Assignments 1 part 2

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11. $(p \to (q \to r)) \leftrightarrow ((p \wedge q) \to r)$

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

13b. $\sim (p \to q) \equiv p \wedge \sim q$

p	q	$\sim p$	$\sim q$	$p \to q$	$\sim (p \to q)$	$p \wedge \sim q$
T	T	F	F	T	F	F
T	F	F	T	F	T	T
F	T	T	F	T	F	F
F	F	T	T	T	F	F

There isn't much to say except that the tables prove the logical equivalence between the two statements

15 $p \to (q \to r)$ and $(p \to q) \to r$

p	q	r	$q \to r$	$p \to (q \to r)$	$(p \to q)$	$(p \to q) \to r$
T	T	T	T	T	T	T
T	F	T	T	T	F	T
T	T	F	F	F	T	F
T	F	F	T	T	F	T
F	T	T	T	T	T	T
F	F	T	T	T	T	T
F	T	F	F	F	T	F
F	F	F	T	T	T	F

The two statements in question 15 is not logically equivalent.

20a. If P is a square, then P is a rectangle.
P is a square and P is not a rectangle

20b. If today is New Years Eve, then tomorrow is January
Today is New Years Eve and tomorrow is not January.

20c. If the decimal expansion of r is terminating, then r is rational
The decimal expansion of r is terminating and r is not rational

20d. If n is prime, then n is odd or n is 2.
n is prime and n is neither odd nor 2

20e. If x is non negative, then x is positive or x is 0
X is non negative and x is not positive or x is not 0.

20f. If Tom is Ann's Father, then Jim is her uncle and Sue is her aunt.
Tom is Ann's Father and Jim is not her uncle or Sue is not her aunt.

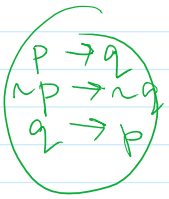
20g. If n is divisible by 6, then n is divisible by 2 and n is divisible by 3.
n is divisible by 6 and n is not divisible by 2 or n is not divisible by 3

43. Doing homework regularly is a necessary condition for Jim to pass the course.

43. Doing homework regularly is a necessary condition for Jim to pass the course.

A) If Jim does not do his homework regularly then Jim will not pass the course

B) If Jim passes the course then Jim did his homework regularly



45 A necessary condition for this computer program to be correct is that it is not produce error messages during translation

If the computer program does not produce an error message during translation, then the computer program is correct.