

SE-410 Homework 5

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1. Draw a truth table to show that $\neg(P \rightarrow Q) \equiv P \wedge \neg Q$

P	Q	$\neg(P \rightarrow Q)$	$P \wedge \neg Q$
F	F	F	F
F	T	F	F
T	F	T	T
T	T	F	F

4. Explain the difference between the universal and the existential quantifiers.

Universal are statements that don't make an existence claim over an item, such as,
"For all x , $P(x)$ holds"

Existential are statements that are not universally true, such as,
"if anything is an x , then for all x , $P(x)$ holds"

5. Express the following statements in the predicated calculus

a. All natural numbers are greater than 10

$$(\forall x \in \mathbb{N}) (x > 10)$$

b. There is at least on natural number between 5 and 10

$$(\exists x \in \mathbb{N}) (5 < x < 10)$$

c. There is a prime number between 100 and 200

$$(\exists x \in \mathbb{U}) (100 < x \text{ is a prime number} < 200)$$