \cdot \sim Ba$	8, 7, Conj.
10.	$(\exists x)(Cx \cdot \sim Bx)$	9, E.G.