

EXERCISES FOR SECTION 3.4

PART I: TAUTOLOGIES

(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 *not* a tautology.

A	B	A	\vee	\sim	B
T	T	T	T	F	T
T	F	T	T	T	F
F	T	F	F	F	T
F	F	F	T	T	F

4. This statement is *not* a tautology.

A	\sim	(A	\vee	\sim A)
T	F	T	T	FT
F	F	F	T	TF

6. This statement *is* a tautology.

H	G	\sim	(\sim	(H	$\&$	\sim G)	$\&$	G)	\vee	G
T	T	F	T	T	F	FT	T	T	T	T
T	F	T	F	T	T	TF	F	F	T	F
F	T	F	T	F	F	FT	T	T	T	T
F	F	T	T	F	F	TF	F	F	T	F

8. This statement *is* a tautology.

X	Y	(X	\rightarrow	Y)	\vee	(Y	\rightarrow	X)
T	T	T	T	T	T	T	T	T
T	F	T	F	F	T	F	T	T
F	T	F	T	T	T	T	F	F
F	F	F	T	F	T	F	T	F

10. This statement *is* a tautology.

A	B	((A	$\&$	B)	\vee	((\sim A	$\&$	B)	\vee	(A	$\&$	\sim B)))	\vee	(\sim A	$\&$	\sim B)
T	T	T	T	T	T	FT	F	T	F	T	F	FT	T	FT	F	FT
T	F	T	F	F	T	FT	F	F	T	T	T	TF	T	FT	F	TF
F	T	F	F	T	T	TF	T	T	T	F	F	FT	T	TF	F	FT
F	F	F	F	F	F	TF	F	F	F	F	F	TF	T	TF	T	TF

12. This statement is *not* a tautology.

H	J	$\sim(H \rightarrow J)$	\rightarrow	$\sim(J \rightarrow H)$
T	T	F	T	T
T	F	T	F	F
F	T	F	T	T
F	F	F	T	F

14. This statement *is* a tautology. (*Lesson:* The disjunction of a self-contradictory statement and a tautology is itself a tautology. More generally, the disjunction of *any* statement and a tautology is itself a tautology.)

G	H	P	$[(G \& \sim H) \& (H \& \sim G)]$	\vee	$(P \rightarrow P)$
T	T	T	F	T	T
T	T	F	F	T	F
T	F	T	F	T	T
T	F	F	F	T	F
F	T	T	F	T	T
F	T	F	F	T	F
F	F	T	F	T	T
F	F	F	F	T	F

16. This statement is *not* a tautology.

E	Q	$\sim(Q \& E)$	\rightarrow	$\sim(Q \vee E)$
T	T	F	T	F
T	F	T	F	F
F	T	T	F	T
F	F	T	T	F

18. This statement *is* a tautology.

H	J	K	$[J \rightarrow (H \& K)]$	\rightarrow	$[(J \rightarrow H) \& (J \rightarrow K)]$
T	T	T	T	T	T
T	T	F	F	T	F
T	F	T	T	F	T
T	F	F	F	T	F
F	T	T	T	F	T
F	T	F	F	T	F
F	F	T	T	F	T
F	F	F	F	T	F

20. This statement *is* a tautology.

X	Y	Z	[(X & Y) → Z]					[(X → Z) ∨ (Y → Z)]						
T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
T	T	F	T	T	F	F	T	T	F	F	F	T	F	F
T	F	T	T	F	T	T	T	T	T	T	T	F	T	T
T	F	F	T	F	F	T	F	T	T	F	F	T	F	F
F	T	T	F	F	T	T	T	T	F	T	T	T	T	T
F	T	F	F	F	T	T	F	T	F	T	F	T	F	F
F	F	T	F	F	F	T	T	T	F	T	T	T	F	T
F	F	F	F	F	F	T	F	T	F	T	F	T	F	F

