PHL 245 H1S

Test 2: Thursday, March 20, 2014

Aid sheet given. No other aids allowed.

100 minutes.

Part marks will be given for ALL questions. When solving symbolizations and derivations show the overall structure and as much work as possible even if you can't solve them completely.

There are seven pages with questions (pages 2-8). Pages 9 and 10 are for rough notes or in case you need extra space.

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Signature:	Rend Din 200

1. COMPLETE a FULL truth-table for the following argument. State whether or not the argument is valid and briefly explain how you know. (13 %)

				$\begin{array}{ccc} P & \wedge & Q & \longleftrightarrow & R. \\ & \bullet & & \end{array}$	\sim (R \vee Q).	$\therefore \sim R \to P$
				•	•	•
****	P	Q	R	PAR	~(R V Q)	:.~R -> P
0	T	T	<u>T</u>	TTTTT	FTTT	FTTT
② _		T	F	TTTFF	FFTT	TFTT
1 -	T	F	T	TFFFT	FTTF	FTTT
•	T			TFFTF	OFFF	TF(T)T
_	F			FFTFT	FTTT	FTTF
6	F	T	F	FFTTF	FFTT	TFFF
(1)	F	F	T .	FFFFT	ETTE	FTFF
~	F			FFFDF	DFFF	TFAF

Valid: when premises are true, conclusion is true.

So we consider the TVA of in PRI, ~ in PRZ & > in Conclusion

Note that in case & & & which satisfy our standard,

and in either case conclusion is true.

Hence the argument is VALID.

2. Provide a shortened truth-table of one line, including a truth-value assignment, that shows that the following set of sentences is consistent. (10 %)

 $\{\ (\sim Q \lor P \to R), \ \sim (Q \land S \to R), \ (\sim S \lor W \leftrightarrow \sim P)\ \}$ Consistent: A TVA such that, those threese sentences are all true or all folse. R S W

10

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In this case, those 3 sentences are true. So consistency proved.

w

Name:

 A^1 : a has a motor.

 B^1 : a is a boat.

 C^1 : a is a canoe.

 D^1 : a is a day.

 H^1 : a is a person.

 K^1 : a is a kayak.

 G^2 : a goes in b.

 L^2 : a likes b.

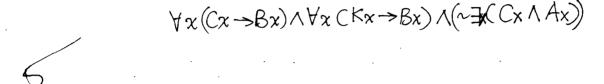
 M^3 : a paddles b on ϵ

e⁰: Elliott

 a^1 : the aunt of a.

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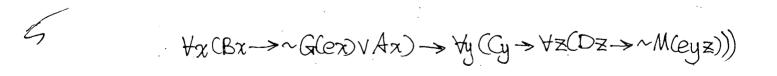
- 3. Using the above abbreviation scheme, symbolize the following: $(5 \times 5\% = 25\%)$
 - a) Canoes and kayaks are boats, but no canoe has a motor.



b) Some people only go in boats that have motors.

$$\exists_{x} (H_{x} \land \forall y (B_{y} \rightarrow (G (xy) \rightarrow A_{y}))$$

c) Provided that Elliott doesn't go in boats unless they have motors, he never paddles a canoe.



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e⁰: Elliott

 a^1 : the aunt of a.

- 3. (continued) Using the above abbreviation scheme, symbolize the following: $(5 \times 5\% = 25\%)$
 - d) Not everyone who paddles a canoe and a kayak on the same day likes all motorless boats.

e) The one boat that Elliot goes in is a kayak that both he and his aunt like.

$$\forall x (Bx \rightarrow \exists y (G(ey) \land Ky GL(ey) \land L(a(e)y)) \longrightarrow x=y)$$

Name:	

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4. a) Using the symbolization scheme above, provide an idiomatic English sentence that expresses: 5 %

$$\forall x(Hx \land \forall y(Hy \land L(yx) \rightarrow L(xy)) \leftrightarrow x=e)$$

Elliott is the person that so likes everyone who likes him.

4. b) Using the symbolization scheme above, symbolize the following ambiguous sentence **two** logically distinct ways and, for each, write an English sentence that clarifies the meaning: 5 %

Someone paddles a canoe every day.

Description paddles a (different, maybe) can exerce every day.

The same person

∃x(Hx A yy(Cy -> Yz (Dz->M(xyz))))

1) There are always people (different people) paddles the cance (doesn't matter which or whose) Every day.

