NAME

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 The exam is worth a total of 160 points. The points for each section & question are noted in parentheses.

The Exam is due at 8:30pm Today. You must **email it by that time to** danieladdison43@gmail.com.

Symbols: You **may** use the symbols in the right-hand column, which are available to your fingerprints, as equivalents for the (proper) symbols in the left-hand column.

Proper Symbol	You May Use	
~	~	
⊃	>	[Right-arrow Key]
•	&	[Command+7]
∨	v	[lower-case "V for Victor")
≡	=	[equals sign]

Answer all questions on the Exam. There are 13 Questions.

A. DEFINITIONS AND QUESTIONS. (60 points total; 6 points each)

1. State the new definition of "justified step". (6)

2. Complete the following with "always," "sometimes," or "never": (6)

    (a) Proving a theorem _____ requires use of C.P. or I.P.

    (b) The proof of a theorem _____ begins with certain given premises.

    (c) A theorem is _____ a contingency.

3. What premise would be needed to get this conclusion by DeMorgan? (6)

    Conclusion: ((A • B) ∨ ~ (A • C))

4. State the following rules symbolically: (6)

    (a) Exportation (Exp)   (b) Modus Tollens (MT)

5. What rule has applied? (6)

   Premises: (B ∨ C) ⊃ (A • D), (~R⊃ G) ⊃ (B ∨ C)
   Conclusion: (~R ⊃ G) ⊃ (A • D)

6. What conclusion could be derived using <u>all three</u> of the following premises, and by what rule?
   (6 points)

   Premises: (A • C) ∨ ~B,   ~B ⊃ (C ∨ ~D),   (A • C) ⊃ R

7. If we gave (IP) as a reason for ~~(A ∨ ~B), we would have to have assumed _____? (6)

8. Which (if any) of the following are correct applications of the cited rule? For those which are
   not, state briefly what is wrong. (6)

   (a)   1. ~(A ∨ ~B) ⊃ (C • A)   Pr.
              2. ~(C • A) ⊃ (A ∨ ~B)   Contrap. 1

   (b)   1. (A • C) ⊃ (C ∨ D)   Pr.
              2. ~C   Pr.
              3. D   D.S. 1,2

9. Construct a "mini-proof" from the premise to the conclusion: (6)

   ~(p ⊃ q) / ∴ ~q

10. Prove the following theorem: (6)

   ~~p ⊃ (p ∨ q)

EXAM 2   2

B. Construct proofs for the following three arguments. You *must* use CP in *at least one* of these problems. (It is *not* necessary to use CP is *all* three problems. You <u>*may*</u> use CP and IP in any problem, as many times as you wish.) (100 points)

11. ∼(S ∨ T), (P • Q) ⊃ S, P / ∴ ∼Q   (30)

12. ∼(T ∨ S) ∨ G,   G ≡ (P ∨ P)   / ∴ (S ∨ T) ⊃ (G • P)   (40)

13. Construct a proof of the following theorem: (30)

$\sim((p \cdot (p \supset q)) \cdot \sim q)$

END OF EXAM