

Quiz 2 - Math 374, Frank Thorne (thorne@math.sc.edu)

Monday, January 26, 2015

(1) Write negations for each of the following statements:

(a) If today is New Year's Eve, then tomorrow is January.

Answer: Today is New Year's Eve and tomorrow is not January.

(b) If n is prime, then n is odd or n is 2.

Answer: n is prime and n is even and n is not 2. As an intermediate step, you might write something like ' n is prime and NOT (n is odd or n is 2)' and then use DeMorgan's laws. (You might write the same thing instead in symbols.)

Alternative correct answer: n is prime and n is neither n nor 2.

Please see p. 42 of the book for further explanation of this kind of problem.

(2) Determine whether the two statement forms below are logically equivalent. Construct truth tables and include a sentence justifying your answer.

$$(p \wedge q) \vee r \quad p \wedge (q \vee r)$$

p	q	r	$p \wedge q$	$(p \wedge q) \vee r$
T	T	T	T	T
T	T	F	T	T
T	F	T	F	T
T	F	F	F	F
F	T	T	F	T
F	T	F	F	F
F	F	T	F	T
F	F	F	F	F

p	q	r	$q \vee r$	$p \wedge (q \vee r)$
T	T	T	T	T
T	T	F	T	T
T	F	T	T	T
T	F	F	F	F
F	T	T	T	F
F	T	F	T	F
F	F	T	T	F
F	F	F	F	F

The truth tables are not identical; in particular, there are two rows which are different. Therefore, the statements are not logically equivalent.