

Determine which of the following arguments below are valid.

1. If I go downtown, then I go shopping. I went downtown. Therefore I went shopping.

$[(p \Rightarrow q) \wedge p] \Rightarrow q$. This is valid, in fact it is Modus Ponens.

2. If I go downtown or go to Little Rock, then I go shopping. I went shopping. Therefore if I don't go downtown, then I must have gone to Little Rock.

$[(p \vee q) \Rightarrow r] \wedge r \Rightarrow (\neg p \Rightarrow q)$ This is not valid, let's find a combination of the variables that make for true premises, but a false conclusion.

p : F

q : F

r : T

In this case, when all the variables are false, the whole implication evaluates to false, making this argument not valid.

3. Assume $p \Rightarrow q$ and $\neg q$. Therefore $\neg p$.

$[(p \Rightarrow q) \wedge \neg q] \Rightarrow \neg p$. This is valid, in fact it is Modus Tollens.

4. Assume $p \wedge \neg p$. Therefore q .

$[p \wedge \neg p] \Rightarrow q$. This is valid. You can see this by looking at the truth table: the premise is always false, so the implication is always true.

5. Assume $p \vee q$ and $\neg p$. Therefore $\neg q$.

$[(p \vee q) \wedge \neg p] \Rightarrow \neg q$. This is not valid. A combination of the variables to show this is:

p : F

q : T