EXERCISES FOR SECTION 3.5

PART I: TRUTH-FUNCTIONAL PROPERTIES

(*Note*: You can find solutions to the odd-numbered problems in the authors' solutions manual, which you can find at the following web site: http://blue.butler.edu/~sglennan/SSM.pdf.)

2. This statement is *contingent*.

G	~	G	→	G
T	F	T	T	T
F	T	F	F	F

4. This statement is *self-contradictory*.

G	~	G	↔	G
T	F	T	F	T
F	T	F	F	F

6. This statement is *contingent*.

A	~	(A	&	A)
T	F	T	T	T
F	T	F	F	F

8. This statement is *tautologous*.

H	H	→	(H	∨	~	H)
T	T	T	T	T	F	T
F	F	T	F	T	T	F

10. This statement is *contingent*.

G	H	G	∨	(H	&	~	G)
T	T	T	T	T	F	F	T
T	F	T	T	F	F	F	T
F	T	F	T	T	T	T	F
F	F	F	F	F	F	T	F

12. This statement is *tautologous*.

M	O	M	→	(~	M	→	O)
T	T	T	T	F	T	T	T
T	F	T	T	F	T	T	F
F	T	F	T	T	F	T	T
F	F	F	T	T	F	F	F

14. This statement is *contingent*.

L	M	P	[M	&	(L	→	P)]	∨	~	M
T	T	T	T	T	T	T	T	T	F	T
T	T	F	T	F	T	F	F	F	F	T
T	F	T	F	F	T	T	T	T	T	F
T	F	F	F	F	T	F	F	T	T	F
F	T	T	T	T	F	T	T	T	F	T
F	T	F	T	T	F	T	F	T	F	T
F	F	T	F	F	F	T	T	T	T	F
F	F	F	F	F	F	T	F	T	T	F

16. This statement is *contingent*.

M	O	(~	O	→	M)	∨	(~	M	→	O)
T	T	F	T	T	T	T	F	T	T	T
T	F	T	F	T	T	T	F	T	T	F
F	T	F	T	T	F	T	T	F	T	T
F	F	T	F	F	F	F	T	F	F	F

18. This statement is *contingent*.

A	B	~	[(A	→	~	B)	→	~	(A	→	B)]
T	T	F	T	F	F	T	T	F	T	T	T
T	F	F	T	T	T	F	T	T	T	F	F
F	T	T	F	T	F	T	F	F	F	T	T
F	F	T	F	T	T	F	F	F	F	T	F

PART II: TRUTH-FUNCTIONAL RELATIONSHIPS

20. These statements are *equivalent*.

L	M	~	(M	∨	L)		~	M	&	~	L
T	T	F	T	T	T		F	T	F	F	T
T	F	F	F	T	T		T	F	F	F	T
F	T	F	T	T	F		F	T	F	T	F
F	F	T	F	F	F		T	F	T	T	F

22. These statements are *neither* equivalent nor contradictory.

L	M	~	(M	&	L)	~	M	&	~	L
T	T	F	T	T	T	F	T	F	F	T
T	F	T	F	F	T	T	F	F	F	T
F	T	T	T	F	F	F	T	F	T	F
F	F	T	F	F	F	T	F	T	T	F

24. These statements are *equivalent*.

M	~	~	M	M
T	T	F	T	T
F	F	T	F	F

26. These statements are *neither* equivalent nor contradictory.

R	S	~	(R	→	S)	R	→	~	S
T	T	F	T	T	T	T	F	F	T
T	F	T	T	F	F	T	T	T	F
F	T	F	F	T	T	F	T	F	T
F	F	F	F	T	F	F	T	T	F

28. These statements are *equivalent*.

R	S	~	(R	→	S)	R	&	~	S
T	T	F	T	T	T	T	F	F	T
T	F	T	T	F	F	T	T	T	F
F	T	F	F	T	T	F	F	F	T
F	F	F	F	T	F	F	F	T	F

30. These statements are *contradictory*.

R	R	↔	R	R	↔	~	R
T	T	T	T	T	F	F	T
F	F	T	F	F	F	T	F

32. These statements are *equivalent*.

G	(G	&	G)	&	G	G
T	T	T	T	T	T	T
F	F	F	F	F	F	F

34. These statements are *neither* equivalent nor contradictory.

A	B	C	A	→	(B	→	C)	(A	→	B)	→	C
T	T	T	T	T	T	T	T	T	T	T	T	T
T	T	F	T	F	T	F	F	T	T	T	F	F
T	F	T	T	T	F	T	T	T	F	F	T	T
T	F	F	T	T	F	T	F	T	F	F	T	F
F	T	T	F	T	T	T	T	F	T	T	T	T
F	T	F	F	T	T	F	F	F	T	T	F	F
F	F	T	F	T	F	T	T	F	T	F	T	T
F	F	F	F	T	F	T	F	F	T	F	F	F

36. These statements are *neither* equivalent nor contradictory.

A	B	~	(A	&	B)	~	(~	A	&	~	B)
T	T	F	T	T	T	T	F	T	F	F	T
T	F	T	T	F	F	T	F	T	F	T	F
F	T	T	F	F	T	T	T	F	F	F	T
F	F	T	F	F	F	F	T	F	T	T	F

38. These statements are *equivalent*.

A	B	~	(A	↔	A)	B	↔	~	B
T	T	F	T	T	T	T	F	F	T
T	F	F	T	T	T	F	F	T	F
F	T	F	F	T	F	T	F	F	T
F	F	F	F	T	F	F	F	T	F

40. These statements are *equivalent*.

L	M	(L	→	L)	&	M	M
T	T	T	T	T	T	T	T
T	F	T	T	T	F	F	F
F	T	F	T	F	T	T	T
F	F	F	T	F	F	F	F