PART II: VALIDITY

22. This argument is *invalid*, as is shown on the first line of the truth table.

A	B	A	∨	B	~A	∨	~B		
T	T	T	T	T	F	T	F	T	*
T	F	T	T	F	F	T	T	F	
F	T	F	T	T	T	F	T	F	
F	F	F	F	F	T	T	T	F	

24. This argument is *invalid*, as is shown on the second and third lines of the truth table.

P	Q	~	(P & Q)	~P	&	~Q			
T	T	F	T	T	F	T	F	T	
T	F	T	F	F	F	T	T	F	*
F	T	T	F	T	F	F	T	F	*
F	F	T	F	F	T	T	T	F	

26. This argument is *valid*.

W	Z	Z	∨	W	W	→	Z	Z
T	T	T	T	T	T	T	T	T
T	F	F	T	T	T	F	F	F
F	T	T	T	F	F	T	T	T
F	F	F	F	F	F	T	F	F

28. This argument is *invalid*, as is shown on the second line of the truth table.

E	F	E	∨	F	~	~	E	F	
T	T	T	T	T	T	F	T	T	
T	F	T	T	F	T	F	T	F	*
F	T	F	T	T	F	T	F	T	
F	F	F	F	F	F	T	F	F	

30. This argument is *valid*.

A	B	$\sim (A \rightarrow B)$				$\sim B$	
T	T	F	T	T	T	F	T
T	F	T	T	F	F	T	F
F	T	F	F	T	T	F	T
F	F	F	F	T	F	T	F

32. This argument is *invalid*, as is shown on the first line of the truth table.

F	G	$F \rightarrow G$			$\sim F \rightarrow \sim G$			$\sim (F \& G)$			
T	T	T	T	T	F	T	F	T	T	T	*
T	F	T	F	F	F	T	T	F	T	F	F
F	T	F	T	T	T	F	F	T	F	F	T
F	F	F	T	F	T	F	T	F	F	F	F

34. This argument is *valid*.

H	J	$H \rightarrow J$			$\sim J \rightarrow (H \rightarrow J)$		
T	T	T	T	T	F	T	T
T	F	T	F	F	T	F	F
F	T	F	T	T	F	T	T
F	F	F	T	F	T	F	F

36. This argument is *valid*.

K	L	$\sim (\sim \sim K \& \sim \sim L)$							$\sim \sim K$		$\sim L$	
T	T	F	T	F	T	T	T	F	T	F	T	
T	F	T	T	F	T	F	F	T	F	T	F	
F	T	T	F	T	F	F	T	F	T	F	T	
F	F	T	F	T	F	F	F	T	F	T	F	

38. This argument is *invalid*, as is shown on the fifth and seventh lines of the truth table.

M	N	O	$M \rightarrow N$			$N \rightarrow O$			$\sim M$		$\sim O$		
T	T	T	T	T	T	T	T	T	F	T	F	T	
T	T	F	T	T	T	T	F	F	F	T	T	F	
T	F	T	T	F	F	F	T	T	F	T	F	T	
T	F	F	T	F	F	F	T	F	F	T	T	F	
F	T	T	F	T	T	T	T	T	T	F	F	T	*
F	T	F	F	T	T	T	F	F	T	F	T	F	*
F	F	T	F	T	F	F	T	T	T	F	F	T	
F	F	F	F	T	F	F	T	F	T	F	T	F	

40. This argument is *valid*.

A	C	D	\sim A	(C \vee D)	\rightarrow	\sim A	A	\rightarrow	\sim D
T	T	T	F	T	T	T	F	F	T
T	T	F	F	T	F	F	T	T	F
T	F	T	F	F	T	F	F	F	T
T	F	F	F	F	F	T	F	T	F
F	T	T	T	T	T	T	F	F	T
F	T	F	T	T	F	T	F	F	F
F	F	T	T	F	T	T	F	F	T
F	F	F	T	F	F	T	F	F	F

42. This argument is *invalid*, as is shown on the tenth, twelfth, fourteenth and sixteenth lines of the truth table.

H	J	L	M	H \rightarrow J	J \rightarrow \sim (L & M)	\sim M	H & J
T	T	T	T	T	F	F	T
T	T	T	F	T	T	T	T
T	T	F	T	T	T	F	T
T	T	F	F	T	T	F	T
T	F	T	T	T	F	T	F
T	F	T	F	T	F	T	F
T	F	F	T	T	F	F	F
T	F	F	F	T	F	F	F
F	T	T	T	F	T	T	F
F	T	T	F	F	T	T	F
F	T	F	T	F	T	F	F
F	T	F	F	F	T	F	F
F	F	T	T	F	F	T	F
F	F	T	F	F	T	T	F
F	F	F	T	F	T	F	F
F	F	F	F	F	T	T	F

44. This argument is *valid*.

K	M	P	\sim [K \vee (K \rightarrow M)]	P & \sim P
T	T	T	F	F
T	T	F	F	F
T	F	T	F	F
T	F	F	F	F
F	T	T	F	F
F	T	F	F	F
F	F	T	F	F
F	F	F	F	F