YXCHX > Fy(Cy/Hz(Dz->M(xyz))))

3 =

5. Provide a derivation that shows that the following argument is valid, using only the basic rules: DN, R, MP, MT, MTP, ADD, S, ADJ, BC, CB, EI, EG, UI.

$$\exists x (Hx \land \forall y \sim M(xy)). \qquad \exists y Fy \to \forall w \forall z (B(zw) \to M(wz)).$$

$$\therefore \forall x (Fx \to \exists y (Hy \land \sim B(xy)))$$

1		
ļ	Show Yx (Fx -> 3y (Hy1~B(xy)))	Shaw conc
2	Sportx -> = y CHy 1~B(xy))	show inst
3	Fx	as d
4	Share Fly (Hurn B(xy))	show cons
5	Share Fly (Hun-BCzy) Hi X Yyn M(iy)	prl ei
6		<u>5</u> sl
7	Yy~M(iy)	5 ST
8	□ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □	3 eg
9	JyFy YwYz(B(Zw)->M(wz))	<u>pr28 mp</u>
10	~M(ix)	7 w
11	∀z(B(zi)→M(iz))	7 wi 9 wi
12	$B(xi)\rightarrow M(ix)$	11 24
13	~B(xi)	10 2 mt
14	Hinn-Rai)	6 13 adj
15	Fy(HynnB(xy))	14 eg
16		15 dd
17		4 cd,
18		2 ud
19		
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Name:		

6. Provide a derivation that shows that the following argument is valid. (Use any rules.)

$$\exists z M(a(z)z) \rightarrow \exists x \forall y (B(xy) \land L(xy)).$$
 :.

 $\exists z M(a(z)z) \ \rightarrow \ \exists x \forall y (B(xy) \land \ L(xy)). \quad \therefore \ \exists x \forall y M(ya(x)) \rightarrow \ \sim \forall x \exists y (B(xy) \rightarrow \sim L(xx))$

1	Show 3x tyM(ya(x)) > ~ Vx3y (B(xy)> ~ (xx))	show conc
2	7xtyMyaco)	ass ca
3	Show Hx Fy (B(Cxx) >~L(Cxx))	_ ghav cons
4	Vxzy(B(xy)=m(xxx))	ass id
5	Hy M(ya(i))	<u>2 ei</u>
6	Macawaci)	<u>5 ui</u>
7	3zM(a(z)z)	bæg
8	7x4y(BGxy)(Lay)	ForImp
9	Yu(B(jy))	7 pr/mp 8 ei
10	Fy(Bijy) - ~ L(ji)	<u>4 rii</u>
11	B(jj) AL(jj)	9 rû
12	LGD	11.51
13	B(jk)->n_(jj)	10 ei
14	nMGj)	12 dn
15	~BGK)	1314 mt
16	B(jk)	quist
17		15 bid
18		3 cd
19		
20		
21		
22		
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24		
25		
26		,
27		<u> </u>

7. Show that the following is a valid argument. (Use any rules.)

14.%

 $\forall x \exists y (F(yxy) \rightarrow H(yx)).$

prl

 $\forall x \forall y (L(xx) {\rightarrow} G(xy)) \ {\rightarrow} \ \exists x \forall y \forall z F(yxz) \ .$

 $\forall x (\exists y L(xy) \rightarrow \forall z (G(xz) \vee G(zz))).$

pr3

 $\therefore \sim \exists x G(xx) \to \exists x \exists y H(xy)$

ر ا	
1	Show ~3xG(XX) -> 3x3yH(Xy) show come
2	bo æs cd
3	Show IXIYHOUD show cons
4	~=x=uH(xy) ass id
5	ng 4 gn
6	n=y+(xy) yes
7	=yHcay assid
8	∃y((yy)→Yz(G(yz)VG(₹Z))) pr8 m'
9	[(ii)→∀z(G(iz)VG(zz)) ? ei
10	~L(ii) V Y Z (G(iz) V G(ZZ)) 9 cdj
11	mugh idea ML(ii) 1 YZ(G(iz) VG(ZZ))) (10 dm
12	
13	
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23	Basically idea is to use pr3 first, then use L&G to get
24	Fin pr2, back to pr 1 finally get H.
25	And should use show ant pr 2 somewhere
26	
27	
28	