

1. Suppose that the following statement is true: "If the pressure is $p < 1$ atmosphere and temperature is $t > 150^\circ C$ then the water boils." Write the following using \wedge, \vee , and using the statements " $p < 1$ " and " $t > 150$ ". (Simplify so there is no \sim . For \sim water boils, use "water doesn't boil.")

Done!

(a) The statement above (original implication) using "implies".

$((p < 1) \wedge (t > 150))$ implies the water boils.

10

(b) The contrapositive of the statement, using "If" and "then".

(c) The negation of the statement.

(d) Write the original implication using the words "is necessary when."

(e) Write the contrapositive using the word "necessary."

(f) Write the inverse using the word "sufficient."

$((p \geq 1) \vee (t \leq 150))$ is sufficient that water doesn't boil.

Done!

2. Check the validity of the following argument. Write valid or invalid in the blank.

$$\begin{array}{l} (P \wedge \sim Q) \Rightarrow R \\ \sim R \\ \hline \therefore P \Rightarrow Q \end{array} \quad \text{is } \underline{\hspace{2cm}}$$

P	Q	R	
T	T	T	
T	T	F	
T	F	T	
F	T	T	
T	F	F	
F	T	F	
F	F	T	
F	F	F	