

Activity: Show $p \wedge q \rightarrow p \vee r$ is a tautology

$$\begin{aligned}
 & P \wedge q \rightarrow p \vee r && \text{Given} \\
 & \equiv \neg(p \wedge q) \vee (p \vee r) && \text{I-D} \\
 & \equiv \neg(\neg p \vee \neg q) \vee (p \vee r) && \text{De Morgan} \\
 & \equiv \neg \neg p \vee \neg \neg q \vee p \vee r && \text{Associative} \\
 & \equiv \neg \neg p \vee p \vee \neg \neg q \vee r && \text{Commutative} \\
 & \equiv (\neg \neg p \vee p) \vee (\neg \neg q \vee r) && \text{Associative} \\
 & \equiv T \vee (\neg \neg q \vee r) && \text{Negation} \\
 & \equiv T && \text{Dominative}
 \end{aligned}$$

∴ Q.E.D. \blacksquare

Activity $\neg(p \vee q) \not\equiv \neg p \vee \neg q$

P	Q	$\neg p$	$\neg q$	$p \vee q$	$\neg p \vee \neg q$	$\neg(p \vee q)$	$\neg(p \vee q) \leftrightarrow \neg p \vee \neg q$
T	T	F	F	T	F	F	T
T	F	F	T	T	T	F	F
F	T	T	F	T	T	F	F
F	F	T	T	F	T	T	T

Activity:

If it is sunny out, I walk to work

converse: If I walk to work, then it is sunny out

inverse: If it is not sunny out, then I will not walk to work

contrapos: I will not walk to work if it is not sunny out

I stay home whenever it is stormy

Conv: If it is stormy then I stay home

Activity

1. In - T
EXC - T

2. H - T
HE - T

3. E - F

Activity

U: "you understand the material"

S: "You study the theory"

W: "you work on exercises"

(S \wedge W) $\wedge \neg$ U



"You study the theory and work on exercises,
but you do not understand the material"

U: the applicant is 18

S: The applicant is experienced

W: the applicant could be hired

If the applicant is 18 or experienced then

the applicant could be hired

(U \vee S) \rightarrow W

Activity

$$P: T \quad Q: T \quad r: F$$
$$P \vee (\neg Q \leftrightarrow r)$$

$$\begin{array}{c} P \\ + \\ \end{array} \left| \begin{array}{c} T \vee (F \leftrightarrow F) \\ T \vee T \\ + \end{array} \right.$$

Activity

$$P \Leftrightarrow Q \text{ and } (P \Rightarrow Q) \wedge (Q \Rightarrow P)$$
$$T \Leftrightarrow T \quad (T \Rightarrow T) \wedge (T \Rightarrow T)$$
$$T \wedge T$$

$$T \equiv T$$

Activity

1. "It rains exactly when I plan a picnic"
· It rains if and only if I plan a picnic"
2. "I visit the library whenever I have a paper to write
· I visit the library if and only if I have a paper

Activity

1. T

2. T

3. F

4. G

T

5. T

6. T

7. F