

# Math 1303 - Math in the Liberal Arts

Homework #1 - 2005.08.26

Due Date - 2005.09.02

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1. Show that the following equivalencies are true:

a)  $p \wedge q \Leftrightarrow \sim(\sim p \vee \sim q)$ .

b)  $p \rightarrow q \Leftrightarrow \sim p \vee q$ .

c)  $p \leftrightarrow q \Leftrightarrow (\sim p \vee q) \wedge (\sim q \vee p)$

2. Using the information in problem 1, write the biconditional ( $\leftrightarrow$ ) in terms of disjunction ( $\vee$ ) and negation ( $\sim$ ) only. Notice that this implies that the connectives  $\wedge$ ,  $\rightarrow$ , and  $\leftrightarrow$  can be expressed in terms of  $\vee$  and  $\sim$  only!

3. Let  $p$  and  $q$  be arbitrary statements,  $t$  be a tautology (a statement which is always true), and  $f$  be a self-contradiction (a statement which is always false). Determine if the following equivalencies are correct.

a)  $p \rightarrow t \Leftrightarrow t$

b)  $f \rightarrow q \Leftrightarrow f$

c)  $p \vee t \Leftrightarrow t$

d)  $p \wedge f \Leftrightarrow f$

4. Negate the following statements:

a) There are no extra credit questions.

b) Every student will do well in this class.

c) Some students will get a perfect score on this homework assignment.