

Answer on Question #72465 – Math – Discrete Mathematics

6. Show that $\sim(p \rightarrow q)$ and $p \wedge \sim q$ are logically equivalent. (Hint: you can use a truth table to prove it or you apply De Morgan law to show the $\sim(p \rightarrow q)$ is $p \wedge \sim q$.)

$\sim(p \rightarrow q)$	$p \wedge \sim q$
0 1 1 1	1 0 0 1
1 1 0 0	1 1 1 0
0 0 1 1	0 0 0 1
0 0 1 0	0 0 1 0

So, both formulas have the same truth table, then they're logically equivalent.

7. Let p and q be the propositions.

p : I bought a lottery ticket this week.

q : I won the million-dollar jackpot on Friday.

a) Form a tautology using p . Express the tautology in English sentence.

$p \vee \sim p$: I bought a lottery ticket this week or I didn't buy a lottery ticket this week.

b) Form a tautology using q . Express the tautology in English sentence.

$q \vee \sim q$: I won the million-dollar jackpot on Friday or I didn't win the million-dollar jackpot on Friday.

c) Form a contradiction using p . Express the contradiction in English sentence.

$p \wedge \sim p$: I bought a lottery ticket this week and I didn't buy a lottery ticket this week.

d) Form a contradiction using q . Express the contradiction in English sentence.

$q \wedge \sim q$: I won the million-dollar jackpot on Friday and I didn't win the million-dollar jackpot on Friday.

8. If you have a tautology r and you negate r , what kind of sentence do you get?

b. A contradiction.