46. This argument is *valid*.

R	S	T	U	R	\vee	(S	\rightarrow	T)	\sim	T	&	\sim	R	\sim	(S	&	U)
T	T	T	T	T	T	T	T	T	F	T	F	F	T	F	T	T	T
T	T	T	F	T	T	T	T	T	F	T	F	F	T	T	T	F	F
T	T	F	T	T	T	T	F	F	T	F	F	F	T	F	T	T	T
T	T	F	F	T	T	T	F	F	T	F	F	F	T	T	T	F	F
T	F	T	T	T	T	F	T	T	F	T	F	F	T	T	F	F	T
T	F	T	F	T	T	F	T	T	F	T	F	F	T	T	F	F	F
T	F	F	T	T	T	F	T	F	T	F	F	F	T	T	F	F	T
T	F	F	F	T	T	F	T	F	T	F	F	F	T	T	F	F	F
F	T	T	T	F	T	T	T	T	F	T	F	T	F	F	T	T	T
F	T	T	F	F	T	T	T	T	F	T	F	T	F	T	T	F	F
F	T	F	T	F	F	T	F	F	T	F	T	T	F	F	T	T	T
F	T	F	F	F	F	T	F	F	T	F	T	T	F	T	T	F	F
F	F	T	T	F	T	F	T	T	F	T	F	T	F	T	F	F	T
F	F	T	F	F	T	F	T	T	F	T	F	T	F	T	F	F	F
F	F	F	T	F	T	F	T	F	T	F	T	T	F	T	F	F	T
F	F	F	F	F	T	F	T	F	T	F	T	T	F	T	F	F	F

48. This argument is *valid*.

M	N	O	P	\sim	[M	\vee	(N	\vee	O)]	(\sim	M	\rightarrow	P)	&	(\sim	O	\rightarrow	P)	P	\rightarrow	\sim	N	\sim	N	\rightarrow	P
T	T	T	T	F	T	T	T	T	T	F	T	T	T	T	F	T	T	T	T	F	F	T	F	T	T	T
T	T	T	F	F	T	T	T	T	T	F	T	T	F	T	F	T	T	F	F	T	F	F	T	T	T	F
T	T	F	T	F	T	T	T	T	F	F	T	T	T	T	T	F	T	T	T	T	F	F	T	T	T	T
T	T	F	F	F	T	T	T	T	F	F	T	T	F	F	T	F	F	F	F	F	T	F	T	T	T	F
T	F	T	T	F	T	T	F	T	T	F	T	T	T	T	F	T	T	T	T	T	T	F	T	T	T	T
T	F	T	F	F	T	T	F	T	T	F	T	T	F	T	F	T	T	F	F	T	F	T	F	F	F	F
T	F	F	T	T	T	T	F	F	F	F	T	T	T	T	T	F	T	T	T	T	T	F	T	T	T	T
T	F	F	F	T	T	T	F	F	F	F	T	T	F	F	T	F	F	F	F	F	T	F	T	F	F	F
F	T	T	T	F	F	T	T	T	T	T	F	T	T	T	T	F	T	T	T	T	F	F	T	T	T	T
F	T	T	F	F	F	T	T	T	F	T	F	T	T	T	T	F	T	T	F	F	T	F	T	T	T	F
F	T	F	F	F	F	T	T	T	F	T	F	F	F	F	T	F	F	F	F	F	T	F	T	T	T	F
F	F	T	T	F	F	T	F	T	T	T	F	T	T	T	F	T	T	T	T	T	T	F	T	T	T	T
F	F	T	F	F	F	T	F	T	T	T	F	F	F	F	F	T	T	F	F	F	T	F	T	F	F	F
F	F	F	T	T	F	F	F	F	F	T	F	T	T	T	T	F	T	T	T	T	T	F	T	T	T	T
F	F	F	F	T	F	F	F	F	F	T	F	F	F	F	T	F	F	F	F	F	T	F	T	F	F	F

