

# Introduction to Logic

## Answers to Practice Exam for Unit/Exam 1:

### A. Validity and Soundness

- TRUE                      2. FALSE
- FALSE                     4. TRUE
- (a) VALID, (b) NOT FACTUALLY CORRECT, (c) UNSOUND
- (a) INVALID, (b) NOT FACTUALLY CORRECT, (c) UNSOUND
- (a) INVALID, (b) FACTUALLY CORRECT, (c) UNSOUND

### B. Truth Tables

8. 

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

CONTRADICTION

9. 

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

CONTRADICTION

10. 

(P	→	Q)	↔	(P	∨	~ Q)	
T	T	T	T	T	T	F	T
T	F	F	F	T	T	T	F
F	T	T	F	F	F	F	T
F	T	F	T	F	T	T	F

CONTINGENT

11. 

(M	→	~ N)	∨	[(N	&	O)	→	M]	
T	F	F	T	T	T	T	T	T	
T	F	F	T	T	F	F	T	T	
T	T	T	F	T	F	F	T	T	
T	T	T	F	T	F	F	F	T	T
F	T	F	T	T	T	T	F	F	
F	T	F	T	T	F	F	T	F	
F	T	T	F	T	F	F	T	T	F
F	T	T	F	T	F	F	F	T	F

TAUTOLOGY

12. 

X	∨	Y ;	Y	→	X /	X
T	T	T	T	T	T	T
T	T	F	F	T	T	T
F	T	T	T	F	F	F
F	F	F	F	T	F	F

VALID

13. 

(P	∨	Q)	→	P /	~	(P	&	~ Q)	
T	T	T	T	T	T	T	F	F	T
T	T	F	T	T	F	T	T	T	F
F	T	T	F	F	T	F	F	F	T
F	F	F	T	F	T	F	F	T	F

INVALID

14. 

(A	∨	B)	∨	C ;	~	B /	~ C	→	A	
T	T	T	T	T	F	T	F	T	T	
T	T	T	T	F	F	T	T	F	T	T
T	T	F	T	T	T	F	F	T	T	T
T	T	F	T	F	T	F	T	F	T	T
F	T	T	T	T	F	T	F	T	T	F
F	T	T	T	F	T	F	T	F	T	F
F	T	F	T	T	T	F	T	T	F	F
F	T	F	T	F	T	F	T	T	F	F
F	F	F	T	T	T	F	T	F	T	F
F	F	F	F	F	T	F	T	F	F	F

VALID

15. 

F	→	(G	→	H)	;	F	→	G /	~ H	→	~ F
T	T	T	T	T	T	T	T	F	T	T	F
T	F	T	F	F	T	T	T	T	F	F	F
T	T	F	T	T	T	F	F	F	T	T	F
T	T	F	T	F	T	F	F	T	F	F	F
F	T	T	T	T	F	T	T	F	T	T	F
F	T	T	F	F	F	T	T	T	F	T	F
F	T	F	T	T	F	T	F	F	T	T	F
F	T	F	T	F	F	T	F	T	F	T	F

VALID

### C. Translations

- ~N & ~M —OR—  
~(N ∨ M)
- (F & G) & ~S
- (B ∨ C) → T
- P → (~S → A) —OR—  
P → (A ∨ S)
- J → ~R —OR—  
~R → ~J —OR—  
R → ~J

- B ↔ J —OR—  
(~B → ~J) & (B → J) —OR—  
(J → B) & (B → J) etc.
- P → (~J → P) —OR—  
~(~P → ~J) → ~P —OR—  
~(~J → P) → ~P etc.
- ~(G ↔ B) → (S ∨ C) —OR—  
(~G ↔ B) → (S ∨ C)

### D. Combined Methods

24. 

D	→	P ;	~ U	→	~ P ;	~ U /	~ D	
T	T	T	F	T	F	T	F	T
T	T	T	T	F	F	T	F	T
T	F	F	F	T	T	F	T	F
T	F	F	T	F	T	F	T	F
F	T	T	F	T	F	T	F	T
F	T	T	T	F	F	T	F	T
F	T	F	T	T	F	T	F	T
F	T	F	T	F	T	F	T	F
F	T	F	F	T	T	F	T	F
F	T	F	F	T	F	T	F	T

VALID

Note: the first premise may also be translated ~P → ~D. The second premise may also be translated ~P ∨ U

25. 

~ P	→	~ G ;	B	→	~ G /	B	∨	P
F	T	F	T	F	F	T	T	T
F	T	F	T	F	F	T	T	T
F	T	T	F	T	T	F	T	T
F	T	T	F	T	T	F	T	T
T	F	F	F	T	F	F	T	T
T	F	F	F	T	F	F	T	T
T	F	T	T	F	T	F	T	F
T	F	T	T	F	T	F	T	F
T	F	T	F	T	T	F	T	F
T	F	T	F	T	T	F	T	F

INVALID

Note: the last sentence in the English paragraph is NOT the conclusion of the argument! The first premise may also be translated P ∨ ~G.