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**A.7 Chapter 7 Answers**
**Exercise 7.1.1 Wffs**

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|----|-----------------|----|-----------|-----|-----------|------|-----------|
| i  | Atomic sentence | ii | Not a wff | iii | Not a wff | iv   | Not a wff |
| v  | Universal       | vi | Not a wff | vii | Not a wff | viii | Negation  |
| ix | Biconditional   | x  | Not a wff |     |           |      |           |

**Exercise 7.1.2 Translations**

- i  $\exists x(Cx \ \& \ \forall y(Cy \rightarrow y=x))$   
 ii  $\exists x x=p$   
 alt:  $\exists x(x=p \ \& \ \forall y(y=p \rightarrow y=x))$   
 iii  $\exists xy(((Tx \ \& \ Ty) \ \& \ x \neq y) \ \& \ (Ebx \ \& \ Eby))$   
 iv  $\forall x(x \neq b \rightarrow Ebx) \ \& \ \sim Ebb$   
 alt:  $\forall x(x \neq b \leftrightarrow Ebx)$   
 v  $\forall x(Dx \rightarrow \exists y((Ty \ \& \ Byx) \ \& \ \forall z(Tz \ \& \ Bzx \rightarrow y=z)))$

**Exercise 7.2 Proofs**(S118)  $a=b, b \neq c \vdash a \neq c$ 

1	(1)	$a=b$	A
2	(2)	$b \neq c$	A
3	(3)	$a=c$	A
1,3	(4)	$b=c$	1,3 =E
1,2	(5)	$a \neq c$	2,4 RAA (3)

(S120)  $\forall x x=x \rightarrow \exists xFx, \forall x(\sim Fx \vee Gx) \vdash \exists x(Fx \ \& \ Gx)$ 

1	(1)	$\forall x x=x \rightarrow \exists xFx$	A
2	(2)	$\forall x(\sim Fx \vee Gx)$	A
	(3)	$a=a$	=I
	(4)	$\forall x x=x$	4 $\forall I$
1	(5)	$\exists xFx$	1,4 $\rightarrow E$
6	(6)	$Fa$	A
2	(7)	$\sim Fa \vee Ga$	2 $\vee E$
2,6	(8)	$Ga$	6,7 $\vee E$
2,6	(9)	$Fa \ \& \ Ga$	6,8 $\& I$
2,6	(10)	$\exists x(Fx \ \& \ Gx)$	9 $\exists I$
1,2	(11)	$\exists x(Fx \ \& \ Gx)$	5,10 $\exists E(6)$