50. This argument is *valid*.

A	B	C	D	E	(A & B)	→	(C →	(D & E))	~	(D → E)	&	C	~	(A & B)
T	T	T	T	T	T	T	T	T	T	T	F	T	F	T
T	T	T	T	F	T	T	F	T	F	T	F	F	T	T
T	T	T	F	T	T	T	F	T	F	F	F	T	F	T
T	T	T	F	F	T	T	F	T	F	F	F	F	F	T
T	T	F	T	T	T	T	T	F	T	T	T	T	F	F
T	T	F	T	F	T	T	T	F	T	T	F	F	F	F
T	T	F	F	T	T	T	T	F	T	F	F	T	F	F
T	T	F	F	F	T	T	T	F	T	F	F	F	F	F
T	F	T	T	T	T	F	F	T	T	T	T	T	F	T
T	F	T	T	F	T	F	F	T	T	F	F	T	T	F
T	F	T	F	T	T	F	F	F	T	F	F	T	T	F
T	F	T	F	F	T	F	F	T	T	F	F	F	T	F
T	F	F	T	T	T	F	F	T	T	T	T	T	F	F
T	F	F	T	F	T	F	F	T	T	F	F	F	F	F
T	F	F	F	T	T	F	F	T	F	T	F	F	T	F
T	F	F	F	F	T	F	F	T	F	T	F	F	F	F
F	T	T	T	T	F	F	T	T	T	T	T	T	F	T
F	T	T	T	F	F	F	T	T	F	T	F	F	T	T
F	T	T	F	T	F	F	T	T	F	F	F	T	F	T
F	T	T	F	F	F	F	T	T	F	F	F	F	T	F
F	T	F	T	T	F	F	T	F	T	T	T	T	F	T
F	T	F	T	F	F	F	T	F	T	F	F	T	F	T
F	T	F	F	T	F	F	T	F	T	F	F	F	T	F
F	T	F	F	F	F	F	T	F	T	F	F	F	F	T
F	F	T	T	T	F	F	F	T	T	T	T	T	F	T
F	F	T	T	F	F	F	T	T	F	T	F	F	T	T
F	F	T	F	T	F	F	T	T	F	F	F	T	F	T
F	F	T	F	F	F	F	T	T	F	F	F	F	T	F
F	F	F	T	T	F	F	T	F	T	T	T	T	F	F
F	F	F	T	F	F	F	T	F	T	T	F	F	T	F
F	F	F	F	T	F	F	T	F	T	F	F	T	F	F
F	F	F	F	F	F	F	T	F	T	F	F	F	T	F

PART III: SYMBOLIZATION

52. B: There will be a sea battle tomorrow; F: The future is fixed.

- $B \vee \sim B$
- $B \rightarrow F$
- $\sim B \rightarrow F$
- $\therefore F$

The following truth table shows that this argument is *valid*:

B	F	B	∨	~	B	B	→	F	~	B	→	F	F
T	T	T	T	F	T	T	T	T	F	T	T	T	T
T	F	T	T	F	T	T	F	F	F	T	T	F	F
F	T	F	T	T	F	F	T	T	T	F	T	T	T
F	F	F	T	T	F	F	T	F	T	F	F	F	F

54. R: Rene really wants to appreciate Marcel Proust; S: Rene will read all seven volumes of *A la recherche du temps perdu*; F: Rene will learn French.

$$\begin{aligned}
 &R \rightarrow S \\
 &S \rightarrow F \\
 &\therefore \sim F \rightarrow \sim R
 \end{aligned}$$

The following truth table shows that this argument is *valid*:

F	R	S	R	→	S	S	→	F	~	F	→	~	R
T	T	T	T	T	T	T	T	T	F	T	T	F	T
T	T	F	T	F	F	F	T	T	F	T	T	F	T
T	F	T	F	T	T	T	T	T	F	T	T	T	F
T	F	F	F	T	F	F	T	T	F	T	T	T	F
F	T	T	T	T	T	T	F	F	T	F	F	F	T
F	T	F	T	F	F	F	T	F	T	F	F	F	T
F	F	T	F	T	T	T	F	F	T	F	T	T	F
F	F	F	F	T	F	F	T	F	T	F	T	T	F

56. S: The “Socrates” argument is valid; T: The “Socrates” argument has true premises; F: The “Socrates” argument has a false conclusion.

$$\begin{aligned}
 &S \leftrightarrow \sim(T \& F) \\
 &F \\
 &\therefore \sim S
 \end{aligned}$$

The following truth table shows that this argument is *invalid*:

F	S	T	S	↔	~	(T & F)	F	~	S
T	T	T	T	F	F	T	T	T	T
T	T	F	T	T	T	F	F	T	T
T	F	T	F	T	F	T	T	T	F
T	F	F	F	F	T	F	F	T	F
F	T	T	T	T	T	T	F	F	T
F	T	F	T	T	T	F	F	F	T
F	F	T	F	F	T	T	F	F	F
F	F	F	F	F	T	F	F	F	F

