

Discrete Math Quiz 6

Name: _____

You have 10 minutes to complete this quiz. You may not use any unauthorized sources and you may not communicate with others about the exam. If you have a question raise your hand and remain seated. In order to receive full credit your answer must be **complete**, **legible** and **correct**. Show your work, and give adequate explanations.

1. State Cantor's Theorem.

Cantor's Theorem. For any set A , $|A| < |\mathcal{P}(A)|$.

2. Is $((p \rightarrow q) \leftrightarrow (q \rightarrow p))$ a tautology? (Explain.)

No.

If $((p \rightarrow q) \leftrightarrow (q \rightarrow p))$ were a tautology, then we would have $(p \rightarrow q) \equiv (q \rightarrow p)$. However, the only truth assignment that makes $p \rightarrow q$ false is $p = 1, q = 0$, and this assignment does NOT make $q \rightarrow p$ false, so $p \rightarrow q$ is NOT equivalent to $q \rightarrow p$.

You can answer this question with a truth table, too.

p	q	$p \rightarrow q$	$q \rightarrow p$	$(p \rightarrow q) \leftrightarrow (q \rightarrow p)$
0	0	1	1	1
0	1	1	0	0
1	0	0	1	0
1	1	1	1	1

The final column contains some 0's, so the proposition is not a tautology.