Quiz 1

1. Construct the truth table for the proposition \((p \rightarrow q) \land (\neg p \rightarrow q)\).

<table>
<thead>
<tr>
<th>p</th>
<th>q</th>
<th>p \rightarrow q</th>
<th>\neg p</th>
<th>\neg p \rightarrow q</th>
<th>(p \rightarrow q) \land (\neg p \rightarrow q)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T</td>
<td>T</td>
<td>T</td>
<td>F</td>
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<td>F</td>
<td>F</td>
<td>T</td>
<td>T</td>
<td>T</td>
<td>T</td>
</tr>
</tbody>
</table>

2. State the converse and the contrapositive of the conditional statement: “I come to class if there is going to be a quiz.”

Original: If there is going to be a quiz, then I come to class.

Converse: If I come to class, then there is going to be a quiz.

Contrapositive: If I don’t come to class, then there is not going to be a quiz.

3. 1) Express the statement “Someone in this class knows Russian” as a logical statement using quantifiers, 2) Form the negation of the logical statement, and 3) Express the negation as an English sentence.

Solution 1

\( P(x) = \text{"Student } x \text{ knows Russian.}\)

\( X = \text{set of students in the class.}\)

\( \exists x \in X \ (P(x)) \)

Negation: \( \forall x (\neg (x \in X) \lor \neg P(x)) \)

"Every student in this class does not know Russian."

Solution 2

\( \exists x \ ( (x \in X) \land P(x)) \)

Negation:

\( \forall x (\neg (x \in X) \lor \neg P(x)) \equiv \forall x (x \notin X) \lor \neg P(x) \)

"a student is not in this class or the person does not know Russian."

Negation: 

\( \exists x \in X \ (P(x)) \equiv \forall x (x \in X) \land P(x) \)

"Everyone in the class knows Russian."