*

58. M: My computer makes mistakes; C: My computer has been correctly programmed; P: There is a power failure.

$$\begin{aligned} & \sim(\sim C \vee P) \rightarrow \sim M \\ & \sim P \& M \\ & \therefore \sim C \end{aligned}$$

The following truth table shows that this argument is *valid*:

C	M	P	\sim	$(\sim C \vee P)$	\rightarrow	$\sim M$	$\sim P$	$\& M$	$\sim C$
T	T	T	F	F	T	T	F	T	F
T	T	F	T	F	F	F	T	T	F
T	F	T	F	F	T	T	F	F	F
T	F	F	T	F	F	T	F	F	F
F	T	T	F	T	T	T	F	T	T
F	T	F	F	T	F	T	F	T	T
F	F	T	F	T	T	T	F	F	T
F	F	F	F	T	F	T	F	F	T

60. M: Maria will go to the university next year; S: Sally will go to the university next year; L: We will take out a student loan.

$$\begin{aligned} & M \vee S \\ & [(M \vee S) \& \sim(M \& S)] \rightarrow \sim L \\ & (M \& S) \rightarrow L \\ & \therefore L \rightarrow (M \leftrightarrow S) \end{aligned}$$

The following truth table shows that this argument is *valid*:

L	M	S	M	\vee	S	$[(M \vee S) \& \sim(M \& S)]$	\rightarrow	$\sim L$	$(M \& S)$	\rightarrow	L	$L \rightarrow (M \leftrightarrow S)$
T	T	T	T	T	T	T	T	F	T	T	T	T
T	T	F	T	F	T	F	F	T	F	T	T	F
T	F	T	F	T	T	T	F	F	T	T	T	F
T	F	F	F	F	F	F	T	F	F	T	T	F
F	T	T	T	T	T	T	F	T	T	F	F	T
F	T	F	T	F	T	F	T	T	F	F	F	F
F	F	T	F	T	T	T	F	F	T	F	F	T
F	F	F	F	F	F	F	T	F	F	F	F	F

62. R: The positivists are right; S: Statements exist; P: Propositions exist; M: Sentences are the conveyors of meaning; E: Synonymy can be reasonably explained.

$R \rightarrow (\sim S \ \& \ \sim P)$
 $(\sim S \ \& \ \sim P) \rightarrow M$
 $M \rightarrow \sim E$
 E
 $\therefore (S \vee P) \ \& \ \sim R$

The following truth table shows that this argument is *valid*:

E	M	P	R	S	R	\rightarrow	(\sim S	$\&$	\sim P)	(\sim S	$\&$	\sim P)	\rightarrow	M	M	\rightarrow	\sim	E
T	T	T	T	T	T	F	F	T	F	F	T	F	T	T	T	F	F	T
T	T	T	T	F	T	F	T	F	F	F	T	T	F	T	T	T	F	T
T	T	T	F	T	F	T	F	T	F	F	T	F	T	T	T	T	F	T
T	T	T	F	F	F	T	T	F	F	F	T	T	F	T	T	T	F	T
T	T	F	T	T	T	F	F	T	F	T	F	F	T	T	T	T	F	T
T	T	F	T	F	T	T	T	F	T	T	F	T	F	T	T	T	F	T
T	T	F	F	T	F	T	F	T	F	T	F	F	T	T	T	T	F	T
T	T	F	F	F	F	T	T	F	T	T	F	T	F	T	T	T	F	T
T	F	T	T	T	T	F	F	T	F	F	T	F	T	F	F	T	F	T
T	F	T	T	F	T	F	T	F	F	F	T	T	F	F	F	T	F	T
T	F	T	F	T	F	T	F	T	F	F	T	T	F	T	F	T	F	T
T	F	T	F	F	F	T	T	F	F	F	T	T	F	T	F	T	F	T
T	F	F	T	T	T	F	F	T	F	T	F	F	T	F	F	T	F	T
T	F	F	T	F	T	T	T	F	T	T	F	T	F	F	F	T	F	T
T	F	F	F	T	F	T	F	T	F	T	F	F	T	F	F	T	F	T
T	F	F	F	F	F	T	T	F	T	T	F	T	F	F	F	T	F	T
F	T	T	T	T	T	F	F	T	F	F	T	F	T	T	T	T	T	F
F	T	T	T	F	T	F	T	F	F	F	T	T	F	T	T	T	T	F
F	T	T	F	T	F	T	F	T	F	F	T	F	T	T	T	T	T	F
F	T	T	F	F	F	T	T	F	F	F	T	T	F	T	T	T	T	F
F	T	F	T	T	T	F	F	T	F	T	F	F	T	T	T	T	T	F
F	T	F	T	F	T	T	T	F	T	T	F	T	F	T	T	T	T	F
F	T	F	F	T	F	T	F	T	F	T	F	F	T	T	T	T	T	F
F	T	F	F	F	F	T	T	F	T	T	F	T	F	T	T	T	T	F
F	F	T	T	T	T	F	F	T	F	F	T	F	T	F	F	T	T	F
F	F	T	T	F	T	F	T	F	F	F	T	T	F	F	F	T	T	F
F	F	T	F	T	F	T	F	T	F	F	T	T	F	F	F	T	T	F
F	F	T	F	F	F	T	T	F	F	F	T	T	F	F	F	T	T	F
F	F	F	T	T	T	F	F	T	F	T	F	F	T	F	F	T	T	F
F	F	F	T	F	T	T	T	F	T	T	F	T	F	F	F	T	T	F
F	F	F	F	T	F	T	F	T	F	T	F	F	T	F	F	T	T	F
F	F	F	F	F	F	T	T	F	T	T	F	T	F	F	F	T	T	F

