

## Intermediate Logic

## Homework #17

(Due: 2/12/2013)

Read pages 38-46 in the *Intermediate Logic* text and complete the exercises.

**Exercise 8** (from pages 41-42 of the text).

1. Fill-in the following truth table to determine the truth values for the exclusive *or*. The truth values for  $p$  and  $q$  are filled out for you.

$p$	$q$	$(p \vee q)$	$(p \cdot q)$	$\sim (p \cdot q)$	$(p \vee q) \cdot \sim(p \cdot q)$
T	T				
T	F				
F	T				
F	F				

2. Determine the truth values for  $\sim(J \cdot R)$  and  $\sim J \cdot \sim R$  to prove that they are different. The initial J and R should follow the same pattern as  $p$  and  $q$  in problem one.

J	R	$\sim J$	$\sim R$	$(J \cdot R)$	$\sim(J \cdot R)$	$\sim J \cdot \sim R$

3. Write sentences in English corresponding to the two compound propositions in problem five, using *Joe is a student* for J and *Rachel is a student* for R.

$\sim(J \cdot R)$  \_\_\_\_\_

$\sim J \cdot \sim R$  \_\_\_\_\_

Determine the truth value for each compound proposition. Assume that propositions A and B are true, X and Y are false. Circle T if the entire compound proposition is true. Circle F if it is false. Use the space at the right for showing any work (tables) if you wish.

4.  $\sim A \vee B$                       T    F

5.  $X \vee \sim B$                       T    F

6.  $\sim(A \vee B)$                       T    F

7.  $(A \cdot X) \vee (B \cdot Y)$             T    F

8.  $\sim[X \vee (Y \cdot \sim A)]$             T    F

Identify the truth value of each of the following sentences by circling T or F.

9. Jonah was a prophet or Isaiah was a prophet. T F
10. Jeremiah was not a prophet but Isaiah was a prophet. T F
11. It is not true that both Jeremiah was a prophet and Isaiah was not a prophet. T F
12. Jonah was not a prophet or both Jeremiah and Isaiah were not prophets. T F
13. A false proposition is not true. T F
14. It is false that a true proposition is not false. T F
15. It is true that it is false that a true proposition is not false. T F

**Exercise 9** (from page 46 of the text)

1. Develop the truth table for the compound proposition  $\sim p \vee q$  on the line below.

p	q	$\sim p$	$\sim p \vee q$
T	T		
T	F		
F	T		
F	F		

2. To what compound proposition is  $\sim p \vee q$  equivalent? \_\_\_\_\_

If A, B, and C represent true propositions and X, Y and Z represent false propositions, determine whether the following compound propositions are true or false and circle the appropriate letter.

3.  $A \supset B$  T F
4.  $B \supset Z$  T F
5.  $X \supset C$  T F
6.  $(A \supset B) \supset Z$  T F
7.  $X \supset (Y \supset Z)$  T F
8.  $(A \supset Y) \vee (B \supset \sim C)$  T F
9.  $[(X \supset Z) \supset C] \supset Z$  T F
10.  $[(A \bullet X) \supset Y] \supset [(X \supset \sim Z) \vee (A \supset Y)]$  T F

If S represents *I will go swimming* and C represents *The water is cold*, symbolize the following:

11. If the water is not cold, then I will go swimming. \_\_\_\_\_

12. I will go swimming if the water is cold. \_\_\_\_\_



Define the following logical operator as explained in the text.

- Conditional –

## Cranium Calisthenics

The Lady or the Tiger?\*

The Third Trial: The king explained that, again, the signs were either both true or both false.

Here are the signs:

I  
EITHER A TIGER IS  
IN THIS ROOM OR  
A LADY IS IN THE  
OTHER ROOM

II  
A LADY IS IN THE  
OTHER ROOM

Does the first room contain a lady or a tiger? What about the other room? Explain your answer!  
(Reminder: each room contains either a lady or a tiger; there are no empty rooms.)



\* *The Lady or the Tiger? And other Logic Puzzles*, by Raymond Smullyan. Random House, Inc. 1982