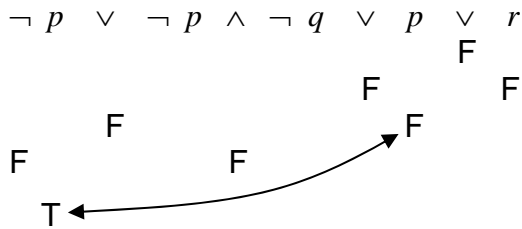


COMP 681 Formal Methods Spring 2008 Recitation 2—Solutions

Use the shorter truth table method to determine whether the following are tautologies.

1. $\neg p \vee \neg p \wedge \neg q \vee p \vee r$

Answer

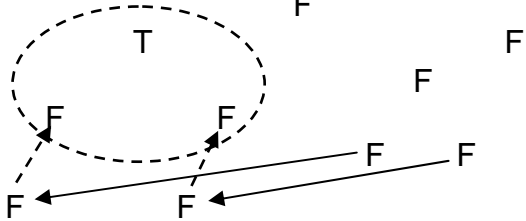


Assuming the formula is F forced an inconsistent truth assignment on p , so the formula is a tautology.

2. $p \wedge q \vee r \wedge s \Rightarrow (p \vee r) \wedge (q \vee r \vee s)$

Answer

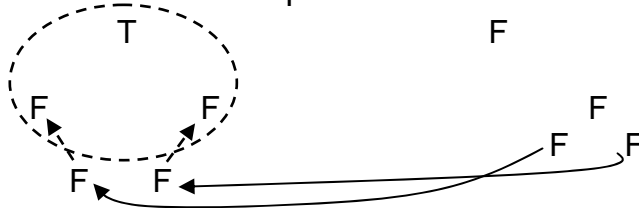
$p \wedge q \vee r \wedge s \Rightarrow (p \vee r) \wedge (q \vee r \vee s)$
 F



Choice: $p \vee r$ is F or $q \vee r \vee s$ is F
 Choose $p \vee r$ F

We're forced into a contradiction with this choice, so we try the next choice—next page.

$p \wedge q \vee r \wedge s \Rightarrow (p \vee r) \wedge (q \vee r \vee s)$
 F



Choice: $p \vee r$ is F or $q \vee r \vee s$ is F
 F Choose $q \vee r \vee s$ F
 F

Now both choices have resulted in a contradiction. So there is no assignment of truth values to the constituent primes of the formula that make it F, so it is a tautology.