E	M	P	R	S	E	(S	\vee	P)	&	\sim	R
T	T	T	T	T	T	T	T	T	F	F	T
T	T	T	T	F	T	F	T	T	F	F	T
T	T	T	F	T	T	T	T	T	T	T	F
T	T	T	F	F	T	F	T	T	T	T	F
T	T	F	T	T	T	T	T	F	F	F	T
T	T	F	T	F	T	F	F	F	F	F	T
T	T	F	F	T	T	T	T	F	T	T	F
T	T	F	F	F	T	F	F	F	F	T	F
T	F	T	T	T	T	T	T	T	F	F	T
T	F	T	T	F	T	F	T	T	F	F	T
T	F	T	F	T	T	T	T	T	T	T	F
T	F	T	F	F	T	F	T	T	T	T	F
T	F	F	T	T	T	T	T	F	F	F	T
T	F	F	T	F	T	F	F	F	F	F	T
T	F	F	F	T	T	T	T	F	T	T	F
T	F	F	F	F	T	F	F	F	F	T	F
F	T	T	T	T	F	T	T	T	F	F	T
F	T	T	T	F	F	F	T	T	F	F	T
F	T	T	F	T	F	T	T	T	T	T	F
F	T	T	F	F	F	F	T	T	T	T	F
F	T	F	T	T	F	T	T	F	F	F	T
F	T	F	T	F	F	F	F	F	F	F	T
F	T	F	F	T	F	T	T	F	T	T	F
F	T	F	F	F	F	F	F	F	F	T	F
F	F	T	T	T	F	T	T	T	F	F	T
F	F	T	T	F	F	F	T	T	F	F	T
F	F	T	F	T	F	T	T	T	T	T	F
F	F	T	F	F	F	F	T	T	T	T	F
F	F	F	T	T	F	T	T	F	F	F	T
F	F	F	T	F	F	F	F	F	F	F	T
F	F	F	F	T	F	T	T	F	T	T	F
F	F	F	F	F	F	F	F	F	F	T	F

64. D: The doctrine of determinism is true; F: The doctrine of freedom is true; B: Blanshard's view is correct; S: Sartre is right.

$$\begin{aligned} &\sim(D \ \& \ F) \\ &(B \ \rightarrow \ D) \ \& \ (\sim F \ \rightarrow \ \sim S) \\ &\therefore \sim B \ \& \ \sim S \end{aligned}$$

This argument is *invalid*, as is shown on the fourth and thirteenth lines of the truth table.

B	D	F	S	$\sim (D \ \& \ F)$	$(B \ \rightarrow \ D) \ \& \ (\sim F \ \rightarrow \ \sim S)$	$\sim B \ \& \ \sim S$
T	T	T	T	F	T	F
T	T	T	F	F	T	F
T	T	F	T	T	T	F
T	T	F	F	T	T	F
T	F	T	T	T	F	F
T	F	T	F	T	F	F
T	F	F	T	T	F	F
T	F	F	F	T	F	F
F	T	T	T	F	T	F
F	T	T	F	F	T	F
F	T	F	T	T	F	F
F	T	F	F	T	F	F
F	F	T	T	T	F	F
F	F	T	F	T	F	F
F	F	F	T	T	F	F
F	F	F	F	T	F	F

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