<table>
<thead>
<tr>
<th>P</th>
<th>q</th>
<th>~P</th>
<th>~q</th>
<th>p~q</th>
<th><del>p</del>q</th>
<th>(p∧¬q)∨(¬p∧q)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T</td>
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</table>

Statement forms are logically equivalent if they have the same truth table.

\[(p∧¬q)∧(¬p∧q) \equiv (p∧q)∨(¬p∧q) \equiv p⊕q\]

Statements are logically equivalent if their statement forms are logically equivalent.
\( p \)  
\( x \) is negative or \( y \) is negative but not both are negative
\( (p \lor q) \land \neg (p \land q) \)

\( x < 0 \)
\( \neg (x < 0) \Rightarrow x \geq 0 \)

either \( x \) is negative and \( y \) is not negative, or \( x \) is not negative and \( y \) is negative
\( \neg (p \land q) \)

Josh is short and poor.
\( p \) = Josh is short
\( q \) = Josh is poor

\( \neg p \land \neg q \)
De Morgan’s Laws \[ \neg(p \lor q) \equiv \neg p \land \neg q \]
\[ \neg(p \land q) \equiv \neg p \lor \neg q \]

John is tall or John is noisy.
\[ p \lor q \]

negation:
John is not tall and John is not noisy.
\[ \neg p \land \neg q \]

commutative:
\[ p \land q \equiv q \land p \]
\[ p \lor q \equiv q \lor p \]

5 + 6 = 6 + 5

5 + 7 = 7 + 5

\[ (p \land q) \lor r \equiv p \land (q \lor r) \equiv p \land q \land r \]
\[ (p \lor q) \land r \equiv p \lor (q \land r) \equiv p \lor q \lor r \]

\[ p \lor (q \land r) \equiv (p \lor q) \land (p \lor r) \]

\[ p \land (q \lor r) \equiv (p \land q) \lor (p \land r) \]

\[ a \lor (b + c) = a + b + c \]
\[ a + (b + c) \neq (a + b) + c \]
Identity: \( p \land t = p \)  \\
\( p \lor c = p \) \hspace{2cm} \text{always true: tautology} \\
\( p \lor \neg p = t \) \hspace{2cm} \text{always false: contradiction} \\
\neg \text{negation: } \neg(p \land \neg p) = c \\\n\neg(p \lor \neg p) = t \\
\text{double neg: } \neg \neg p = p \\
\text{Idempotent: } p \lor p = p \land p = p \\
\text{universal bound: } p \lor t = t \land p \lor c = c \\
\neg (\neg p \land q) \land (p \lor q) \\
\text{DeMorgan } \equiv (\neg(p \lor q)) \land (p \lor q) \\
\text{double neg } \equiv (p \lor \neg q) \land (p \lor q) \\
\text{It is not the case that it is both not hot and raining, and it is hot or raining.} \\
\text{distributive (backwards) } \equiv p \lor (\neg q \land q) \\
\text{negation } \equiv p \lor c \\
\equiv p \\
\text{p = it is hot} \\
\neg q = \text{it is raining}
If you all ace the quiz next week then I'll buy you donuts.

<table>
<thead>
<tr>
<th>( P )</th>
<th>( \neg P )</th>
<th>( P \rightarrow \neg P )</th>
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<tbody>
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<td>( T \ { \text{vacuously true} } )</td>
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